Table of Contents

UET

The University of Engineering and Technology (UET) was founded in 2004 as a member university of Vietnam National University, Hanoi (VNU).

The last only five years have seen immense progresses in the development of our university in various aspects of its activities thanks to the great efforts put in by the government with strong financial supports, by the VNU with steering leadership and administration, by the national and international educational institutions and corporations in fruitful collaborations and advices, and by all the staff and students of the UET with determination, hard work and patience.

Today, our university has built up a solid foundation for a sustainable and dynamic development in coming years. This solid foundation consists of a completed system of well-designed programs at both undergraduate and graduate levels, renovated teaching and learning facilities, a just limited but strong and advanced research infrastructure with state-of-the-art and completed equipment systems, a sustainable and fruitful collaboration with leading research and educational institutions in the country, and a bright, young, well-educated and welltrained faculty who are eager to take on advanced research and studies. All these have made our university a prestigious institution and firmly established its education and research capabilities. This is proved by the facts that only in the last four years our university has established close and solid ties and cooperation with prestigious foreign universities, just to name a few, the University Paris-Sud 11 (France), Japan Advanced Institute of Science and Technology, the National University of Singapore, Nanyang Technological University (Singapore), University of New South Wales and with famous international industrial and technological corporations such as Samsung, Toshiba, NEC, Mitani, Human Resocia, IBM, and other well-known institutions in the region and around the world. This is also proved in a convincing way by the facts that only in the last two years, our university has been granted several significant research projects from various national research programs. Our university has become an attractive destination for talented students at all training levels. We are proud that our university is the only Vietnamese higher-education institution that has one among the 100 best student's teams all over the world participating the World Final of the ACM International Collegiate Programming Contest (rank #29 in 2015). We are also proud that in this year, our faculty has won an award in the National Contest in Information Technology entitled "Vietnamese Talent Award" and three awards in the VNU Science & Technology Award for the period of 2011-2015. In the coming period, we shall put our great efforts to solidify our strength and prestige. We shall widen our training scope while paying significant attention to further improvement on the education quality. We shall strongly enhance our concentrated research activity by exploring efficiently and effectively our well established foundation for a further dynamic development and, thus, contributing our crucial part to the socio-economic development of our nation and fulfilling our great missions clearly assigned by the government in the decision on the establishment of our university. To do that, innovative thinking and acting by all faculty, administrative staff and students are of deciding role and of crucial importance.

ORGANIZATION

SCIENTIFIC & ACADEMIC COUNCIL — RECTOR BOARD — INTERNATIONAL ADVISORY BOARD

Academic Faculties
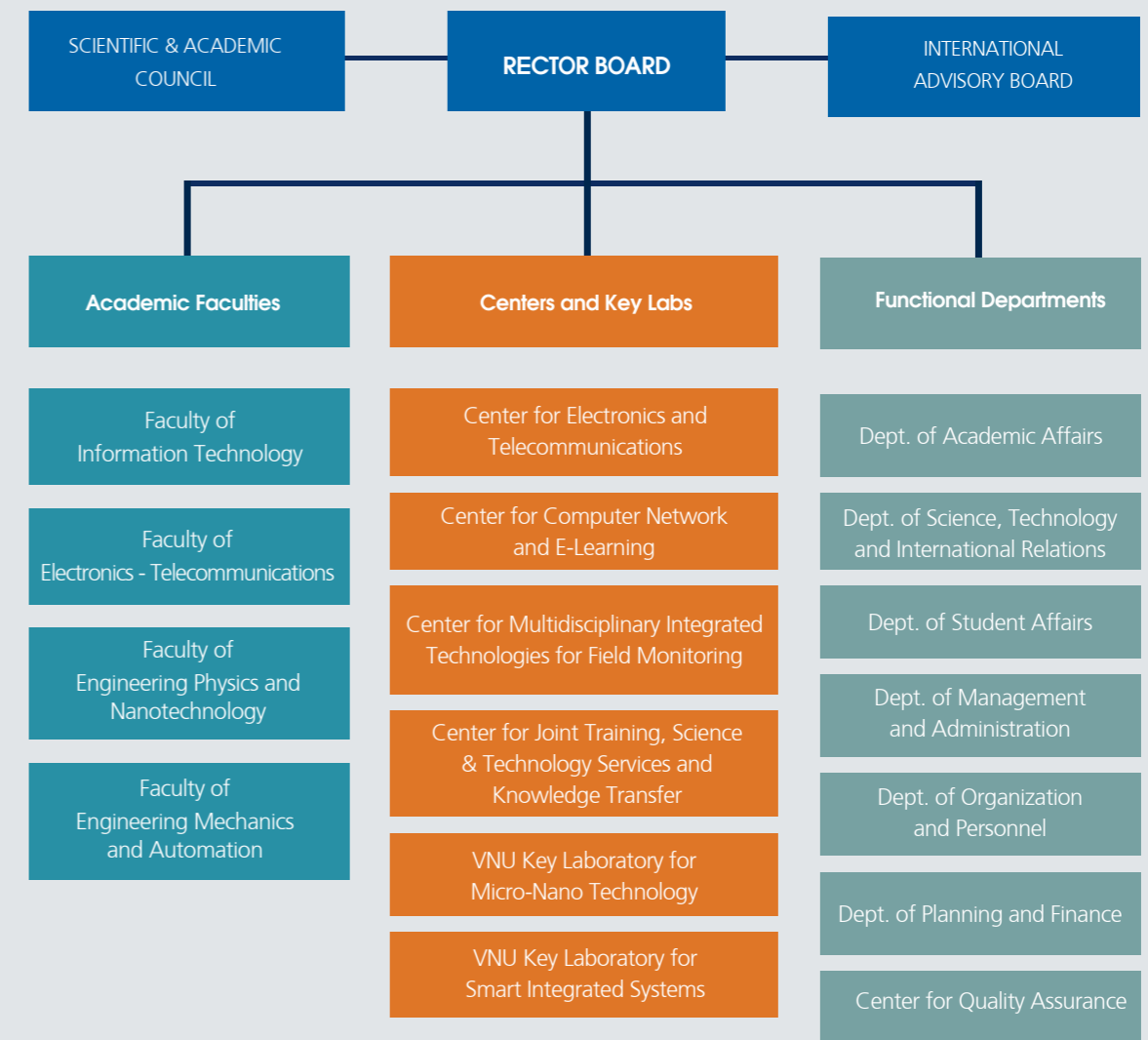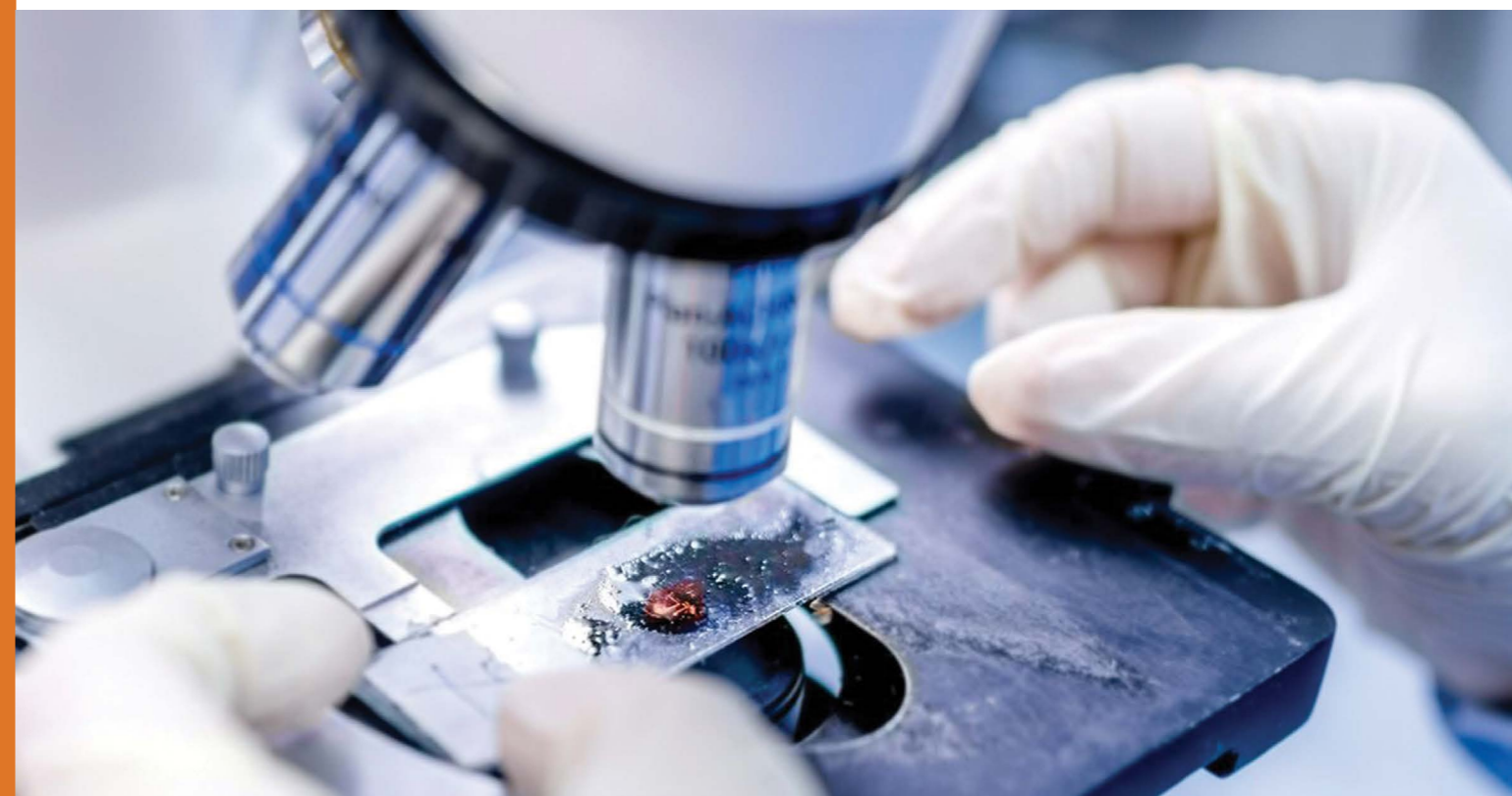- Faculty of Information Technology
- Faculty of Electronics - Telecommunications
- Faculty of Engineering Physics and Nanotechnology
- Faculty of Engineering Mechanics and Automation

Centers and Key Labs
- Center for Electronics and Telecommunications
- Center for Computer Network and E-Learning
- Center for Multidisciplinary Integrated Technologies for Field Monitoring
- Center for Joint Training, Science & Technology Services and Knowledge Transfer
- VNU Key Laboratory for Micro-Nano Technology
- VNU Key Laboratory for Smart Integrated Systems

Functional Departments
- Dept. of Academic Affairs
- Dept. of Science, Technology and International Relations
- Dept. of Student Affairs
- Dept. of Management and Administration
- Dept. of Organization and Personnel
- Dept. of Planning and Finance
- Center for Quality Assurance

UNIVERSITY'S RESEARCH CENTERS/LABORATORIES

RESEARCH CENTERS & KEY LABORATORIES

- Center for Multidisciplinary Integrated Technologies for Field Monitoring
- Center for Electronics and Telecommunications Research
- VNU Key Laboratory for Smart Integrated Systems (SISLAB)
- VNU Key Laboratory for Micro-Nano Technology
- Laboratory for Engineering Mechanics and Automations
- Research Laboratories and Departments
- Department of Computer Science
- Department of Computer Networks and Communications
- Department of Software Engineering
- Department of Information Systems
- Department of Computational Science and Engineering
- Natural Languages Laboratory
- Bio-informatics Laboratory
- Information Security Laboratory
- Embedded Systems Laboratory
- UET-Toshiba Cooperation Laboratory for Software Engineering
- Knowledge Engineering Laboratory
- Human-Machine Interaction Laboratory
- Department of Electronics and Computer Engineering
- Department of Micro Electro-Mechanical Systems and Microsystems

- Department of Wireless Communications
- Department of Networks and Communications Systems
- Signals and Systems Laboratory
- Automation and Robotics Laboratory
- Department of Marine and Environment Engineering
- Electromechatronic and Industrial Fluids-Mechanics Laboratory
- Distributed Controls Laboratory
- Advanced Materials and Structures Laboratory
- Department of Nano-Magnetic Materials and Devices
- Department of Nano-Biotechnologies
- Department of Nano-Semiconductor Materials and Devices
- Hybrid Materials and Devices Laboratory
- Electro-Optical Laboratory
- Energy Engineering Laboratory

PRACTICAL LABORATORIES

- Center for Computer Network and E-Learning
- Computer Labs
- Fundamental Electronics and Communications Practical Laboratory
- Advanced Electronics and Communications Laboratory

FACULTY OF INFORMATION TECHNOLOGY (FIT)

ADDRESS: ROOM 301, BUILDING E3, 144 XUAN THUY STREET, CAU GIAY DISTRICT, HANOI, VIETNAM

TELEPHONE: 024.3754 9359 OR 024.3754 7064

FAX: 04.3754 7460

EMAIL: FIT@VNU.EDU.VN

WEBSITE: HTTP://FIT.UET.VNU.EDU.VN

FACEBOOK: WWW.FACEBOOK.COM/UET.FIT

Founded in 1995, The Faculty of Information Technology, University of Engineering and Technology, Vietnam National University, Hanoi has affirmed its national leading position as a IT faculty, contributing positively and significantly to the task of enhancing international competitiveness in scientific research and training IT human resources for Vietnam education system.

MISSION & VISION

New challenges from the mission of "pioneering high-level international integration" require The Faculty of Information Technology, UET, VNU to be effective in reaching higher levels in the region and in the world.

The highly qualified and active scientists of The Faculty of Information Technology focus on advanced science research, modern technologies and smart application development that have a great influence on society.

Establishing and sustaining a culture of "creative and collaborative value creation" will be a fundamental foundation and great motivation for The Faculty of Information Technology to quickly reach advanced levels in the region and in the world.

- Dean of Faculty

- Science and Training Board

- Faculty Office

- Departments:

  o   Department of Information Systems

  o   Department of Software Engineering

ORGANIZATIONAL STRUCTURE

  o   Department of Computer Science

  o   Department of Computational Science and Engineering

  o   Department of Computer Networks and Communications

- Laboratories

  o   Information Security Laboratory

  o   Embedded Systems Laboratory

  o   Data Science and Knowledge Engineering Laboratory

  o   Human Machine Interaction Laboratory

- Center for Applied Research and Business Cooperation

RESEARCH DIRECTIONS

- Machine learning and deep learning

- Data mining and business intelligence

- Natural language processing

- Artificial intelligence

- Optimization and operations research

- Image and video processing

- Computer graphics

- Bioinformatics and computational biology

- Databases and information systems

- Formal methods in software development

- Software verification and testing

- Service science

- Information security

- Digital signature

- Next-generation networks

- Wireless and mobile networks

- Internet of things

OUTSTANDING ACHIEVEMENTS IN 2016

• Number of journal and international conference articles: 76

• Number of ISI / Scopus articles: 07

• Number of doctoral students successfully defended their doctoral dissertation: 03

• Scientific conferences/events:

  o The 8th International Conference on Knowledge and Systems Engineering (KSE-2016).

  o Data Mining Summer School (DMSS-2016)

• Science and Technology Awards:

  o For the first time, the first, second and third prizes of the Vietnam Talent Award in the IT product category was awarded to teams of lecturers, part-time lecturers, and alumni of Faculty of Information Technology.

  o A faculty received the Five Year Award in Science and Technology of VNU Hanoi.

  o Two out of ten Honda Y-E-S awards nationwide for young engineers and scientists belong to two young researchers of the faculty.

  o Research project of Faculty of Information Technology has won the second prize in scientific research of Ministry of Education and Training.

OUTSTANDING TECHNOLOGICAL PRODUCTS IN 2006

Sách mềm – A Textbook Supporting Software Service

Sách Mềm is a joint software project from Vietnam Education Publishing House and Vietnam National University, Hanoi (VNU) that aims to assist education and training activities by utilizing the recent advances in information and communication technology. With Sách Mềm, students can easily study and pratice the content in their textbooks in a more interesting and interactive way. Sách Mềm service is currently being deployed and used for the English training of The Ministry of Education and Training from grade 1 to grade 12. In addition to normal English textbooks, Sách Mềm provides students with interactive contents like images, video clips, games that help both teachers and students to teach and learn English more efficiently.

https://sachmem.vn/
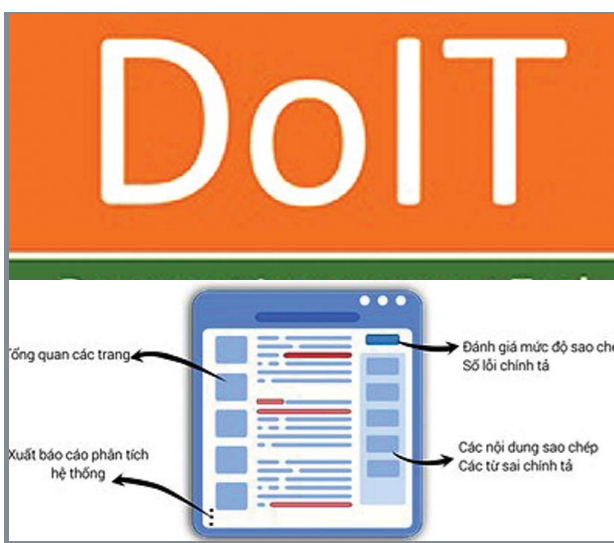
DoIT – A Document Quality Improving Software System

DoIT (Document Improvement Tool) is a software system that help to improve Vietnamese documents in a number of ways. The key features of DoIT are spell-checking and duplicate content detection. While the former is to help improve the language, the latter is to help identify potential plagiarism in school/univeristy and academic environment.

http://doit.uet.vnu.edu.vn

VAV – A Virtual Assistant for Vietnamese on Smartphone

VAV is a smart virtual assistant on mobile phones that allows users to set alarm, add and manage calendar, change system settings, call someone, send sms, open an application, surf the web, find direction on the map, find ATM machine, gas station, ask for weather information, gold price, exchange rate or play a song that you love using Vietnamese natural/human spoken commands. Being designed and developed with advanced techniques in artificial intelligence, machine learning, and natural language processing, VAV can analyze and understand user intents no matter how the user expresses their requests (in natural language). In addition, VAV can integrate and interact with many different (online) applications or services like calendar, maps, online news, financial news, weather news, Wikipedia etc. in order to serve its users with useful information. VAV is a smart and virtual friend that can improve the user experience on smartphone significantly. VAV is currently available on Android only.

https://play.google.com/store/apps/details?id=uet.mdnteam.vav&hl=vi

SELECTED PUBLICATIONS

1) Phuc Hoang and Tze Min Teo and Thien Xuan Ho and Le Sy Vinh (2016) Mechanisms of sex determination and transmission ratio distortion in Aedes aegypti. **Parasites & Vectors, 9 (49). ISSN 1756-3305**

Background: More effective mosquito control strategies are urgently required due to the increasing prevalence of insecticide resistance. The sterile insect technique (SIT) and the release of insects carrying a dominant lethal allele (RIDL) are two proposed methods for environmentally-friendly, species-targeted population control. These methods may be more suitable for developing countries if producers reduce the cost of rearing insects. The cost of control programs could be reduced by producing all-male mosquito populations to circumvent the isolation of females before release without reducing male mating competitiveness caused by transgenes. Results: An RNAi construct targeting the RNA recognition motif of the Aedes aegypti transformer-2 (tra-2) gene does not trigger female-to-male sex conversion as commonly observed among dipterous insects. Instead, homozygous insects show greater mortality among m-chromosome-bearing sperm and mm zygotes, yielding up to 100 % males in the subsequent generations. The performance of transgenic males was not significantly different to wild-type males in narrow-cage competitive mating experiments. Conclusion: Our data provide preliminary evidence that the knockdown of Ae. aegypti tra-2 gene expression causes segregation distortion acting at the level of gametic function, which is reinforced by sex-specific zygotic lethality. This finding could promote the development of new synthetic sex distorter systems for the production of genetic sexing mosquito strains. Keywords: Aedes aegypti, Sex determination, Transformer-2, Meiotic drive, Spermatogenesis, Culicinae

2) Hoang Quynh Le and Mai Vu Tran and Thanh Hai Dang and Quang Thuy Ha and Nigel Collier (2016) Sieve-based coreference resolution enhances semi-supervised learning model for chemical-induced disease relation extraction. **Database, 2016 . baw102. ISSN 1758-0463**

The BioCreative V chemical-disease relation (CDR) track was proposed to accelerate progress of text mining in facilitating integrative understanding ofchemical substances, diseases and their relations. In this article, we describe an extension of the UET-CAM system for mining chemical-disease relations from text data, of which performance was ranked 4th among 18 participating corresponding systems by the BioCreative CDR track committee. In Disease Named Entity Recognition and Normalization (DNER) phase, our system employs joint learning with a perceptron-based named entity recognizer (NER) and a back-off model with Semantic Supervised Indexing (SSI) and Skip-gram for named entity normalization (NEN). Crucially, for solving the chemical-induced disease (CID) sub-task, we propose a pipeline that includes a coreference resolution module and a SVM intra-sentence relations extraction model. The former module utilizes a multi-pass sieve to identify inter-sentence references for entities while the latter is trained on both the CDR data and our silverCID corpus with a rich feature set. SilverCID is the silver standard corpus contains more than 50 thousands sentences which are automatically built based on the CTD database in order to provide evidence for the CID relation extraction. We critically evaluated our method on the CDR test set in order to clarify the contribution of our system components. Results show an F1 of 82.44 for the DNER task, and a best performance of F1 58.90 on the CID task. The comparisons also demonstrate the significant contribution of the multi-pass sieve coreference

image or stereoscopic color image pair, which are not always available in many practical applications. In this paper, we propose a new depth image quality metric which demands only a single pair of color and depth images. Our observations reveal that the depth distortion is strongly related to the local image characteristics, which in turn leads us to formulate a new distortion assessment method for the edge and non-edge pixels in the depth image. The local depth distortion is adaptively weighted using the Gabor filtered color image and added up to the global depth image quality metric. The experimental results show that the proposed metric closely approximates the depth quality metrics that use the ground truth depth or stereo color image pair.

5) Thanh Ha Le and Tung Long Vuong and Trieu Duong Dinh and Seung-Won Jung (2016) Reduced Reference Quality Metric for Synthesized Virtual Views in 3DTV. ETRI Journal, 38 (6). pp. 1114-1123. ISSN 1225-6463

Multi-view video plus depth (MVD) has been widely used owing to its effectiveness in three-dimensional data representation. Using MVD, color videos with only a limited number of real viewpoints are compressed and transmitted along with captured or estimated depth videos. Because the synthesized views are generated from decoded real views, their original reference views do not exist at either the transmitter or receiver. Therefore, it is challenging to define an efficient metric to evaluate the quality of synthesized images. We propose a novel metric - the reduced-reference quality metric. First, the effects of depth distortion on the quality of synthesized images are analyzed. We then employ the high correlation between the local depth distortions and local color characteristics of the decoded depth and color images, respectively, to achieve an efficient depth quality metric for each real view. Finally, the objective quality metric of the synthesized views is obtained by combining all the depth quality metrics obtained from the decoded real views. The experimental results show that the proposed quality metric correlates very well with full reference image and video quality metrics.

6) Quoc Dat Nguyen and Quoc Dai Nguyen and Duc Dang Pham and Bao Son Pham (2016) A robust transformation-based learning approach using ripple down rules for part-of-speech tagging. AI Communications, 29 (3). pp. 409-422.

In this paper, we propose a new approach to construct a system of transformation rules for the part-of-speech (POS) tagging task. Our approach is based on an incremental knowledge acquisition method where rules are stored in an exception structure and new rules are only added to correct the errors of existing rules; thus allowing systematic control of the interaction between the rules. Experimental results on 13 languages show that our approach is fast in terms of training time and tagging speed. Furthermore, our approach obtains very competitive accuracy in comparision to state-of-the-art POS and morphological taggers.

7) Thao Nguyen and Sy Vinh Le and Hai Ho and Si Quang Le (2016) Building ancestral recombination graphs for whole genomes. IEEE/ACM Transactions on Computational Biology and Bioinformatics . ISSN 1545-5963 (In Press)

The Ancestral Recombination Graph (ARG) plays an important role in human population genetics. Nevertheless, most current ARG inference algorithms are only applicable to small data sets due to their computational burden. Margarita by Minichiello and Durbin [1] can handle larger data sets; however, it is still not feasible at genome scale. We hereby propose a heuristic algorithm, called ARG4WG, to construct plausible ARGs from thousands of whole chromosome samples, in which the so-called longest shared end, i.e. the longest match between left or right ends of sequences, is used for recombination in the building process. This strategy allows ARG4WG to significantly reduce the computational cost, by working hundreds to thousands times faster than Margarita. ARG4WG leads to ARGs with fewer numbers of recombination events on real data sets. Margarita is slightly better than ARG4WG in reconstructing tree topology on simulated data. The ARGs resulted from our algorithm also performed reasonably well in an association study with 5560 haplotypes across a whole Chromosome 11 of the Gambia dataset. These results indicate that ARG4WG is a good candidate for genome-wide association study from large data sets.

---

resolution method and the silverCID corpus.

3) Hong Anh Le and Nakajima Shin and Ninh Thuan Truong (2016) Formal analysis of imprecise system requirements with Event B. SpringerPlus, 5 (1000)

Formal analysis of functional properties of system requirements needs precise descriptions. However, the stakeholders sometimes describe the system with ambiguous, vague or fuzzy terms, hence formal frameworks for modeling and verifying such requirements are desirable. The Fuzzy If - Then rules have been used for imprecise requirements representation, but verifying their functional properties still needs new methods. In this paper, we propose a refinement-based modeling approach

4) Thanh Ha Le and Seung Won Jung and Chee Sun Won (2016) A new depth image quality metric using a pair of color and depth images. Multimedia Tools and Applications . ISSN 1380-7501

Typical depth quality metrics require the ground truth depth

for specification and verification of such requirements. First, we introduce a representation of imprecise requirements in the set theory. Then we make use of Event-B refinement providing a set of translation rules from Fuzzy If - Then rules to Event-B notations. After that, we show how to verify both safety and eventuality properties with RODIN/EventB. Finally, we illustrate the proposed method on the example of Crane Controller.

OTHER PUBLICATIONS

1) Duc Hanh Dang and Martin Gogolla (2016) *An OCL-based Framework for Model Transformations*. VNU Journal of Computer Science and Communication Engineering, 32 (1). pp. 42-57. ISSN 0866-8612

2) Duc Hanh Dang and Anh Hoang Truong and Van Hung Dang (2016) *On Model Finding with Constraint Patterns*. In: Proc. 5th Int. Conf. on New Trends in Software Methodologies, Tools and Technique (SoMeT).

3) Thi Huong Dao and Hong Anh Le and Ninh Thuan Truong (2016) *An approach to analyzing execution preservation in Java program refactoring*. In: 5th EAI International Conference on Context-Aware Systems and Applications, 24-25 November 2016, Vietnam.

4) Thi Ngoc Dinh and Dinh Hieu Vo and Viet Ha Nguyen (2016) *A Technique for Generating Test Data using Genetic Algorithm*.In: The 2016 International Conference on Advanced Computing and Applications, 23-25 November 2016, Vietnam.

5) Phuong Hanh Du and Hai Dang Pham and Ngoc Hoa Nguyen (2016) *Optimizing the Shortest Path Query on Large-Scale Dynamic Directed Graph*. In: The 3rd IEEE/ACM International Conference on Big Data Computing, Applications and Technologies, 12/2016.

6) Anh Duc Duong and Hanh Tan and Son Bao Pham (2016) *Customer gender prediction based on E-commerce data*. In: The 8th International Conference on Knowledge and Systems Engineering (KSE), 6-8 October 2016, Hanoi, Vietnam.

7) Tran Duc Duong and Bao Son Pham and Hanh Tan (2016) *Using Content-Based Features for Author Profiling of Vietnamese Forum Posts*. In: Recent Developments in Intelligent Information and Database Systems. Springer International Publishing, pp. 287-296.

8) Viet Huy Duong and Dinh Viet Nguyen (2016) *Target tracking solution for multi-sensor data fusion in wireless sensor networks*. VNU Journal of Computer Science and Communication Engineering, 32 (2). pp. 63-71. ISSN 0866-8612

9) Quang Thuy Ha and Hong Nhung Bui and Tri Thanh Nguyen (2016) *A trace clustering solution based on using the distance graph model*. In: The 8th International Conference on Computational Collective Intelligence (ICCCI), 28-30

September 2016, Halkidiki, Greece. (In Press)

10) Van Sang Ha and Ha Nam Nguyen (2016) *C-KPCA: Custom Kernel PCA for Cancer Classification*. In: Machine Learning and Data Mining in Pattern Recognition. Springer International Publishing, pp. 459-467. ISBN 978-3-319-41919-0

11) Van Sang Ha and Ha Nam Nguyen (2016) *FRFE: Fast Recursive Feature Elimination for Credit Scoring*. In: International Conference on Nature of Computation and Communication, 2016.

12) Van Sang Ha and Ha Nam Nguyen and Duc Nhan Nguyen (2016) *A Novel Credit Scoring Prediction Model based on Feature Selection Approach and Parallel Random Forest*. Indian Journal of Science and Technology, 9 (20).

13) Thi Diep Hoang and Le Sy Vinh and Tomas Flouri and Alexandros Stamatakis and Arndt von Haeseler and Bui Quang Minh(2016) *A new phylogenetic tree sampling method for maximum parsimony bootstrapping and proof-of-concept implementation*. In: 2016 Eighth International Conference on Knowledge and Systems Engineering (KSE).

14) Van Xiem Hoang and Duong Trieu Dinh and Thanh Ha Le (2016) *Spatial - Temporal Feature Extraction based Adaptive Search Range for Effective Frame Rate Up - Conversion*. In: the 2016 International Conference on Advanced Technologies for Communications (ATC), 12-14 October 2016, Hanoi, Vietnam.

15) Van Xiem Hoang and Trieu Duong Dinh and Thanh Ha Le (2016) *Spatial-Temporal Feature Extraction based Adaptive Search Range for Effective Frame Rate-Up Conversion*. In: the 2016 International Conference Advanced Technologies for Communications (ATC), 12-14 October 2016, Hanoi, Vietnam.

16) Chi Luan Le and Hoang Viet Tran and Ngoc Hung Pham (2016) *A Framework for Modeling and Modular Verifying of Component-Based System Designs*. VNU Journal of Computer Science and Communication Engineering, 32 (2). pp. 31-42. ISSN 0866-8612

17) Dinh Minh Le and Tung Long Vuong and Van Xiem Hoang and Trieu Duong Dinh and Thanh Ha Le (2016) *Improving 3D-TV View Synthesis Using Motion Compensated Temporal Interpolation*. In: the 2016 International Conference Advanced Technologies for Communications (ATC), 12-14 October 2016, Hanoi, Vietnam.

18) Hong Anh Le and Ninh Thuan Truong (2016) *A New Method to Analyze Graphical User Interfaces of Android Applications*. In: 5th EAI International Conference on Context-Aware Systems and Applications, November 24-25, 2016, Viet Nam.

19) Hong Hai Le and Ngoc Hoa Nguyen (2016) *Nâng cao thuật toán đối sánh mã trụ MCC*. In: The 7th International Symposium on Information and Communication Technology (SoICT), 8-9 December 2016, Ho Chi Minh city, Vietnam.

20) Hong Hai Le and Ngoc Hoa Nguyen and Tri Thanh Nguyen (2016) *Exploiting GPU for Large Scale Fingerprint Identification*. In: 8th Asian Conference on Intelligent Information and Database Systems (ACIIDS), 14-16 March 2016, Danang, Vietnam.

21) Hong Hai Le and Ngoc Hoa Nguyen and Tri Thanh Nguyen (2016) *A complete fingerprint matching algorithm on GPU for a large scale identification system*. In: the 7th International Conference on Information Science and Application (ICISA), 15-18 February 2016, Ho Chi Minh city, Vietnam.

22) Minh Duc Le and Duc Hanh Dang and Viet Ha Nguyen (2016) *Domain-Driven Design Patterns: A Metadata-Based Approach*. In: 12th International Conference on Computing and Communication Technologies (RIVF), 7-9 November 2016, Hanoi, Vietnam.

23) Minh Duc Le and Duc Hanh Dang and Viet Ha Nguyen (2016) *Domain-Driven Design Using Meta-Attributes: A DSL-Based Approach*. In: The 8th International Conference on Knowledge and Systems Engineering (KSE), 6-8 October 2016, Hanoi, Vietnam.

24) Minh Khoi Le and Hsien-Tsung Chang and Yi-Min Chang and Yi-Hao Hu and Huan-Ting Chen (2016) *An efficient multilevel healthy cloud system using Spark for smart clothes*. In: 2016 International Computer Symposium, 15-17 December 2016, Chiayi, Taiwan. (In Press)

25) Nguyen Khoi Le and Dario Landa-Silva (2016) *Hyper-volume Evolutionary Algorithm*. VNU Journal of Computer Science and Communication Engineering, 32 (1). pp. 10-32. ISSN 0866-8612

26) Van Giap Le and Huu Tung Nguyen and Dang Nhac Lu and Ngoc Hoa Nguyen (2016) *A Solution for Automatically Malicious Web Shell and Web Application Vulnerability Detection*. In: Computational Collective Intelligence. Lecture

Notes in Computer Science, 9875 . Springer, pp. 367-378. ISBN 0302-9743.

27) Thanh Le Dinh and Dai Tho Nguyen (2016) *Indoor Fire Detection using Wireless Sensor Networks.* Research, Development and Application on Information & Communication Technology, 3 (13).

28) Dang Nhac Lu and Thu Trang Nguyen and Thi Thu Trang Ngo and Thi Hau Nguyen and Ha Nam Nguyen (2016) *Mobile Online Activity Recognition System Based on Smartphone Sensors.* Advances in Information and Communication Technology, 538 . pp. 357-366. ISSN 2194-5357.

29) Thai Le Luong and Thi Hanh Tran and Quoc Tuan Truong and Thi Minh Ngoc Truong and Thi Thu Phi and Xuan Hieu Phan(2016) *Learning to Filter User Explicit Intents in Online Vietnamese Social Media Texts.* In: The 8th Asian Conference on Intelligent Information and Database Systems (ACIIDS), 14-16 March 2016, Da Nang, Vietnam.

30) Thai Le Luong and Quoc Tuan Truong and Hai Trieu Dang and Xuan Hieu Phan (2016) *Domain identification for intention posts on online social media.* In: The 7th Symposium on Information and Communication Technology (SoICT), 08 - 09 December 2016, Ho Chi Minh City, Viet Nam.

31) Viet Nguyen Luong and Nhat Tien Trinh and Van Canh Ho (2016) *A Watermark Algorithm Against De-Synchronization Attacks.* VNU Journal of Computer Science and Communication Engineering, 32 (2). pp. 49-62. ISSN 0866-8612

32) Viet Hung Luu and Duc Chuc Man and Chinh Ke Luong and Quang Hung Bui and Thi Nhat Thanh Nguyen (2016) *Air pollution mapping from high spatial resolution satellite images: a case study in Hanoi.* In: The 2nd International Joint Conference (IJCC), 2016, Hanoi, Vietnam.

33) Viet Hung Luu and Van Manh Pham and Duc Chuc Man and Quang Hung Bui and Thi Nhat Thanh Nguyen (2016) *Comparison of Various Image Fusion Methods for Impervious Surface Classification from VNREDSat-1.* International Journal of Advanced Culture Technology (IJACT), 4 (2). pp. 1-6.

34) Thi Chau Ma and Minh Duong Hoang (2016) *Kinect based character navigation in VR Game.* VNU Journal of Computer Science and Communication Engineering, 32 (2). pp. 23-30. ISSN 0866-8612

35) Yoshiki Makino and Konlakorn Wongpatikaseree and Takashi Okada and Hoai Son Nguyen and Yuto Lim and Yasuo Tan(2016) *Development of home simulation with thermal environment and electricity consumption.* In: 7th International Conference on Information Communication Technology for Embedded Systems 2016 (IC-ICTES 2016).

36)   Shamsul Faisal Mohd Hussein and Hoaison Nguyen and Shahrum Shah Abdullah and Yuto Lim and Yasuo Tan (2016) *Black box modelling the thermal behaviour of ihouse using auto regressive and moving average (ARMA) model.* Jurnal Teknologi, 78 (6-13). ISSN 0127-9696

37) ME Monge and X Zang and CM Jones and Quoc Long Tran and Manshui Zhou and DeEtte Walker L. and Roman Mezencev and Alexander Gray and John F. McDonald and Facundo Fernandez (2016) *High Accuracy Prostate Cancer Detection Using Human Blood Serum Metabolomic Profiling.* In: 2nd Latin American Metabolic Profiling Symposium, October 2016.

38) Thi Lan Ngo and Quang Vu Duong and Son Bao Pham and Xuan Hieu Phan (2016) *Speech act classification in Vietnamese Utterance and its application in smart mobile voice interaction.* In: Proceedings of the Seventh Symposium on Information and Communication Technology (SoICT), December 08 - 09, 2016, Ho Chi Minh City, Viet Nam.

39) Thi Lan Ngo and Van Hop Nguyen and Thi Hai Yen Vuong and Thac Thong Nguyen and Thi Thua Nguyen and Bao Son Pham and Xuan Hieu Phan (2016) *Identifying User Intents in Vietnamese Spoken Language Commands and Its Application in Smart Mobile Voice Interaction.* In: ACIIDS 2016: the 8th Asian Conference on Intelligent Information and Database Systems, 14-16 March 2016, Da Nang, Vietnam.

40) Duc Anh Nguyen and Ngoc Hung Pham and Viet Ha Nguyen (2016) *A Method for Automated Unit Testing of C Programs.* In: NICS: 3rd National Foundation for Science and Technology Development Conference on Information and Computer Science, 14-16 September 2016, Da Nang city, Viet Nam.

41) Hai Chau Nguyen and Thi Ngoc Anh Le (2016) *Using Local Weather and Geographical Information to Predict Cholera Outbreaks in Hanoi, Vietnam.* Advanced Computational Methods for Knowledge Engineering Volume 453 of the series Advances in Intelligent Systems and Computing, 453 . pp. 195-212. ISSN 2194-5357

42) Hoai Son Nguyen and Dinh Nghia Nguyen and Xuan Hoang Tran (2016) *A Cluster-based File Replication Scheme for DHT-based File Backup Systems.* In: the 2016 International Conference Advanced Technologies for Communications (ATC), 12-14 October 2016, Hanoi, Vietnam.

43) Thac Huy Nguyen and The Chuan Do and Viet Anh Nguyen (2016) *Implicit Feedback Mechanism to Manage User Profile Applied in Vietnamese News Recommender System.* International Journal of Computer and Communication Engineering, 5 (4). pp. 276-285. ISSN 2010-3743

44) Thanh Dat Nguyen and Claudiu Vasile Kifor and Hoai

Son Nguyen (2016) DSMAV: *An improved solution for multi-attribute search based on load capacities.* In: 6th IEEE International Conference on Communications and Electronics (ICCE), 27-29 July 2016, Ha Long, Vietnam.

45) Thi Huong Thao Nguyen and Huu Tien Vu and Van San Vu and Van Xiem Hoang and Thanh Ha Le and Trieu Duong Dinh(2016) *Side information creation using adaptive block size for distributed video coding.* In: the 2016 International Conference Advanced Technologies for Communications (ATC), 12-14 October 2016, Hanoi, Vietnam.

46) Thu-Trang Nguyen and Thi-Hau Nguyen and Ha-Nam Nguyen and Duc-Nhan Nguyen and GyooSeok Choi (2016) *Detecting user status from smartphone sensor data.* The International Journal of Advanced Culture Technology, 4 (1). pp. 28-30. ISSN 2288-7202

47) Tuan Phong Nguyen and Anh Cuong Le (2016) *A hybrid approach to Vietnamese word segmentation.* In: The 2016 IEEE RIVF International Conference on Computing and Communication Technologies, 7-9 November 2016, Hanoi, Vietnam.

48) Van Nam Nguyen and Van Cuong Tran (2016) *An Efficient Log Management System.* VNU Journal of Computer Science and Communication Engineering, 32 (2). pp. 43-48. ISSN 0866-8612

49) Viet Anh Nguyen (2016) *Examining student's satisfaction with online learning activities in blended learning course: a case study.* In: ICERI 2016 Conference, 14-16 November 2016, Seville, Spain.

50) Viet Anh Nguyen (2016) *A peer assessment approach to project based blended learning course in a Vietnamese higher education.* Education and Information Technologies. ISSN 1360-2357 (In Press)

51) Viet Anh Nguyen and Manh Tien Hoang and Hoa Huy Nguyen (2016) *Mô hình chia sẻ tài nguyên học liệu trực tuyến.* Journal of Science of HNUE, 61 (4). pp. 172-176. ISSN 2354-1059

52) Viet Anh Nguyen and Thanh Ha Le and Thi Thuy Nguyen (2016) *Single Camera Based Fall Detection Using Motion and Human Shape Features.* In: The 7th International Symposium on Information and Communication Technology (SoICT), 8-9 December 2016, Ho Chi Minh city, Vietnam.

53) Xuan Nam Nguyen and Dai Tho Nguyen and Hai Long Vu (2016) POCAD: *a Novel Payload-based One-Class Classifier for Anomaly Detection.* In: 2016 3rd National Foundation for Science and Technology Development (NAFOSTED) Conference on Information and Computer Science (NICS),
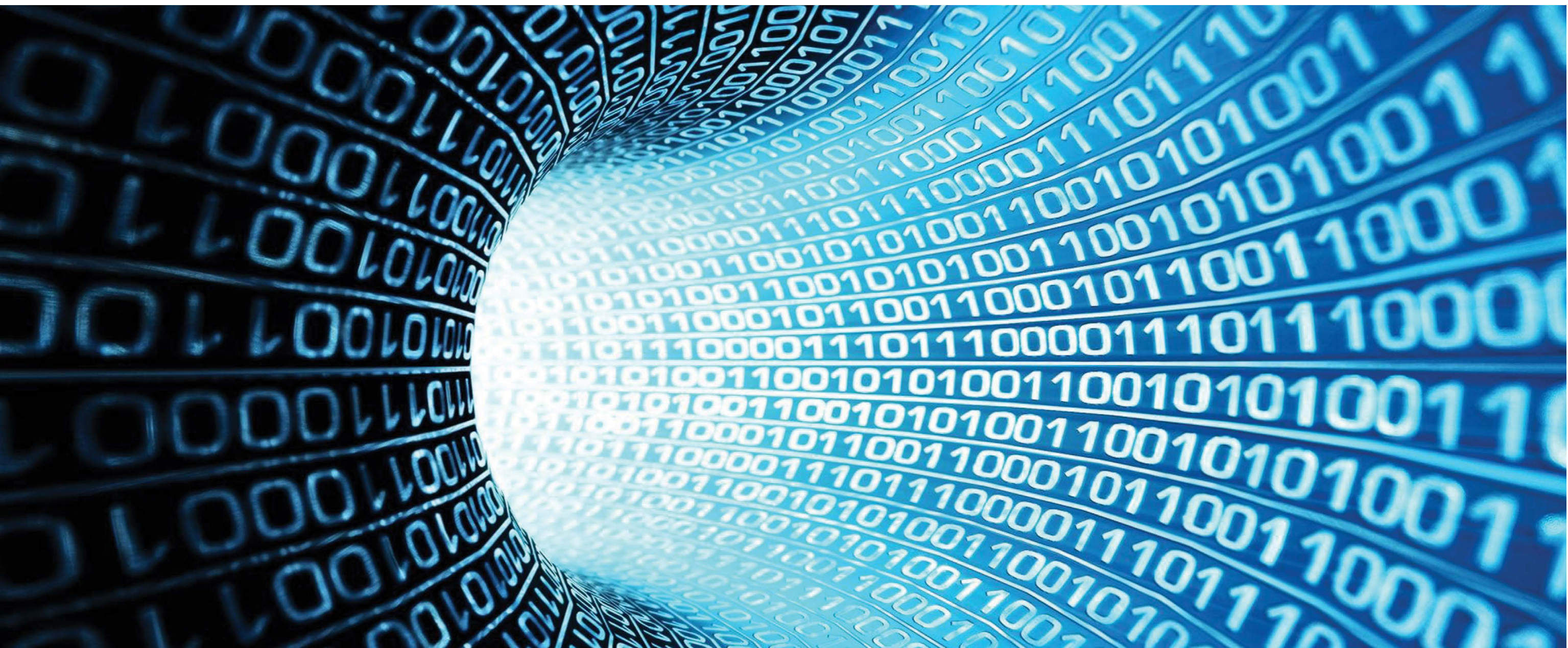
September 14-16, 2016, Danang City, Vietnam.

54) Thi Ngan Pham and Thi Hong Vuong and Thi Hoai Thai and Mai Vu Tran and Quang Thuy Ha (2016) *Sentiment Analysis and User Similarity for Social Recommender System: An Experimental Study.* In: ICISA: the 2016 International Conference on Information Science and Application, 15-18 February 2016, Ho Chi Minh city, Vietnam.

55) Thi Thuong Pham and Xuan Hoai Nguyen and Tri Thanh Nguyen (2016) *A study on fitness representation in Genetic Programming.* In: The Advanced of International Conference on Advances in Information and Communication Technology (ICTA), 12-13 December 2016, Thai Nguyen, Vietnam. (In Press)

56) Van Canh Pham and Kim Dung Ha and Quang Dung Ngo and Quang Cao Vu and Xuan Huan Hoang (2016) *A new viral marketing strategy with the competition in the large-scale Online Social Networks.* In: RIVF 2016.

57) Van Canh Pham and Tra My Thai and Kim Dung Ha and Quang Dung Ngo and Xuan Huan Hoang (2016) *Time-Critical Viral Marketing Strategy with the Competition on Online Social Networks.* In: Computational Social Networks, 2016.

58) Hoang Viet Tran and Chi Luan Le and Ngoc Hung Pham (2016) *A Strongest Assumption Generation Method for Component-Based Software Verification.* In: The 2016 IEEE RIVF International Conference on Computing and Communication Technologies, 7-9 November 2016, Hanoi, Vietnam.

59) Ngoc Ha Tran and Xuan-Huan Hoang (2016) *ACOGNA: An Efficient Method for Protein-Protein Interaction Network Alignment.* In: KSE 2016.

60) Phuong Nam Tran and Van Duc Ta and Quoc Tuan Truong and Quang Vu Duong and Thac Thong Nguyen and Xuan Hieu Phan (2016) *Named Entity Recognition for Vietnamese Spoken Texts and Its Application in Smart Mobile Voice Interaction.* In: ACIIDS: the 8th Asian Conference on Intelligent Information and Database Systems, 14-16 March 2016, Da Nang, Vietnam.

61) Anh Hoang Truong and Van Hung Dang and Duc Hanh Dang and Xuan Tung Vu (2016) *A Type System for Counting Logs of Multi-threaded Nested Transactional Programs.* In: 12th International Conference on Distributed Computing and Internet Technology (ICDCIT).

62) Anh Hoang Truong and Ngoc Khai Nguyen and Van Hung Dang and Duc Hanh Dang (2016) *Calculating Statically Maximum Log Memory Used by Multi-threaded Transactional Programs.* In: 13th International Conference on Theoretical Aspects of Computing (ICTAC).

63) Dieu Huong Vu and Yuki Chiba and Kenro Yatake and Toshiaki Aoki (2016) *Verifying OSEK/VDX OS Design using Its Formal Specification.* In: TASE 2016, 17-19, July, 2016, Shanghai, China.

64) Duc Quang Vu and Van Truong Nguyen and Xuan-Huan Hoang (2016) A*n Improved Artificial Immune Network For Solving Construction Site Layout Optimization.* In: RIVF 2016.

65) Thi Dao Vu and Ngoc Hung Pham and Viet Ha Nguyen (2016) *A Method for Automated Test Cases Generation from Sequence Diagrams and Object Constraint Language for Concurrent Programs.* VNU Journal of Computer Science and Communication Engineering . ISSN 0866-8612 (In Press)

66) Thi Dao Vu and Ngoc Hung Pham and Viet Ha Nguyen (2016) *A Method for Automated Test Cases Generation from UML Models with String Constraints.* In: The 9th Asian Conference on Intelligent Information and Database Systems, 2016, Japan. (In Press)

67) Thi Hong Nhan Vu and Yang Koo Lee and Namsrai Oyun-Erdene (2016) *Activity Recognition based on Clustering Methods for Senior Homecare Services.* In: The 9th International Conference on Frontiers of Information Technology, Applications and Tools, 31 March - 3 April 2016, Zhuhai, China.

68) Xuan Tung Vu and Van Khanh To and Mizuhito Ogawa (2016) *raSAT: An SMT Solver for Polynomial Constraints.* In: The 8th International Joint Conference on Automated Reasoning, 2016.

69) Tung Long Vuong and Dinh Minh Le and Thi Thuy Le and Thanh Ha Le (2016) *Pre-rendered subtitles removal in video sequences using text detection and inpainting.* In: The 2016 International Conference on Electronics, Information and Communication (ICEIC), 27-30 January 2016, Danang, Vietnam.
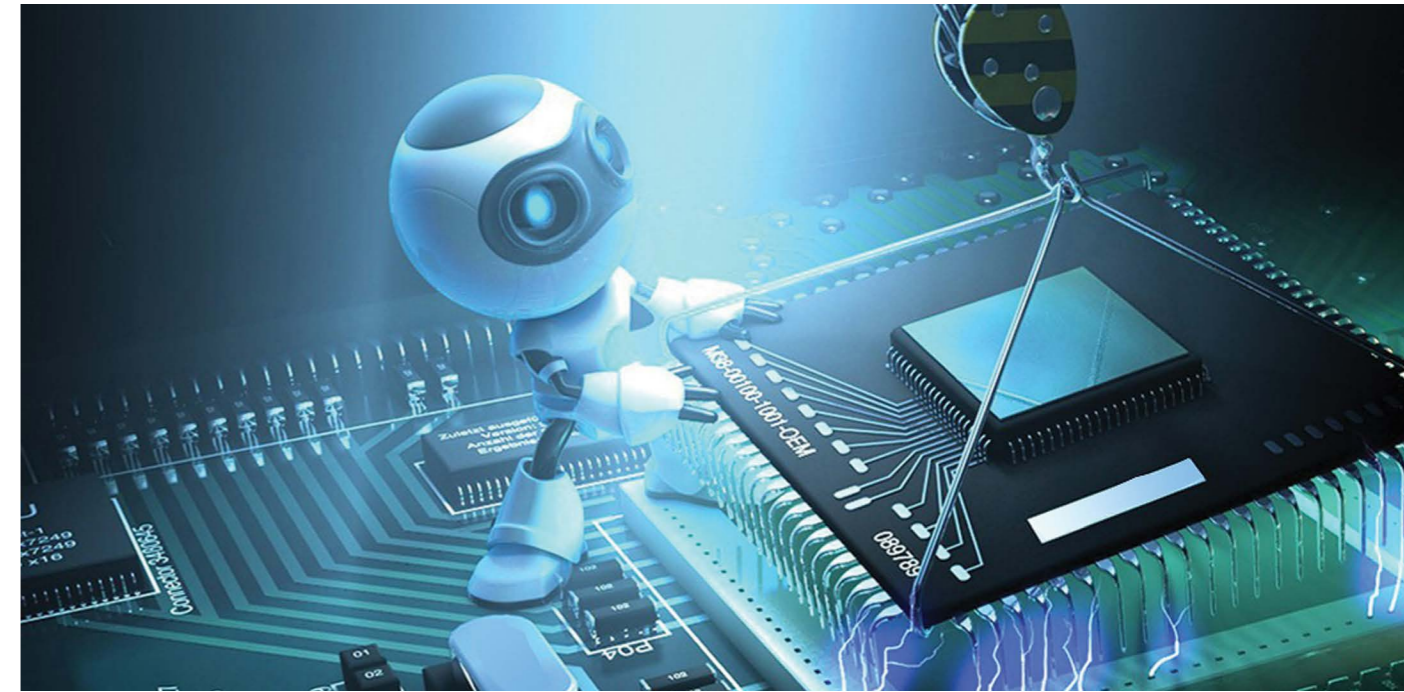
FACULTY OF ELECTRONICS AND TELECOMMUNICATIONS **(FET)**

WEBSITE: HTTP://FET.UET.VNU.EDU.VN

FB: HTTPS://WWW.FACEBOOK.COM/FET.UET

TEL: 024 37547338

MISSION & VISION

Mission: Governed by the mission of VNU-UET, FET contributes to the goals of this mission by: (a) Conducting education and training and to foster talents, providing highly-qualified human resources at all higher-education levels in the field of Electronics and Communications; (b) Conducting research on development and application of advanced sciences and technologies based on a strong information and communication technology background; (c) Pioneer approaching regional and international higher-education standards; (d) Effectively contributing to the development of the intelligence-based country's economy and society.

Vision: To become an institution of excellence in higher education, a center for technology innovation, and one of national and regional top in education and research in the field of electronics and communications engineering.

ORGANIZATIONAL STRUCTURE

The organizational structure of FET includes:

• Department of Network & Communication Systems

• Department of Wireless Communications

• Department of Electronics and Computer Engineering

• Department of Micro-Electro-Mechanical Systems and Micro Systems

• Signals and Systems Laboratory

• Practical Electronics and Telecommunications Laboratories

RESEARCH DIRECTIONS

- Design & fabrication of smart devices & systems

Smart House

INS/GPS Navigation

Wireless Sensor Networks for Environmental Monitoring

Sign-Language Recognition System Using Mems Sensors

Landslide Monitoring System

Cow Monitoring System

- Robotics & automation

Robots for Cleaning

Robots for Product Classification

Networked robot

- VLSI (ASIC & FPGA) design & embedded systems

Systems-on-Chips (Socs), Network-On-Chips (Nocs)

Design-for-Testability & Fault Tolerance

Variability-Aware & Low-Power Design

HF Chip Design

- Design of MEMS devices & micros systems

MEMS-based Acceleration Sensors

Polymeric Thermal Micro-Actuators

Microfluidic Systems

- Wireless communications & networking

Massive MIMO systems and 5G Network

Millimeter Communications and life

Security in Sensor Networks

Cognitive Radios And Cooperative Sensing & Relaying Systems

Network Coding

FPGA -Based Communication System Design

- Design of antennas and HF transceivers

Microtrip Antennas on Multilayer Structures

Microwave-Power Transmitters

Power Amplifiers

- Biosignal processing and bioelectronic implementation

EEG-based Automatic Detection of Epileptic Spikes

Fast Image Acquisition in Biomedical Imaging Systems

Patient Monitoring System

Bio-Analytical Chip based on Microfluidics

Ultrasound Tomography

- Signal /Image/Video algorithms

Image Super-Resolution

Compressed Sensing

Blind Source Separation

OUTSTANDING ACHIEVEMENTS IN 2016

• 14 ISI/SCOPUS indexed journal papers

• 4 PhDs graduated in 2016

• Hosted ATC-2016: The 2016 International Conference on Advanced Technologies for Communications (ATC2016) was jointly organized by The IEEE Communications Society, The Radio-Electronics Association of Vietnam (REV) and VNU University of Engineering and Technology in Hanoi, Vietnam, on October 12-14 2016. The technical program of the conference featured 86 papers, including 81 oral presentations and 5 poster presentations. All papers are indexed by IEEEXplore. The IEEE Communications Society was actively involved in the conference organizing committee with Prof. Stefano Bregni (IEEE ComSoc Vice-President for Member and Global Activities) acting as the Technical Program Co-chair, Prof. Vijay Bhargava (2012–2013 President of IEEE ComSoc) as the Steering Co-chair, and Prof. Hikmet Sari (2014–2015 IEEE ComSoc Vice-President for Conferences) as the General Co-chair. The conference was also honored to welcome Prof. José Roberto Boisson de Marca, 2014 President of IEEE, as the Honorary Co-chair.

• 02 Utility Solutions granted by the National Office of Intellectual Property of Vietnam.

• Some selected works:

+ A1: Capacitive sensors for conductive and non-conductive fluidic channel

+ A2: Surface acoustic wave device for liquid sensing applications

+ A3: Front-End for Satellite Receiver

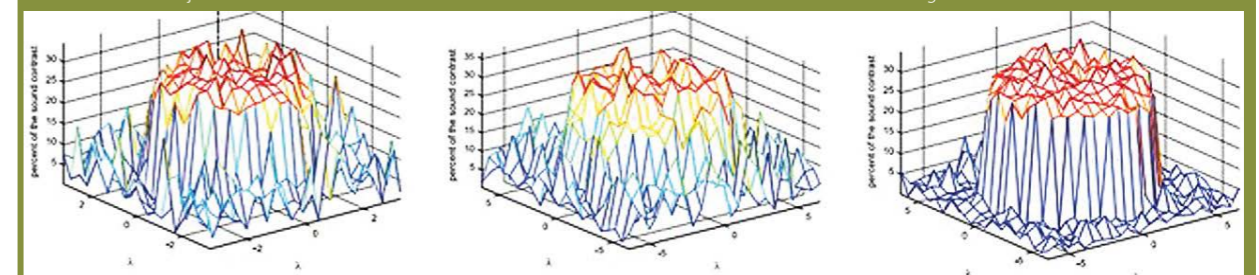+ A4: Efficient indoor visible light communication
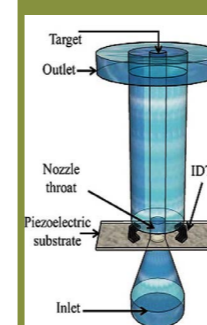
A1-2: Novel position of the SAW sensor in the injector

A3: Completed structrure of L-band receiver
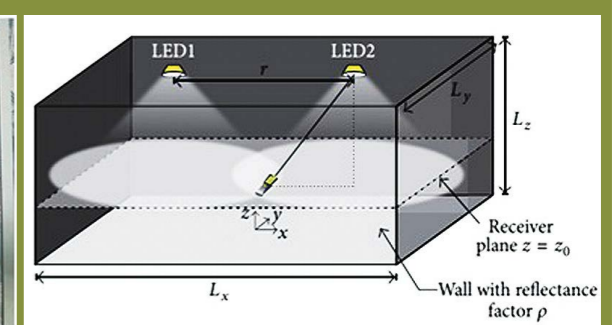
A4: An indoor VLC system model with two LEDs tiled in the ceiling of a room

A5: The reconstructed results of the different approaches in ultrasound tomography

1) Thai-Chien Bui and Suwit Kiravittaya and Keattisak Sripimanwat and Nam Hoang Nguyen (2016) A Comprehensive Lighting Configuration for Efficient Indoor Visible Light Communication Networks. International Journal of Optics, 2016 . ISSN 1687-9384

Design of an efficient indoor visible light communication (VLC) system requires careful considerations on both illumination and communication aspects. Besides fundamental factors such as received power and signal-to-noise ratio (SNR) level, studies on mobility scenarios and link switching process must be done in order to achieve good communication link quality in such systems. In this paper, a comprehensive lighting configuration for efficient indoor VLC systems for supporting mobility and link switching with constraint on illumination, received power, and SNR is proposed. Full connectivity in mobility scenarios is required to make the system more practical. However, different from other literatures, our work highlights the significance of recognizing the main influences of field of view angle on the connectivity performance in the practical indoor scenarios. A flexible link switching initiation algorithm based on the consideration of relative received power with adaptive hysteresis margin is demonstrated. In this regard, we investigate the effect of the overlap area between two light sources with respect to the point view of the receiver on the link switching performance. The simulation results show that an indoor VLC system with sufficient illumination level and high communication link quality as well as full mobility and support link switching can be achieved using our approach.

2) Thanh Van Dau and Thanh Tung Bui and Xuan Thien Dinh and Tibor Terebessy (2016) Pressure sensor based on bipolar discharge corona configuration. Sensors and Actuators A Physical . pp. 81-90. ISSN 0924-4247

We present a pressure sensing unit based on a unique corona discharge setup using symmetrical electrode arrangement with simultaneous positive and negative corona generation. The device generates stable corona discharge and enables reliable air pressure measurement in the range of 80-105 kPa, tested with five prototypes. The current-voltage characteristics of bipolar discharge system is analyzed in general form and three governing parameters, namely electrode geometry, electrode distance and discharge current, are studied in relation with absolute pressure. The sensors are driven with constant discharge current as low as 1 µA. The measured sensitivity is in good agreement with theoretical prediction and the sensor stability has been confirmed with 20-h continuous test without sensitivity deterioration. The sensitivity does not depend on the tested temperature range and its variation between devices is small, approximately ±3.0%. The advantage of the proposed system compared with similar corona-based constructions is its stable operation at low current with low power consumption and minimum electrode deterioration, which provides a cost effective and reliable solution

3) Thanh Van Dau and Thien Xuan Dinh and Terebessy Tibor and Thanh Tung Bui (2016) Ion Wind Generator Utilizing Bipolar Discharge in Parallel Pin Geometry. IEEE Transactions on Plasma Science, 44 (12). pp. 2979-2987. ISSN 0093-3813

We present a simple and efficient airflow generator utilizing the effect of ion wind by generating simultaneously both the positive and negative ions from two sharp electrodes mounted parallel to each other. The unique bipolar geometrical setup eliminates the effect of space charge by the high recombination rate of oppositely charged ions. The two-electrode arrangement is symmetrical, where the electrode creating charged ions of one polarity also serves as the reference electrode to establish the electric field required for ion creation by the opposite electrode, and vice versa. Unlike the conventional setup, with a single electrode generating ion wind with movement toward the reference electrode, in this configuration the air movement is parallel to the electrodes, and is directed away from the device. The airflow behavior is studied by both experiments and numerical simulation. The ion wind speed has a linear relationship with the square root of the discharge current, $U \propto \sqrt{I}$, and its measured values agree well with simulation. The characterization of the discharge current-voltage relationship was derived from mathematical processing in the general form $I = b(V - V_0)^n$. The ion wind speed and the current-voltage characteristics depend on the interspace between the electrodes and the electrode geometry. An ion wind speed on the order of ms^{-1} is created with a microampere discharge current, resulting in a total net charge of only several femtoampere. The proposed configuration is beneficial in minimizing the power consumption of the system, and in enabling air recirculation for airflow control applications, cooling applications, propulsion technology, and micropump design, especially for the applications where neutralized ion wind flow is required.

4) Thanh Van Dau and Xuan Thien Dinh and Tibor Terebessy and Thanh Tung Bui (2016) Bipolar corona discharge based air flow generation with low net charge. Sensors and Actuators A Physical . pp. 146-155. ISSN 0924-4247

In this paper, we report on a miniaturized device that can generate ion wind flow with very low net charge. Both positive and negative ions are simultaneously generated from two sharp electrodes placed in parallel, connected to a single battery-operated power source. The two-electrode arrangement is symmetrical, where the electrode creating charged ions of one polarity also serves as the reference electrode to establish the electric field required for ion creation by the opposite electrode, and vice versa. The numerical simulation is carried out with programmable open source OpenFOAM, where the measured current-voltage is applied as boundary condition to simulate the electrohydrodynamics flow. The air flow inside the device is verified by eight hotwires embedded alongside the downstream channel. It was confirmed that the jet flow generated in the channel has a linear relationship with the square root of the discharge current and its measured values agree well with simulation. The device is robust, ready-to-use and minimal in cost. These are important features that can contribute to the development of multi-axis fluidic inertial sensors, fluidic amplifiers, gas mixing, coupling and analysis. The proposed configuration is beneficial with space constraints and/or where neutralized discharge process is required, such as inertial fluidic units, circulatory flow heat transfer, electrospun polymer nanofiber to overcome the intrinsic instability of the process, or the formation of low charged aerosol for inhalation and deposition of charge particles.

5) Thanh Van Dau and Canh-Dung Tran and Thanh Tung Bui and V. D. X. Nguyen and Xuan Thien Dinh (2016) Piezo-resistive and thermo-resistance effects of highly-aligned CNT based macrostructures. RSC Adv., 6 (108). pp. 106090-106095. ISSN 2046-2069

Recent advances in assembling Carbon NanoTubes (CNTs) into macrostructures with outstanding properties, such as high tensile strength, high conductivity and porosity, and strong corrosive resistance, have underpinned potentially novel applications. For example, in advanced electronics, bioengineering and nanomechanics. This paper focuses on the development of (i) the piezoresistive polydimethylsiloxane–CNT (PDMS–CNT) composite membrane, and (ii) the thermo-resistive CNT hotwire using a technique of producing highly aligned CNT yarns and films. Our experimental results show that while PDMS–CNT films possess an outperformed gauge factor (10.7) compared with ones of CNT films in recent publications and several metals, a clear linear relationship of the resistance versus the temperature for a hotwire using CNT yarn is observed. Hence, the work supplies valuable evidence in the use of CNT films and yarns in several potential applications as thermal sensing elements and anemometric hotwires, respectively.

6) Van Thanh Dau and Thien Xuan Dinh and Thanh Tung Bui and Tibor Terebessy (2016) Bipolar corona assisted jet flow for fluidic application. Flow Measurement and Instrumentation, 50 . pp. 252-260. ISSN 09555986

In this paper, we present a study on a jet flow, assisted by low net charge ion wind from bipolar corona discharge setup. The ion wind is simultaneously generated from both positive and negative electrodes placed in parallel, adding momentum to the bulk flow directed alongside the electrodes and focused in the middle of interelectrode space. The electrodes are connected to a single battery-operated power source in a symmetrical arrangement, where the electrode creating charged ions of one polarity also serves as the reference electrode to establish the electric field required for ion creation by the opposite electrode, and vice versa. Multiphysics numerical simulation is carried out with programmable open source OpenFOAM, where the measured current-voltage is applied as a boundary condition to simulate the electrohydrodynamics flow. The jet flow inside the device is verified by hotwire anemometry using hotwires embedded within the device, with the measured values in good agreement with simulation. The corona discharge helped to focus the jet and increased the flow peak velocity from 1.41 m/s to 2.42 m/s with only 27.1 mW of consumed discharge power. The device is robust, ready-to-use and minimal in cost. In addition, as the oppositely charged corona flows are self-neutralized, the generated air flow remains neutral and therefore does not attach to a particular target, which expands the application range. These are important features, which can contribute to the development of multi-axis fluidic inertial sensors, fluidic amplifiers, micro blowers, gas mixing, coupling and analysis with space constraints and/or where neutralized discharge process is required, such as circulatory flow heat transfer or the formation of low charged aerosol for inhalation and charged particle deposition.

7) Wei Feng and Thanh Tung Bui and Naoya Watanabe and Haruo Shimamoto and Masahiro Aoyagi and Katsuya Kikuchi (2016) Fabrication and stress analysis of annular-trench-isolated TSV. **Microelectronics Reliability . ISSN 0026-2714 (In Press)**

The large mismatches among the coefficients of thermal expansion (CTE) of the metal via, insulator liner, and Si substrate of the through-silicon via (TSV) induce thermal stresses within and around the TSV during thermal-cycled fabrication processes. Reduction of thermal stress in the Si substrate is important for minimizing the deviations in the device characteristics. An annular-trench-isolated (ATI) structure was proposed for the TSV to solve the thermal issues, which occur during the three-dimensional (3D) integrated circuit (IC) integration, by stress redistribution. The concept of ATI TSV is based on retaining a Si-ring between the metal core and insulator layer during the fabrication process. We realized the ATI TSV using a via-last fabrication approach, with two deep silicon etching processes (Bosch processes) for the insulator layer and the metal core. Parylene-HT was utilized as the insulator to achieve high uniformity. With a vacuum-assisted filling system, the vias were filled with a solder material. ATI TSVs with diameters of 10 µm and 2-µm-thick Parylene-HT insulation layers were demonstrated. Studies on the thermal stress levels of the ATI TSV were carried out by finite-element method (FEM) simulation, along with comparisons with regular and annular TSVs. We revealed that the ATI TSV shows lower thermal stresses in the Si substrate than the regular and annular TSVs. The ATI TSV is a possible candidate for 3D IC integration with stress-sensitive devices.

8) Quoc Anh Gian and Dinh Chinh Nguyen and Duc Nghia Tran and Duc Tan Tran (2016) Monitoring of Landslides in Mountainous Regions based on FEM Modelling and Rain Gauge Measurements. **International Journal of Electrical and Computer Engineering, 6 (5). pp. 2096-2105. ISSN 2088-8708**

Vietnam is a country heavily influenced by climate change. The effect of climate change leads to a series of dangerous phenomena, such as landslides. Landslides occur not only in the mountainous province, but also in Delta provinces, where hundreds of landslides are reported annually in the North-Western provinces of Vietnam. These events have catastrophic impact to the community as well as the economy. In mountainous areas, the conditions for landslides to occur are met frequently, especially after heavy rains or geological activity, causing harm to the community as well as damaging or destroying much needed infrastructure and key transport routes. However, in Vietnam, investment in mountainous regions has been often lower than in urban areas. The meteorology monitoring and forecasting systems are ill equipped and overloaded, so they cannot deliver earlier and more accurate forecasts for complex weather events, unable to provide timely warnings. It can be seen that in countries that landslide often occur, researchers have been trying to develop low cost and efficient landslide detection system. This paper precisely addressed the problems mentioned, by designing and implementing an efficient and reliable Landslide Monitoring and Early Warning (LMnE) system based on the 3G/2G mobile communication system, and a rain gauge at the field site along with a carefully FEM (finite element method) simulation using the rain density information on the server. The system uses advanced processing algorithms combining obtained data at the central station.

9) Thanh Ha Le and Tung Long Vuong and Trieu Duong Dinh and Seung-Won Jung (2016) Reduced Reference Quality Metric for Synthesized Virtual Views in 3DTV. **ETRI Journal, 38 (6). pp. 1114-1123. ISSN 1225-6463**

Multi-view video plus depth (MVD) has been widely used owing to its effectiveness in three-dimensional data representation. Using MVD, color videos with only a limited number of real viewpoints are compressed and transmitted along with captured or estimated depth videos. Because the synthesized views are generated from decoded real views, their original reference views do not exist at either the transmitter or receiver. Therefore, it is challenging to define an efficient metric to evaluate the quality of synthesized images. We propose a novel metric—the reduced-reference quality metric. First, the effects of depth distortion on the quality of synthesized images are analyzed. We then employ the high correlation between the local depth distortions and local color characteristics of the decoded depth and color images, respectively, to achieve an efficient depth quality metric for each real view. Finally, the objective quality metric of the synthesized views is obtained by combining all the depth quality metrics obtained from the decoded real views. The experimental results show that the proposed quality metric correlates very well with full reference image and video quality metrics.

10) Quang Huy Tran and Duc Tan Tran and Huu Tue Huynh and That Long Ton and Linh Trung Nguyen (2016) Influence of dual-frequency combination on the quality improvement of ultrasound tomography. **Simulation: Transactions of The Society for Modeling and Simulation International, 92 (3). pp. 267-276. ISSN 1741-3133**

The most useful feature of ultrasound tomography founded on the inverse scattering theory is that it can detect small structures below the wavelength of the pressure wave. A popular method introduced in ultrasound tomography is the Distorted Born Iterative Method (DBIM). Recently, the dual-frequency combination technique has been utilized to improve the reconstruction quality and increase the convergence rate of the DBIM. This method uses two frequencies, f_1 (low) and f_2 (high), to estimate the sound contrast in N_{f1} and N_{f2} iterations, respectively. However, the influence of these iteration parameters on the overall performance of the system is not yet known. In this paper, it is shown by using the simulation technique that if we do not pay attention to the choice of these parameters, the reconstruction quality might be worse than that using a single frequency. Furthermore, we focus on the best way to select the parameters in order to improve the reconstruction quality of ultrasound tomography. Given a fixed sum N iter of N_{f1} and N_{f2} , simulation results show that the best value of N_{f1} is $N\_{iter}/2$; this choice of parameters offers a normalized error that reduces by 67.6%, compared to the conventional DBIM using a single frequency.

11) Van Hoi Tran and Thi Lanh Ngo and Xuan Truong Nguyen and Huu Duc Nguyen and Duong Bach Gia (2016) Design of a Front-End for Satellite Receiver. **International Journal of Electrical and Computer Engineering, Vol.6, (No.5). P.2282-P.2290. ISSN 2088-8708**

This paper focuses on the design and implementation of a front-end for a Vinasat satellite receiver with auto-searching mechanism and auto-tracking satellite. The front-end consists of a C-band low-noise block down-converter and a L-band receiver. The receiver is designed to meet the requirements about wide-band, high sensitivity, large dynamic range, low noise figure. To reduce noise figure and increase bandwidth, the C-band low-noise amplifier is designed using T-type of matching network with negative feedback and the L-band LNA is designed using cascoded techniques. The local oscillator uses a voltage controlled oscillator combine phase locked loop to reduce the phase noise and select channels. The front-end has successfully been designed and fabricated with parameters: Input frequency is C-band; sensitivity is greater than -130 dBm for C-band receiver and is greater than -110dBm for L-band receiver; output signals are AM/FM demodulation, I/Q demodulation, baseband signals.

12) Hoi Tran Van and Truong Nguyen Xuan and Lanh Ngo Thi and Gia Duong Bach (2016) Design of aC-Band Low-Noise Block Front-end for Satellite Receivers. **International Journal of Applied Engineering Research, 11 (8). pp. 5646-5652. ISSN 0973-4562**

This paper describes the study, design and fabrication of a C-band low-noise block front-end for satellite receivers. The front-end consists of a low-noise amplifier, two band pass filters in C-band and L-band, a down-converter and an intermediate frequency amplifier. To reduce noise figure and increase bandwidth, the low-noise amplifier was designed using T-type of matching network with negative feedback. The down-converter used a voltage controlled oscillator with phase locked loop to reduce the phase noise. The front-end converts input signals from C-band (3.4 GHz-4.2 GHz) to the L-band (950 MHz-1750 MHz). The low-noise block has successfully been designed and fabricated with parameters: Overall gain is greater than 60 dB; the noise figure is less than 1dB; phase noise of local oscillator obtains-107.57dBc/Hz at 50KHz.

13) Van, T. N., Tan, T. D., Ngoc, H. V., & Duc, T. C. (2016). Improvement of Tuning Fork Gyroscope Drive-mode Oscillation Matched using a Differential Driving Suspension Frame. **International Journal of Electrical and Computer Engineering, 6(6), 2716.**

This paper presents a novel design of a vibration tuning fork gyroscope (TFG) based on a differential driving suspension coupling spring between two gyroscopes. The proposed TFG is equivalent to a transistor differential amplifier circuit. The mechanical vibrations of driving frames are, therefore, well matched. The matching level depends on stiffness of spring. When three various TFG structures respond to differential stiffness of spring, their the driving frame mechanical vibration is well matched in case the input excitation driving differential phase is less than 3.5°, 2.5°, and 4°, respectively. The fabricated tuning fork gyroscope linearly operates in the range from -200 to +200 degree/s with the resolution of about 0.45 mV/degree/s.

14) Hai, N. D., Tuan, V. Q., Hai, N. H., & Trinh, C. D. (2016). Differential C⁴D sensor for conductive and non-conductive fluidic channel. **Microsystem Technologies, 22(10), 2511-2520.**

This paper presents a novel design of a differential C^4D (DC^4D) sensor based on three electrodes for both conductive and non-conductive fluidic channel. This structure consists of two single C^4D with an applied carrier sinusoidal signal to the center electrode as the excitation electrode. The electrodes are directly bonded on the PCB with built-in differential amplifier and signal processing circuit in order to reduce the parasitic component

and common noise. In the non-conductive fluidic channel, the output voltage and capacitance changes 214.39 mV and 14 fF, respectively when a 3.83 µl tin particle crosses an oil channel. In conductive fluidic channel, the output voltage and admittance change up to 300 mV and 0.07 µS for the movement of a 4.88 µl plastic particle through channel. Moreover, the voltage change of this sensor is linear relation with the volume of investigated particle. This sensor also allows measuring velocity of particle inside fluidic channel and resistivity of the conductive fluidic.

15) Bui, T., Morana, B., Scholtes, T., Chu Duc, T., & Sarro, P. M. (2016). A mixing surface acoustic wave device for liquid sensing applications: Design, simulation, and analysis. **Journal of Applied Physics, 120(7), 074504.**

This work presents the mixing wave generation of a novel surface acoustic wave (M-SAW) device for sensing in liquids. Two structures are investigated: One including two input and output interdigital transducer (IDT) layers and the other including two input and one output IDT layers. In both cases, a thin (1 µm) piezoelectric AlN layer is in between the two patterned IDT layers. These structures generate longitudinal and transverse acoustic waves with opposite phase which are separated by the film thickness. A 3-dimensional M-SAW device coupled to the finite element method is designed to study the mixing acoustic wave generation propagating through a delay line.

The investigated configuration parameters include the number of finger pairs, the piezoelectric cut profile, the thickness of the piezoelectric substrate, and the operating frequency. The proposed structures are evaluated and compared with the conventional SAW structure with the single IDT layer patterned on the piezoelectric surface. The wave displacement along the propagation path is used to evaluate the amplitude field of the mixing longitudinal waves. The wave displacement along the AlN depth is used to investigate the effect of the bottom IDT layer on the transverse component generated by the top IDT layer. The corresponding frequency response, both in simulations and experiments, is an additive function, consisting of sinc(X) and uniform harmonics. The M-SAW devices are tested to assess their potential for liquid sensing, by dropping liquid medium in volumes between 0.05 and 0.13 µl on the propagation path. The interaction with the liquid medium provides information about the liquid, based on the phase attenuation change. The larger the droplet volume is, the longer the duration of the phase shift to reach stability is. The resolution that the output change of the sensor can measure is 0.03 µl.

OTHER PUBLICATIONS

1) Thai-Chien Bui and Suwit Kiravittaya and Keattisak Sripimanwat and Nam Hoang Nguyen (2016) *A Comprehensive Lighting Configuration for Efficient Indoor Visible Light Communication Networks*. International Journal of Optics, 2016 . ISSN 1687-9384

2) Thanh Tung Bui and Watanabe Naoya and Cheng Xiaojin and Kato Fumiki and Kikuchi Katsuya and Aoyagi Masahiro (2016) *Copper-Filled Through-Silicon Vias with Parylene-HT Liner*. IEEE Transactions on Components, Packaging, and Manufacturing Technology, 6 (4). pp. 510-517. ISSN 2156-3950

3) Thanh Van Dau and Thanh Tung Bui and Xuan Thien Dinh and Tibor Terebessy (2016) *Pressure sensor based on bipolar discharge corona configuration*. Sensors and Actuators A Physical . pp. 81-90. ISSN 0924-4247

4) Thanh Van Dau and Thien Xuan Dinh and Terebessy Tibor and Thanh Tung Bui (2016) *Ion Wind Generator Utilizing Bipolar Discharge in Parallel Pin Geometry*. IEEE Transactions on Plasma Science, 44 (12). pp. 2979-2987. ISSN 0093-3813

5) Thanh Van Dau and Xuan Thien Dinh and Tibor Terebessy and Thanh Tung Bui (2016) *Bipolar corona discharge based air flow generation with low net charge*. Sensors and Actuators A Physical . pp. 146-155. ISSN 0924-4247

6) Thanh Van Dau and Canh-Dung Tran and Thanh Tung Bui and V. D. X. Nguyen and Xuan Thien Dinh (2016) *Piezo-resistive and thermo-resistance effects of highly-aligned CNT based macrostructures*. RSC Adv., 6 (108). pp. 106090-106095. ISSN 2046-2069

7) Van Thanh Dau and Thien Xuan Dinh and Thanh Tung Bui (2016) J*et flow generation in a circulatory miniaturized system*. Sensors and Actuators B: Chemical, 223 . pp. 820-826. ISSN 0925-4005

8) Van Thanh Dau and Thien Xuan Dinh and Thanh Tung Bui and Tibor Terebessy (2016) *Bipolar corona assisted jet flow for fluidic application*. Flow Measurement and Instrumentation, 50 . pp. 252-260. ISSN 09555986

9) Van Thanh Dau and Thien Xuan Dinh and Bui Thanh Tung and Canh-Dung Tran and Hoa Thanh Phan and Tibor Terebessy (2016) *Corona based air-flow using parallel discharge electrodes*. Experimental Thermal and Fluid Science . (In Press)

10) Thi Thai Mai Dinh and Long Nguyen Thanh and Tuan Nguyen Quoc (2016) *Selection of Appropriate Number of CRs in Cooperative Spectrum Sensing over Suzuki Fading*. VNU Journal of Science: Comp. Science & Com. Eng., 31 (3). pp. 1-9. ISSN 0866-8612

11) Chuc Doan Huu and Duong Bach Gia (2016) *Design and Fabrication of Rectifying Antenna Circuit for Wireless Power Transmission System Operating at ISM Band*. International Journal of Electrical and Computer Engineering (IJECE), Vol.6 (No. 4). pp. 1522-1528. ISSN ISSN: 2088-8708

12) Wei Feng and Thanh Tung Bui and Naoya Watanabe and Haruo Shimamoto and Masahiro Aoyagi and Katsuya Kikuchi (2016) *Fabrication and stress analysis of annular-trench-isolated TSV*. Microelectronics Reliability . ISSN 0026-2714 (In Press)

13) Quoc Anh Gian and Dinh Chinh Nguyen and Duc Nghia Tran and Duc Tan Tran (2016) *Monitoring of Landslides in Mountainous Regions based on FEM Modelling and Rain Gauge Measurements*. International Journal of Electrical and Computer Engineering, 6 (5). pp. 2096-2105. ISSN 2088-8708

14) Anh Quy Hoang and Minh Trien Pham (2016) *Swarm Optimization Approach for Light Source Detection by Multi-robot System*. VNU Journal of Computer Science and Communication Engineering . ISSN 0866-8612 (In Press)

15) Anh Quy Hoang and Minh-Trien Pham (2016) S*warm Intelligence-Based Approach for Macroscopic Scale Odor Source Localization Using Multi-robot System*. Advances in Information and Communication Technology, 538 . pp.

593-602. ISSN 2194-5357

16) Xiem Hoang Van and João Ascenso and Fernando Pereira (2016) Adaptive Scalable Video Coding: a HEVC based Framework Combining the Predictive and Distributed Paradigms. IEEE Transactions on Circuits and Systems for Video Technology, PP (99). pp. 1-10. ISSN 1051-8215

17) Kiem Hung Nguyen and Xuan Tu Tran (2016) An Efficient Implementation of Advanced Encryption Standard on the Coarse-grained Reconfigurable Architecture. VNU Journal of Computer Science and Communication Engineering, 32 (2). ISSN 0866-8612

18) Thi Thanh Van Nguyen and Manh Duong Phung and Anh Viet Dang and Quang Vinh Tran (2016) A Novel Behavior based Navigation Architecture of Mobile Robot in Unknown Enviroments. VNU Journal of Science: Mathematics-Physics . (In Press)

19) Thi Thanh Van Nguyen and Manh Duong Phung and Anh Viet Dang and Quang Vinh Tran (2016) *A Novel Behavior-based Navigation Architecture of Mobile Robot in Unknown Environments*. Journal of Science: Mathematics-Physics, 32 . ISSN 0866-8612 (In Press)

20) Viet Dung Nguyen and Karim Abed-Meraim and Linh Trung Nguyen (2016) *Second-order optimization based adaptive PARAFAC decomposition of three-way tensors*. Digital Signal Processing . ISSN 1051-2004 (Submitted)

21) Viet Dung Nguyen and Karim Abed-Meraim and Linh Trung Nguyen and Rodolphe Weber (2016) *Generalized minimum noise subspace for array processing*. IEEE Transactions on Signal Processing . ISSN 1053-587X (Submitted)

22) Chinh Nguyen Dinh and Anh Gian Quoc and Quy Mai The Phu and Linh Nguyen Tuan and Anh Nguyen Tien and Tan Tran Duc (2016) *NGHIÊN CỨU PHÁT TRIỂN THIẾT BỊ ĐO MƯA HỖ TRỢ CẢNH BÁO TRƯỢT LỞ ĐẤT*. TẠP CHÍ NGHIÊN CỨU KHOA HỌC VÀ CÔNG NGHỆ QUÂN SỰ, 43 (1). pp. 94-101. ISSN 1859-1403

23) Nam Thanh Pham and Khuong Duy Vu and Duong Trieu Dinh and Ha Thanh Le (2016) *Efficient Region-of-Interest Based Adaptive Bit Allocation for 3D-TV Video Transmission over Networks*. VNU Journal of Computer Science and Communication Engineering, 32 (1). pp. 1-9. ISSN 0866-8612

24) Van Tang Pham and Duc Tan Tran and Duc Trinh Chu (2016) *Characterizing Stochastic Errors of MEMS-Based Inertial Sensors*. VNU Journal of Science, 32 (2). pp. 34-42. ISSN 0866-8612

25) Cao Quyen Tran and Van Nui Nguyen (2016) *Underwater sound propagation in Tokin Gulf and its applications for communication*. Journal of Science and Technology, 37. ISSN 1859-3585 (In Press)

26) Quang Huy Tran and Duc Tan Tran and Huu Tue Huynh and That Long Ton and Linh Trung Nguyen (2016) *Influence of dual-frequency combination on the quality improvement of ultrasound tomography.* Simulation: Transactions of The Society for Modeling and Simulation International, 92 (3). pp. 267-276. ISSN 1741-3133

27) Van Hoi Tran and Thi Lanh Ngo and Xuan Truong Nguyen and Huu Duc Nguyen and Duong Bach Gia (2016) *Design of a Front-End for Satellite Receiver.* International Journal of Electrical and Computer Engineering, Vol.6, (No.5). P.2282-P.2290. ISSN 2088-8708

28) Van Hoi Tran and Xuan Truong Nguyen and Thi Lanh Ngo and Gia Duong Bach (2016) *Design of a C-Band Low-Noise Block Front-end for Satellite Receivers.* International Journal of Applied Engineering Research, 11 (8). pp. 5646-5652. ISSN 0973-4562

29) Hoi Tran Van and Truong Nguyen Xuan and Lanh Ngo Thi and Gia Duong Bach (2016) *Design of aC-Band Low-Noise Block Front-end for Satellite Receivers.* International Journal of Applied Engineering Research, 11 (8). pp. 5646-5652.

BOOK SECTION

Adnan Fida and Duy Hung Pham and Nor Jaidi Tuah and Trung Dung Ngo (2016) *Communication-Aware Route Selection in Wireless Sensor Networks.* In: Intelligent Autonomous Systems 13. 2194-5357, 5 (302). Springer International Publishing, pp. 605-619. ISBN 978-3-319-08338-4

Duy Hung Pham and Quang Vinh Tran and Trung Dung Ngo (2016) *A Scalable, Decentralised Large-Scale Network of Mobile Robots for Multi-target Tracking.* In: Intelligent Autonomous Systems 13. 2194-5357, 302 . Springer International Publishing, pp. 621-637. ISBN 978-3-319-08338-4

CONFERENCE OR WORKSHOP ITEM

1. Hoang Giang Bach and Van Giap Nguyen and Phuong Linh Ta and Tuan Anh Vu and Gia Duong Bach (2016) Research, *Design and Fabrication of 2.45 GHz Microstrip Patch Antenna Arrays for Close-Range Wireless Power Transmission Systems.* In: The 2016 International Conference Advanced Technologies for Communications, 12-14 October 2016, Hanoi city, Vietnam.

2. Duy Hieu Bui and Diego Puschini and Simone Bacles-Min and Edith Beigne and Xuan Tu Tran (2016) *Ultra Low-Power and Low-Energy 32-bit Datapath AES Architecture for IoT Applications.* In: The 2016 IEEE International Conference on Integrated Circuit Design and Technology, 27-29 June 2016, Ho Chi Minh city, Vietnam.

3. Thanh Tung Bui and Xiaojin Cheng and Naoya Watanabe and Fumiki Kato and Katsuya Kikuchi and Masahiro Aoyagi(2016) *A Prospective Low-k Insulator for Via-Last through-Silicon-Vias (TSVs) in 3D Integration.* In: 2016 IEEE 66th Electronic Components and Technology Conference (ECTC), 2016.

4. Thanh Tung Bui and Dan Van and Xuan Thien Dinh and Terebessy Tibor and Thanh Hoa Phan (2016) *Absolute pressure sensing with bipolar corona discharge: Design, simulation and experimental validation.* In: IEEE 29th International Conference on Micro Electro Mechanical Systems (MEMS), 24-28 January 2016, China.

5. Thu Hang Bui and Morana Bruno and Scholtes Tom and Duc Trinh Chu and Sarro Pasqualina (2016) *A novel mixing surface acoustic wave device for liquid sensing applications.* In: MEMS: the 2016 IEEE International Conference on Micro Electro Mechanical Systems, 24-28 Januaray 2016, Shanghai, China.

6. Kang Sun Choi and Trieu Duong Dinh and Quang Dieu Tran and Thanh Ha Le (2016) *Multiple Description Coding of Motion Fields Using Wyner-Ziv Scheme for Robust Video Transmission.* In: International Conference on Electronics, Information, and Communication, 28-29 January 2016, Danang, Vietnam.

7. Thi Thai Mai Dinh and Quang Vinh Bui and Truong Sinh Nguyen and Van Han Nghiem and Hong Giap Le and Van Hung Nguyen (2016) *Performance of Cooperative Spectrum Sensing over Lognormal channel using EGC-based Soft Decision.* In: REV 2016.

8. Dang Dinh Tiep and Bui Ngoc My and Vu Quoc Tuan and Pham Quoc Thinh and Tran Minh Cuong and Thanh Tung Bui and Duc Trinh Chu (2016) *Tilt sensor based on three electrodes dielectric liquid capacitive sensor.* In: 2016 IEEE Sixth International Conference on Communications and Electronics.

9. Wei Feng and Thanh Tung Bui and Naoya Watanabe and Masahiro Aoyagi and Katsuya Kikuchi (2016) *Low Residual Stress in Si Substrate of Annular-Trench-Isolated TSV.* In: 2016 IEEE 66th Electronic Components and Technology Conference (ECTC).

10. Anh Quy Hoang and Minh Trien Pham (2016) *Comparing Modified PSO Algorithms for MRS in Unknown Environment Exploration.* In: International Conference on Advances in Information and Communication Technology (ICTA), 12-13 December 2016, Thai Nguyen, Vietnam.

11. Van Xiem Hoang and Joao Ascenso (2016) *Improving SHVC Performance with a Joint Layer Coding Mode.* In: ICASSP: the 41st International Conference on Acoustics, Speech, and Signal Processing, 20-25 March 2016, Shanghai, China.

12. Van Xiem Hoang and Trieu Duong Dinh and Thanh Ha Le (2016) *Spatial-Temporal Feature Extraction based Adaptive Search Range for Effective Frame Rate-Up Conversion.* In: the 2016 International Conference Advanced Technologies for Communications (ATC), 12-14 October 2016, Hanoi, Vietnam.

13. Sinh Cong Lam and Kumbesan Sandrasegaran and Quoc Tuan Nguyen (2016) *Performance of soft frequency*

reuse in random cellular networks in Rayleigh-Lognormal fading channels. In: 22nd Asia-Pacific Conference on Communications (APCC), 25-27 August 2016, Indonesia.

14. Dinh Minh Le and Tung Long Vuong and Van Xiem Hoang and Trieu Duong Dinh and Thanh Ha Le (2016) *Improving 3D-TV View Synthesis Using Motion Compensated Temporal Interpolation*. In: the 2016 International Conference Advanced Technologies for Communications (ATC), 12-14 October 2016, Hanoi, Vietnam.

15. Van Thanh Vu Le and Xuan Tu Tran (2016) *Kiến trúc mới cho giải pháp tái cấu hình mạng trên chip*. In: SW4PHD: the 2016 Scientific Workshop for PhD Students, 26 March 2016, Hanoi.

16. Van Tung Le and Duy Hung Pham and Trung Dung Ngo (2016) *Musicbot: Edutainment with a reconfigurable robotic system*. In: the 2016 International Conference Advanced Technologies for Communications (ATC), 12-14 October 2016, Hanoi, Vietnam.

17. Quang Hai Luong and Duc Tan Tran and Linh Trung Nguyen and Huu Tue Huynh (2016) *Estimation of elasticity and viscosity in heterogeneous medium using FDTD method and AHI algorithm*. In: 9th International Conference on Advanced Technologies for Communications (ATC), 12-14 October 2016, Hanoi, Vietnam.

18. Hai Luong Quang and Tan Tran Duc and Trung Nguyen Linh and Tue Huynh Huu (2016) *Estimation of elasticity and viscosity in heterogeneous medium using FDTD method and AHI algorithm*. In: 2016 International Conference on Advanced Technologies for Communications (ATC).

19. Truong Minh-Chinh and trung nguyen linh and Tan Tran Duc (2016) *On the implementation of chaotic compressed sensing for MRI*. In: 2016 International Conference on Advanced Technologies for Communications (ATC).

20. Dinh Nguyen Nguyen and Duc Quan Nguyen and Ngoc Tan Nguyen and Nam Hoang Nguyen (2016) *Đánh giá hiệu năng của các thuật toán phân bổ tài nguyên trong mạng truyền thông ánh sáng nhìn thấy sử dụng các chùm sáng định hướng*. In: The 2016 National Conference on Electronics, Communications, and Information Technology (REV), 23-24 December 2016, Hanoi, Vietnam.

21. Dinh The Anh Nguyen and Xuan Huy Le and Tuan Anh Vu and Gia Duong Bach (2016) *Research, Design and Fabrication of a Data Transceiver Module for Vessel Monitoring Systems*. In: the 2016 International Conference Advanced Technologies for Communications (ATC), 12-14 October 2016, Hanoi, Vietnam.

22. Duc-Quan Nguyen and Ngoc-Tan Nguyen and Nam-Hoang Nguyen and Keattisak Spirinmanwat (2016) *Light Beam Allocation Algorithm for Eliminating Interference in Visible Light Communications*. In: IEEE ATC2016.
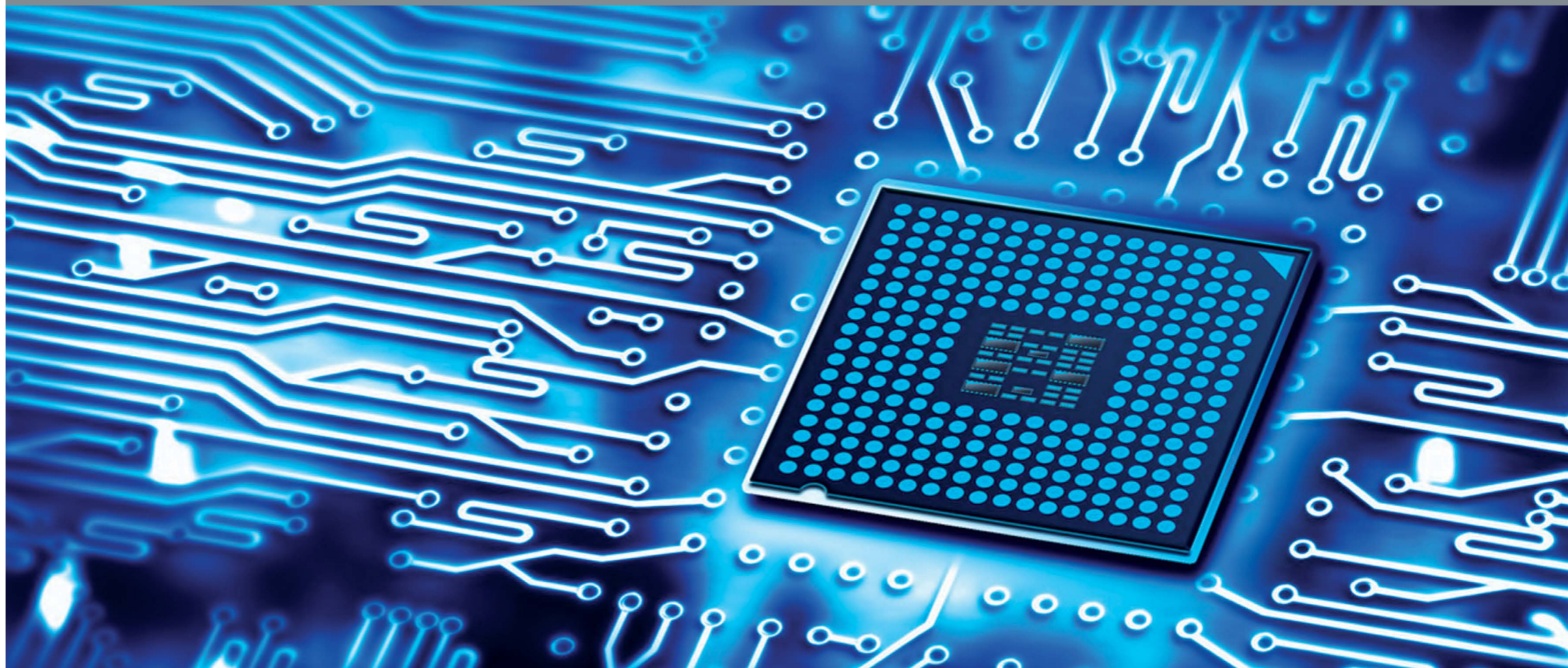
23. Kiem Hung Nguyen and Xuan Tu Tran (2016) *Design and Implementation of a Hybrid Switching Router for the Reconfigurable Network-on-Chip*. In: the 2016 International Conference Advanced Technologies for Communications (ATC), 12-14 October 2016, Hanoi, Vietnam.

24. Ngoc-Tan Nguyen and Quoc-Tuan Nguyen and Nam-Hoang Nguyen (2016) *The Index-based Optical Spatial Modulation Scheme in Optical MIMO*. In: IEEE ATC2016.

25. Thanh Trung Nguyen and Dinh Hoan Trinh and Linh Trung Nguyen (2016) *An efficient example-based method for CT image denoising based on frequency decomposition and sparse representation*. In: 9th International Conference on Advanced Technologies for Communications (ATC), 12-14 October, Hanoi, Vietnam.

26. Thi Huong Thao Nguyen and Huu Tien Vu and Van San Vu and Van Xiem Hoang and Thanh Ha Le and Trieu Duong Dinh (2016) *Side information creation using adaptive block size for distributed video coding*. In: the 2016 International Conference Advanced Technologies for Communications (ATC), 12-14 October 2016, Hanoi, Vietnam.

27. Thi Huyen Nga Nguyen and Thi Thu Ha Le and Ba Cuong Doan and Duc Tan Tran (2016) *Monitoring and classification of cow activities using three-dimensional accelerometers*. In: SSC: the 2016 Student Scientific Contest, 29 April 2016, Hanoi.

28. Thi Phuong Nguyen and Thi Thuy Quynh Tran (2016) *DOA estimation systems in correlated environment: Asym-AWPC-CS and Asym-AWPC-SML*. In: SSC: the 2016 Student Scientific Contest, 29 April 2016, Hanoi.

29. Thi Thuy Nguyen and Van Thanh Vu Le and Kiem Hung Nguyen and Xuan Tu Tran (2016) *Routing-path Tracking and Updating Mechanism in Reconfigurable Network-on-Chips*. In: The 2016 IEEE International Conference on Integrated Circuit Design and Technology, 27-29 June 2016, Ho Chi Minh city, Vietnam.

30. Van Thang Nguyen and Duc Trinh Chu and Duc Tan Tran (2016) *Application of Street Tracking Algorithm in a feedback configuration for an integrated INS/GPS navigation system*. In: SW4PHD: the 2016 Scientific Workshop for PhD Students, 26 March 2016, Hanoi.

31. Viet Dung Nguyen and Karim Abed-Meraim and Linh Trung Nguyen (2016) *Fast adaptive PARAFAC decomposition algorithm with linear complexity*. In: 2016 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 20-25 March 2016, China.

32. Viet Dung Nguyen and Karim Abed-Meraim and Linh Trung Nguyen (2016) *Fast adaptive PARAFAC decomposition algorithm with linear complexity*. In: 41th IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), 20-25 March, Shanghai, China.

33. Viet Dung Nguyen and Karim Abed-Meraim and Linh Trung Nguyen (2016) *Fast tensor decompositions for big data processing*. In: 9th International Conference on Advanced Technologies for Communications (ATC), 12-14 October 2016, Hanoi, Vietnam.

34. Viet Dung Nguyen and Karim Abed-Meraim and Linh Trung Nguyen (2016) *New robust algorithms for sparse non-negative three-way tensor decompositions*. In: 24th European Signal Processing Conference (EUSIPCO), 29 August - 2 September, Budapest, Hungary.

35. Chinh Nguyen Dinh and Cong Phi Khanh Phung and Duc Tan Tran and Vu Ha Le (2016) *Nghiên cứu và thiết kế mô hình hệ thống giám sát hành vi trên bò*. In: The 2016 National Conference on Electronics, Communications and Information Technology.

36. Thinh Nguyen Hong and Ha Le Vu and Cecile Barat and Christophe Ducottet (2016) *String distance for automatic image classification*. In: International Joint Conference on Convergence, Vietnam.

37. Anh Nguyen Tien and Tien Nguyen Van and Tan Tran Duc and Toan Nguyen Van and Hieu Le Chi and Quoc Le Hoai (2016)*Microfluidic Impedance Biosensors For Monitoring A Single And Multiple Cancer Cells In Anticancer Drug Treatments*. In: 6th International Conference on the Development of Biomedical Engineering in Vietnam.

38. Duy Hung Pham and Quang Vinh Tran and Trung Dung Ngo (2016) *Distributed Coverage Control for Networked Multi-Robot Systems in Any Environment*. In: SW4PHD: the 2016 Scientific Workshop for PhD Students, 26 March 2016, Hanoi.

39. Duy Hung Pham and Quang Vinh Tran and Trung Dung Ngo (2016) *Distributed coverage control for networked multi-robot systems in any environments*. In: 2016 IEEE International Conference on Advanced Intelligent Mechatronics (AIM), 2016, Banff, Alberta, Canada.

40. Duy Hung Pham and Quang Vinh Tran and Trung Dung

Ngo (2016) *An Online Local Boundary Detection and Classification Algorithm for Networked Multi-Robot Systems*. In: the 2016 International Conference Advanced Technologies for Communications (ATC), 12-14 October 2016, Hanoi, Vietnam.

41. Minh Trien Pham and Chang Seop Koh (2016) *Differential Evolution Using Adaptive Mutation Scaling Factor for Multi-Objective Electromagnetic Constrained Optimization Problems*. In: IEEE CEFC 2016, 13-16 November 2016, Miami, Florida, USA.

42. Hai Phong Phan and Xuan Tu Tran (2016) *Fuzzy-Logic based Low Power Solution for Network-on-Chip Architectures*. In: the 2016 International Conference Advanced Technologies for Communications (ATC), 12-14 October 2016, Hanoi, Vietnam. (In Press)

43. Hai Phong Phan and Xuan Tu Tran (2016) *Thiết kế và mô hình hoá bộ xử lý lô-gic mờ trong điều khiển tần số - điện áp*. In: SW4PHD: the 2016 Scientific Workshop for PhD Students, 26 March 2016, Hanoi.

44. Cong Phi Khanh Phung and Dinh Chinh Nguyen and Thi Cham Trinh and Thi Vui Pham and Duc Tan Tran (2016) *Classification of Cow Behavior using 3-DOF Accelerometer and Decision Tree Algorithm*. In: The 3rd International Conference on Biomedical Engineering, 5-6 October 2016, Hanoi.

45. Hannah Robbins and Changqing Liu and Sijung Hu and Thanh Tung Bui and Masahiro Aoyagi (2016) *Integration of a microfluidic chip with multiplexed optical fluorescence detector through anisotropic etching of Si using Tetramethylammonium hydroxide (TMAH)*. In: 2016 6th Electronic System-Integration Technology Conference (ESTC).

46. Van Luyen Tong and Vu Bang Giang Truong (2016) *Đề xuất mô hình hệ thống phần cứng để định dạng và điều khiển búp sóng cho các anten thông minh*. In: SW4PHD: the 2016 Scientific Workshop for PhD Students, 26 March 2016, Hanoi.

47. Duc Tan Tran and Linh Trung Nguyen (2016) *Investigating the performance of expert system in a multistage system for automatic detection of epileptic spikes*. In: JCC: the 2nd International Joint Conference on Convergence, 1 January 016, Hanoi, Vietnam.

48. Quang Huy Tran and Duc Tan Tran (2016) *The Efficiency of Applying Compressed Sampling and Multi-Resolution into Ultrasound Tomography*. In: SW4PHD: the 2016 Scientific Workshop for PhD Students, 26 March 2016, Hanoi.

49. Quang Huy Tran and Duc Tan Tran (2016) *Integration of compressed sensing and frequency hopping techniques for ultrasound tomography*. In: the 2016 International Conference on Advanced Technologies for Communications (ATC), 12-14 October 2016, Hanoi, Vietnam.

50. T. T. H. Tran and N. V. Nguyen and N.C. Nguyen and Thanh Tung Bui and Duc Trinh Chu (2016) *Biological microparticles detection based on differential capacitive sensing and dielectrophoresis manipulation*. In: 2016 International Conference on Advanced Technologies for Communications (ATC), 2016.

51. Van Hoi Tran and Gia Duong Bach (2016) *High gain low-noise amplifier design used for RF front end application*. In: SW4PHD: the 2016 Scientific Workshop for PhD Students, 26 March 2016, Hanoi.

52. Van Nam Tran and Anh Quy Hoang and Minh Trien Pham (2016) *Design and Implementation of a Multi-Robot System Based on Zigbee Network*. In: The 2016 National Conference on Electronics, Communications, and Information Technology (REV), 23-24 December 2016, Hanoi, Vietnam. (In Press)

53. Anh Vu Trinh and Van Thanh Pham (2016) *A simple diagram for data transmission using Manchester code*. In: the 2016 International Conference Advanced Technologies for Communications (ATC), 12-14 October 2016, Hanoi, Vietnam.

54. Minh Chinh Truong and Linh Trung Nguyen and Duc Tan Tran (2016) *On the Implementation of Chaotic Compressed Sensing for MRI*. In: the 2016 International Conference Advanced Technologies for Communications (ATC), 12-14 October 2016, Hanoi, Vietnam.

55. Minh Chinh Truong and Viet Dung Nguyen and Linh Trung Nguyen and Karim Abed-Meraim (2016) *Adaptive PARAFAC decomposition for third-order tensor completion*. In: The 6th International Conference on Communications and Electronics (ICCE), 27-29 July 2016, Ha Long, Vietnam.

56. Hoang Tuan Hiep Vu and Minh Chinh Truong and Duc Tan Tran (2016) *Cải tiến phương pháp lặp vi phân Born bằng đặt ngưỡng giới hạn*. In: The 2016 National Conference on Electronics, Communications and Information Technology.

57. Bin Xia and Minh Trien Pham and Gil-Gyun Jeong and Chang Seop Koh (2016) *Utilizing Adaptive Dynamic Taylor Kriging Assisted Multi- Objective DE Algorithm for Optimization Design of Electromagnetic Device*. In: IEEE CEFC 2016, 13-16 Nov 2016, Miami, Florida, U.S.A..

PATENT

VNU University of Engineering and Technology (2016) *Máy phát tín hiệu dải rộng cho radar thế hệ mới*. 1377.

VNU University of Engineering and Technology (2016) *Máy phát tín hiệu mã kiểm soát không lưu*. 1355.
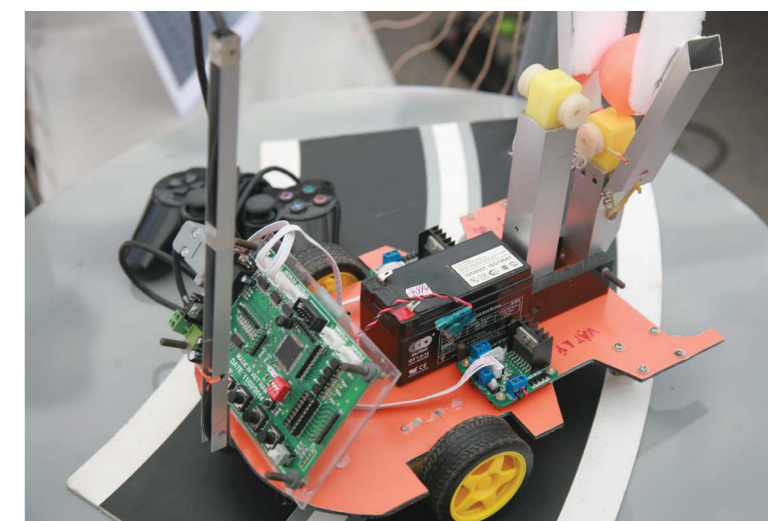
OVERVIEW

Faculty of Mechanical Engineering and Automation is one of the four training divisions at University of Engineering and Technology - Vietnam National University. To date, Faculty of Mechanical Engineering and Automation has had a 15-year history of teaching and development and is the second largest faculty in terms of scale with 800 students.

The Faculty is a new model, representing the cooperation of university, research institute and industrial corporation in the field of scientific research. In the beginning, the faculty was established and operated based upon the collaboration between University of Engineering and Technology (UET) and Institute of Mechanics – Vietnam Academy of Science and Technology. Overtime, this model was expanded through the cooperation among UET, Space Technology Institute (Vietnam Academy of Science and Technology) and Industrial Machinery and Instruments Holding, which took premise upon the agreements signed among the leaders.

MISSION AND OBJECTIVES

Under the mission of UET "to Establish and Develop UET to become a high quality Center for undergraduation and graduation training of human intelligent resources, research, development and application of different fields of modern technology, a famous university in educational system of Vietnam" FEMA is turning out undergraduate and graduate students of high range providing capacity of research and development in Engineering Mechanics, Mechatronics, Fluid-Gas Mechanics, Mechanics of solid, Mechanics of Materials and Composite Constructions.

FACULTY OF ENGINEERING MECHANICS AND AUTOMATION (FEMA)

G2 BUILDING, 144XUAN THUY ROAD, CAU GIAY DIST., HANOI, VIETNAM

WEBSITE: UET.VNU.EDU.VN/FRMA

TEL: (84-24) 3754 9431

FAX: (84-24) 37544760

TRAINING PROGRAMS IN PROGRESS

Undergraduate level: 02 programmes

☐ Mechanical Engineering, engineering degree, 4.5 years of training

☐ Mechatronic Technology, bachelor degree, 4 years of training

Faculty of Mechanical Engineering and Automation is the first faculty in Vietnam National University to establish a program for training engineers. During the training time, students have the chance to do experiment and intern at research institutes, industrial facilities so as to improve career skills and increase job opportunities.

Master level: 02 programmes

☐ Mechanical Engineering – Code: 62 52 02 01

☐ Mechatronic Technology - Code: 60 52 01 14

The structure of each program is built upon the premise of integration and interdisciplinary and aims to increase potential in sciences as well as to broaden the perspectives of future engineers so that they can meet the demand of Science and Technology development.

Doctorate Level:

☐ Mechanical Engineering - Code: 61 52 01 01

THE ORGANIZING STRUCTURE

Dean Panel: Dean of Faculty and 3 Associate Deans

04 Departments:

Hydraulic and Pneumatic Engineering in Industry and Environment;

Marine and Environmental Technology;

Aerospace Technology;

Mechatronic Technology.

Faculty Staff:

The teaching, researching and assisting staff of the faculty consists of 36 members, including tenured lecturers and adjunct lecturers, and is comprised of many leading professors, associate professors, scientific doctors, and doctors working at Institute of Mechanics, Space Technology Institute, National Research Institute of Mechanical Engineering, and Industrial Machinery and Instruments Holding. The faculty staff also has a Korean Lecturer holding a doctorate degree.

Besides tenured lecturers and concurrently lecturers, the faculty also has several visiting lecturers who take part in teaching some specialized courses and assisting students in projects and graduating theses.
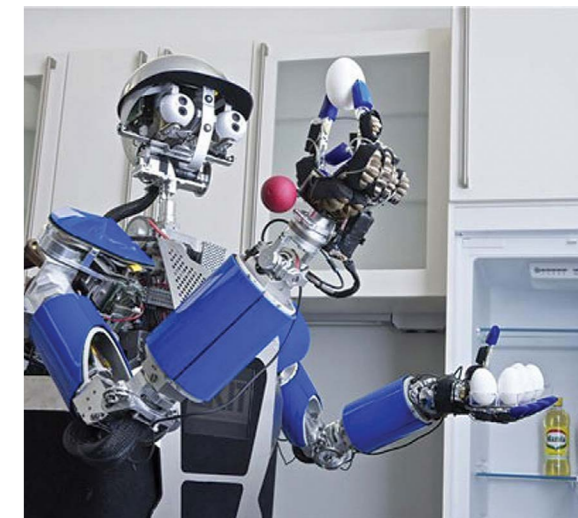
FACILITY

Faculty of Mechanical Engineering and Automation currently has 02 facilities:

• Facility 1, located within the campus of University of Engineering and Technology (144 Xuan Thuy, Cau Giay, Hanoi), is where most of the main activities take place, including administration, university program, graduate program, scientific research and international cooperation.

• Facility 2, located within the campus of Institute of Mechanics, Vietnam Academy of Science and Technology, mainly serves the training programs for university seniors and graduate students in Mechanical Engineering.

SCIENTIFIC RESEARCH

In terms of scientific research, ever since its establishment as an attached faculty, the Faculty of Mechanical Engineering and Automation has its staff and lecturers work closely with its partnered research institutes to launch and carry out several government's focal scientific research projects, belonging to KC.01, KC.03, KC.05, KC.09. Some of the faculty staff also chaired many fundamental research projects, sponsored by the National Foundation for Science and Technology Development (NAFOSTED).

Research areas include Mechatronics; River, Marine, Atmospheric and Environmental Mechanics; Engineering Mechanics; Diagnostic in Construction Engineering; Industrial Hydro Engineering Mechanics (in application in the Exploitation and Transportation of Oil and Gas; Processing Technology for Water and Air Environment; Technology for Flood Forecasting and Disaster Reduction, Technology for Nuclear Safety in nuclear power plants); Aerospace; Automation and Robotics; and Mechanics of Composite Materials and Structures.

INTERNATIONAL EXCHANGE AND COOPERATION

- Cooperation with Korean international cooperation Office for Science (KICOS) about human exchange. Two Korean specialists have been working at FEMA.

- Cooperation with many foreign Institutions such as Paris Ecole Polytique, University of Marseille, University of Caen (French), university of Stanford (USA), University of Hanover, university of Ilmenau, Institute of Mechatronics (FRG), Osaka University, Kyoto University (Japan), Seoul University, Pusan University and Pohang University (Korea) Yuan Ze university (Taiwan).

- Cooperation expansion with International Cooperation such as LG, Samsung, VIDAMCo, Hyundai.

SOCIAL AND SPORT ACTIVITY

In order to turn out graduate students with high knowledge, good health having a sense of responsibility FEMA organizes regularly social musical, sport, picnic activities supported always by a major number of students.

GRADUATING RATE AND JOB OPPORTUNITIES

To date, the faculty has been doing a good job in its training program for university-level students as well as graduate and post-grad students with its close connection with many research institutes and industrial corporates like the Institute of Mechanics, the Institute of Mechanical Engineering, IMI Corporate, etc. The graduating rate of the Faculty is high, ranging from 85% to 97%. The quality of graduating students is considered outstanding and promising. Within 6 months of graduation, more than 60% of the bachelors and engineers get a job in the field they pursued at the faculty and more than 90% of the students get a suitable and satisfactory job after graduating for one year. More specifically, among the students majoring in Mechatronics Technology from class K52 to K55M, more than 100 students were hired by Samsung after graduation. When the probation period was over, many students were appointed to key positions at many important Research and Development Institution.

In addition, students graduated from the faculty also got accepted to many other companies and corporates, namely Viettel Research and Development, Technical Instrument and Consultant Technology Jsc (TECOTEC Jsc), IKO Thompson, Panasonic, Toshiba, Nissan (Japan), Samsung (SVMC – Korea), etc and they are often highly esteemed by employers as having profound technical knowledge and adapting quickly to the modern working environment.

SELECTED PUBLICATIONS

1) On the high temperature mechanical behaviors analysis of heated functionally graded plates using FEM and a new third-order shear deformation plate theory

Quoc Tinh Bui and Van Thom Do and Lan Hoang That Ton and Hong Duc Doan and Satoyuki Tanaka and Dat Tien Pham and Thien-An Nguyen-Van and Tiantang Yu and Sohichi Hirose (2016) On the high temperature mechanical behaviors analysis of heated functionally graded plates using FEM and a new third-order shear deformation plate theory. Composites Part B: Engineering, 92. pp. 218-241. ISSN 1359-8368

Composite functionally graded materials (FGMs) are fabricated and most commonly used to operate in high temperature environments, where are expected to have significant changes in properties of constituent materials. The FGMs inherently withstand high temperature gradients due to low thermal conductivity, core ductility, low thermal expansion coefficient, and many others. It is essential to thoroughly study mechanical responses of FGMs and to develop new effective approaches for accurate prediction of solutions. We present in this paper new numerical results of high temperature mechanical behaviors of heated functionally graded (FG) plates, emphasizing the high temperature effects on static bending deflections and natural frequencies. A displacement-based finite element formulation associated with a novel third-order shear deformation plate theory (TSDT) without any requirement of shear correction factors is thus developed, taking the desirable properties and advantages of the TSDT theory as its kinematics of displacements are derived from elasticity theory rather than the hypothesis of displacement. The FG plates are assumed to be placed suffering high temperature environment, resulting in a uniform distribution of temperature across the plate thickness. The variation of material compositions across the thickness is described by a power-law distribution. Representative numerical examples of heated FG plates with different shapes are considered and obtained results are then investigated. The work additionally involves parametric studies performed by varying volume fraction, temperature range, material combinations, thickness-to-length ratio, etc., which have significant impacts on mechanical deflections and natural frequencies of heated FG plates. It is found that the $ZrO_2/SUS304$ plate possesses different static bending behaviors and performance compared to Al_2O_3/SUS_304 and Si_3N_4/SUS_304 plates due to the differences not only in the nonlinear thermal expansions but also in the material behaviors of constituent materials. In the contrary similar behaviors of natural frequencies of all FG plates is found.

2) High frequency modes meshfree analysis of Reissner–Mindlin plates

Quoc Tinh Bui and Hong Duc Doan and Van Thom Do and Sohichi Hirose and Dinh Duc Nguyen (2016) High frequency modes meshfree analysis of Reissner–Mindlin plates. Journal of Science: Advanced Materials and Devices, 1 (3). pp. 400-412. ISSN 2468-2179

Finite element method (FEM) is well used for modeling plate structures. Meshfree methods, on the other hand, applied to the analysis of plate structures lag a little behind, but their great advantages and potential benefits of no meshing prompt continued studies into practical developments and applications. In this work, we present new numerical results of high frequency modes for plates using a meshfree shear-locking-free method. The present formulation is based on Reissner–Mindlin plate theory and the recently developed moving Kriging interpolation (MK). High frequencies of plates are numerically explored through numerical examples for both thick and thin plates with different boundaries. We first present formulations and then provide verification of the approach. High frequency modes are compared with existing reference solutions and showing that the developed method can be used at very high frequencies, e.g. 500th mode, without any numerical instability.

3) Designing and Analyzing of a Dual-Buoy 5kW Wave Energy Converter

The Ba Dang and Van Tien Doan and Hoang Quan Nguyen (2016) Designing and Analyzing of a Dual-Buoy 5kW Wave Energy Converter. In: The 8th Asia-Pacific Workshop on Marine Hydrodynamics (APHydro), 20-23 January 02016, Ha Noi, Vietnam.

Ocean wave energy is a renewable energy source with a large potential to contribute to the world's electricity production. The work presented in this article is intended to calculate and analyze a dual-buoy 5kW wave energy converter. This device consists of two-body point absorber, one floating body and one semi-submerged body, which moves inside a tube. A linear permanent magnet generator that is a direct-driven conversion mechanism connects two bodies. In this article, a simple modeling approach for the linear permanent magnet generator is presented and its structure is described.

4) Hybrid phase field simulation of dynamic crack propagation in functionally graded glass-filled epoxy

Hong Duc Doan and Quoc Tinh Bui and Dinh Duc Nguyen and Kazuyoshi Fushinobu (2016) Hybrid phase field simulation of dynamic crack propagation in functionally graded glass-filled epoxy. Composites Part B: Engineering, 99 . pp. 266-276. ISSN 1359-8368

Numerical simulation of dynamic crack propagation in functionally graded glass-filled epoxy (FG) beams using a regularized variational formulation is presented. The Griffith's theory based hybrid phase field approach for diffusive fracture is taken, which is able to accurately simulate complex behaviors of dynamic crack growth in FGMs. The FG beams under impact loads experimented by Kirugulige and Tippur (Exper. Mech. 2006; 46:269–281) are considered, taking the same configurations, material property, crack location, and other relevant assumptions. The crack paths, crack length, crack velocity, energies, etc., computed through the hybrid phase field model are numerically analyzed, and some of those results are directly compared with the experimental data. Due to lack of necessary information regarding impact loading profiles and boundary conditions in setting the tests, the simulations become difficult as an inappropriate definition of loading and boundary conditions can significantly alter the outputs of numerical solutions. This issue is important and thus is discussed. Two specific loading profiles, the constant and the linear displacement velocities, are taken into account, while free-free FG beams are considered. We show that good agreements of crack paths between the experiment and phase field approaches can be obtained. Numerical results also confirm a significant effect of elastic gradients on final crack paths. Similar to the experimental results, we also found that the crack path kinks significantly when situated on the stiffer side compared to the compliant side of the FG specimen.

5) Bessel beam laser-scribing of thin film silicon solar cells by ns pulsed laser

Hong Duc Doan and Ryoichi IIDA and Byunggi KIM and Isao SATOH and Kazuyoshi FUSHINOBU (2016) Bessel beam laser-scribing of thin film silicon solar cells by ns pulsed laser. Journal of Thermal Science and Technology, 11 (1). JTST0011-JTST0011. ISSN 1880-5566

The thin film solar cells have attracted wide attentions for its low implementation cost and representative flexibilities such as selectivity of materials and fabrication conditions. On the thin film solar cells, width of the grooves of pattern 1, 2 and 3 are important factors to determine its efficiency and cost. In this study, as P1 fabrication process, ablation experiments of Transparent Conductive Oxide (TCO) coating on glass substrates of thin film solar cells are conducted using Bessel beam nanosecond laser pulse. The purpose is to assess the capability of the Bessel beam in laser scribing of thin film solar cells from the glass side. In order to fulfill this purpose, a Gaussian beam of 1064 nm nanosecond Nd:YAG was shaped into Bessel beam with few-micrometers beam width, using fluidic optical device. The Bessel beam, is used to backside laser ablation of a thin film. The function of the optical system and products fabricated with Bessel beam are compared with those of Gaussian beam. Experimental results show that: in the single pulse ablation, the vias ablated by Bessel beam have smaller variations in diameter and depth than those of Gausian beam at the same laser spot and peak fluence level. Furthermore, a few micrometer wide, perfectly isolated groove could be fabricated with Bessel beam. The paper concludes with suggestions for future research and potential application.

6) Extremum Seeking Control based MPPT for photovoltaic array under uniform and non-uniform irradiances

Van Manh Hoang and Ngoc Viet Nguyen and Manh Thang Pham (2016) Extremum Seeking Control based MPPT for photovoltaic array under uniform and non-uniform irradiances. In: The 4th International Conference on Engineering Mechanics and Automation (ICEMA), 25-27 July 2016, Hanoi, Vietnam.

In order to extract the maximum power from photovoltaic (PV) array, the maximum power point tracking (MPPT) technology has always been applied in PV systems. The Perturb and Observe (P&O) and Incremental Conductance (INC) methods are the most popular and widely used under the constant irradiance. However, the changes of the environmental parameters, such as cloud cover or the building block, will lead to the radiation change and then have a direct effect on the location of Maximum Power Point (MPP). In order to carry out MPPT in PV array under Partial Shading Conditions (PSCs), a method based on Extremum Seeking Control (ESC) is applied to determine the optimal value of a reference current in the PV system. The proposed ESC approach for the Global Maximum Power Point Tracking (GMPPT) in this work uses a series combination of a High Pass Filter (HPF) and two Low Pass Filters (LPFs). These three filters act as two Band Pass Filters (BPFs) and let a specific frequency of input power which includes the derivative of PV with respect to its voltage pass through. This auto-tuning strategy was developed to maximize the PV array output power through the regulation of the voltage input to the DC-DC boost converter in order to lead the PV array steady-state to a stable oscillation behavior around the Global Maximum Power Point (GMPP). The performance of the proposed ESC algorithm is evaluated by comparing it with the conventional ESC and modified P&O method in terms of tracking speed and accuracy by utilizing MATLAB SIMULINK. The simulation results

demonstrate that the tracking capability of the proposed ESC algorithm is superior to that of the conventional ESC and modified P&O algorithm, particularly under low radiance and sudden mutation irradiance conditions. Key Words: Boost converter; Extremum Seeking Control; Maximum Power Point Tracking (MPPT); Partial Shading Conditions (PSCs); Photovoltaic (PV) system.

7) Mechanism of TCO thin film removal process using near-infrared ns pulse laser: Plasma shielding effect on irradiation direction

Byunggi Kim and Ryoichi Iida and Hong Duc Doan and Kazuyoshi Fushinobu (2016) Mechanism of TCO thin film removal process using near-infrared ns pulse laser: Plasma shielding effect on irradiation direction. International Journal of Heat and Mass Transfer, 102 . pp. 77-85. ISSN 0017-9310

Substrate side irradiation is widely used for a thin film removal process because high absorption at the film/substrate or film/film interface leads to complete isolation of thin film by single shot irradiation of laser pulse with low energy. However, in the transparent thin film removal process, large thermal expansion or local phase change at the interface cannot be created by substrate side irradiation because of its large optical penetration depth compared to its small thickness. Nevertheless, substrate side irradiation works obviously for single shot film isolation process compared to film side irradiation, and the mechanism of the process was not clear in terms of difference in irradiation direction. In order to investigate the effect of the irradiation direction, this study focused on the transient interaction between the material and nanosecond laser pulse. Experimental results showed that film was thermally ablated. Variation of temporal profile of nanosecond laser pulse during the process was experimentally investigated to detect plasma shielding. Pulse width and energy transmittance of transmitted pulse decreased by plasma shielding as pulse energy increases regardless of irradiation direction. In addition, temperature distribution in the film during the process was investigated using a 2-dimensional thermal model, which accounts for melting, vaporization, and laser induced plasma shielding. Calculated temperature distribution was used to support the scenario of the process mechanism which was investigated in the experiments. Our findings demonstrate that laser induced backward ablation is a single shot TCO film removal mechanism, and plasma shielding is dominant factor to interrupt absorption of beam thorough the film in the film side irradiation process.

8) On the nonlinear stability of eccentrically stiffened functionally graded annular spherical segment shells

Dinh Duc Nguyen and Huy Bich Dao and Thi Thuy Anh Vu (2016) On the nonlinear stability of eccentrically stiffened functionally graded annular spherical segment shells. Thin-Walled Structures, 106 . pp. 258-267. ISSN 0263-8231

The nonlinear stability of eccentrically stiffened functionally graded (FGM) annular spherical segment resting on elastic foundations under external pressure is studied analytically. The FGM annular spherical segment are reinforced by eccentrically longitudinal and transversal stiffeners made of full metal or ceramic depending on situation of stiffeners at metal-rich or ceramic-rich side of the shell respectively. Based on the classical thin shell theory, the governing equations of FGM annular spherical segments are derived. Approximate solutions are assumed to satisfy the simply supported boundary condition of segments and Galerkin method is applied to study the stability. The effects of material, geometrical properties, elastic foundations, combination of external pressure and stiffener arrangement, number of stiffeners on the nonlinear stability of eccentrically stiffened FGM annular spherical segment are analyzed and discussed. The obtained results are verified with the known results in the literature.

9) Enhanced nodal gradient 3D consecutive-interpolation tetrahedral element (CTH4) for heat transfer analysis

Minh Ngoc Nguyen and Quoc Tinh Bui and Thien Tich Truong and Ngoc Anh Trinh and Indra Vir Singh and Tiantang Yu and Hong Duc Doan (2016) Enhanced nodal gradient 3D consecutive-interpolation tetrahedral element (CTH4) for heat transfer analysis. International Journal of Heat and Mass Transfer, 103 . pp. 14-27. ISSN 0017-9310

In this paper, formulation of a novel consecutive-interpolation 4-node tetrahedral finite element (CTH4) and its applications to the analysis of heat transfer problems in three-dimension (3D) are presented. The field variables approximation is performed on the way of taking both the nodal values and their averaged nodal gradients into account, in terms of the consecutive-interpolation procedure (CIP). The new CTH4 element proposed inherently possesses many desirable advantages over the conventional tetrahedral element (TH4) such as the higher accuracy, higher-order continuity, and continuous nodal gradients without smoothing operation. Importantly, the number of degrees of freedom of the system does not change, but still remains the nodal values as that of the TH4 element. We demonstrate the accuracy and performance of the developed CTH4 element through a series of numerical experiments of 3D heat transfer problems, in which comparison between the present obtained results and reference solutions derived from analytical solutions and other numerical approaches is made. We additionally propose a general formulation of auxiliary functions in terms of the CIP method. As a result, a family of CIP-based elements in all dimensions (i.e., 1D up to 3D) can now straightforwardly be establibshed since any auxiliary functions required by the CIP scheme are easily to be generated by using the present general formulation.

10) A Study on Low-Speed Wind Tunnel – Theory and Experiment

Minh Triet Nguyen and Van Long Nguyen and Ngoc Viet Nguyen and Ngoc Linh Nguyen and Manh Thang Pham (2016) A Study on Low-Speed Wind Tunnel – Theory and Experiment. In: International Conference on Engineering Mechanics and Automation (ICEMA), 25-27 July 2016, Hanoi, Vietnam. (In Press)

A wind tunnel is an important tool used in aerodynamic field to investigate the effects of airstream moving through solid objects. In this paper, a low-speed wind tunnel with a cross section of 50x250mm of working area and a free low velocity from 0 up to 27 m/s was considered. This model includes 30 differential pressure sensors, allows us to measure the pressure along the tunnel. In order to operate the system, a human-machine interface (HMI) in LabVIEW environment has been built. It allows us to modify the experimental parameters as well as display and collect the data. A number of tests with the model are carried out. The study shows that the results obtained from the experimental model are well agreed with the fluid dynamic theory. It shows that the low-speed wind tunnel proposed in this research can be used to study flow phenomena as well as to investigate the aerodynamic charateristics of testing objects.

11) Research on improving aerodynamic performance of an UAV airfoil using numerical simulation method

Ngoc Viet Nguyen and Van Manh Hoang and Ngoc Linh Nguyen (2016) Research on improving aerodynamic performance of an UAV airfoil using numerical simulation method. Journal of Science and Technology, 35 . pp. 35-38. ISSN 1859-3585

This paper shows research results which allow improving the aerodynamic performance of an UAV airfoil through the modeling and simulation of aerodynamic flow around an airfoil using Computational Fluid Dynamics (CFD) tools. Firstly, a model of wing with the NACA4415 across area is considered under the effect of low speed air flow at different coming angles. The aerodynamic characteristics of this airfoil will be simulated, calculated and analyzed. Based on the analysis, the author proposes a new design of UAV airfoil in order to improve the aerodynamic performance of the wing. Several profiles of proposed design have been investigated in the similar airstream conditions with respect to the initial one by using the numerical simulation method on COMSOL software. The results show the good response of the new design. This research can apply for the design and construction tasks about unmanned aerial vehicle (UAV) in Vietnam.

12) Designing and developing of a stabilizer for direct-driven wave energy converter

Van Duc Nguyen and The Ba Dang and Thang Long Nguyen (2016) Designing and developing of a stabilizer for direct-driven wave energy converter. In: International Conference on Engineering Mechanics and Automation (ICEMA), 25-27 July 2016, Hanoi, Vietnam. (In Press)

Direct driven wave energy converter with linear generator have advantages of simple, high reliability. However, the disadvantage of that device is the not stability in primary power source output. The report presents the results of a development and built a stabilizer for 3-phase 40W primary source from the direct driven wave energy convertor devices. Test results for the current stable 12VDC output, to meet the needs of some specific applications such as lighting or light signal buoy. This is the basis for the development of greater capacity variable device solution for converting wave energy on commercial scale.

13) Nonlinear dynamic and stability analysis of ES-FGM plates on elastic foundation

Hong Cong Pham and Dinh Duc Nguyen (2016) Nonlinear dynamic and stability analysis of ES-FGM plates on elastic foundation. In: SW4PHD: the 2016 Scientific Workshop for PhD Students, 26 March 2016.

Since its first introduction in 1984 by a group of material scientists in Japan, functionally graded materials (FGMs) have attracted considerable attention in many engineering applications namely extremely high temperature resistant materials. Eccentrically stiffened FGM (ES-FGM) was firstly studied in 2011 [1]. After that, ES-FGM was attracted and studied more by many authors; however, their studies mainly used classical theory and did not study the effects of temperature on stiffeners. This paper presents an analytical approach to investigate the nonlinear dynamic response and stability analysis of centrically stiffened FGM plates on elastic foundation using both the first order shear deformation plate theory and stress function. The ES-FGM plates are assumed to rest on elastic foundation and subjected to mechanical, thermal loads in thermal environment.

14) Nonlinear dynamic response of eccentrically stiffened FGM plate using Reddy's TSDT in thermal environment

Hong Cong Pham and Minh Anh Vu and Dinh Duc Nguyen (2016) Nonlinear dynamic response of eccentrically stiffened FGM plate using Reddy's TSDT in thermal environment. Thermal Stresses

The nonlinear dynamics of an eccentrically stiffened functionally graded material (ES-FGM) plates resting on the elastic Pasternak foundations subjected to mechanical and thermal loads is considered in this article. The plates are reinforced by outside stiffeners with temperature-dependent material properties in two cases: uniform temperature rise and through the thickness temperature gradient. Both stiffeners and plate are deformed under temperature. Using Reddy's third-order shear deformation plate theory, stress function, Galerkin and fourth-order Runge–Kutta methods, the effects of material and geometrical properties, temperature-dependent material properties, elastic foundations, and stiffeners on the nonlinear dynamic response of the ES-FGM plate in thermal environments are studied and discussed. Some obtained results are validated by comparing with those in the literature.

15) Stress Electro-Cardiogram Instrumentation: Principles and Structure

Manh Thang Pham and Ngoc Viet Nguyen and Van Manh Hoang and Ngoc Linh Nguyen (2016) Stress Electro-Cardiogram Instrumentation: Principles and Structure. In: International Conference on Engineering Mechanics and Automation (ICEMA), 25-27 July 2016, Hanoi, Vietnam. (In Press)

Electrocardiography, nowadays, is an essential part of the initial evaluation for patients presenting with cardiac complaints. However, an normal electrocardiography can not eliminate absolutely the heart disease. For example, in the case our heart rate is irregular and appears intermittently, if ECG is mearsured between the attacks, it will be normally. Also, not all cases of myocardial infarction were detected by normal ECG and angina is a typical case. At that time, we will need to consider a special ECG – Stress (Exercise) Echocardiography. Stress echo is done as part of a stress test. During a stress test, patients exercise or take medicine (given by doctor) to make their heart work hard and beat fast. A technician will use echo to create pictures of patients' heart before they exercise and as soon as they finish. Some heart problems, such as coronary heart disease, are easier to diagnose when the heart is working hard and beating fast. To meet the demands of this procedure, a stress electro-cardiogram instrumentation wil be used in order to observe and store the whole process. Generally, such this system consists of three main units: exercise equipment (treadmill/stationary bicycle), special ECG device and a supported computer system. By considering appropriate components, a stress ECG instrumentation can be designed and integrated completely.

16) A survey for wireless sensor network applications

Thai Son Tran and Van Manh Hoang and Manh Thang Pham (2016) A survey for wireless sensor network applications. In: The 4th International Conference on Engineering Mechanics and Automation (ICEMA), 25-27 July 2016, Hanoi, Vietnam.

Wireless Sensor Networks (WSN) are an emerging technology for low-cost with vital applications such as unattended monitoring of a wide range of environmental parameters and target tracking. This has been enabled by the availability, particularly in recent years, of sensors that are smaller, cheaper, and intelligent. These sensors are equipped with wireless interfaces that they can communicate with one another to create a network. The design of a WSN depends significantly on the applications, and it must consider factors such as the environment, the application's design objectives, cost, hardware, and system constraints. This work not only discusses about their potential advantages and disadvantages but also gives an overview of several new applications and identifies the research challenges associated with such applications.

17) The 2016 Annual Scientific Report of VNU University of Engineering and Technology

Xuan Tu Tran and Anh Cuong Le and Duc Tan Tran and Manh Thang Pham and Thi Huong Giang Do (2016) The 2016 Annual Scientific Report of VNU University of Engineering and Technology. VNU University of Engineering and Technology.

The University of Engineering and Technology (UET) was founded in 2004 as a member university of Vietnam National University, Hanoi (VNU). The last only five years have seen immense progresses in the development of our university in various aspects of its activities thanks to the great efforts put in by the government with strong financial supports, by the VNU with steering leadership and administration, by the national and international educational institutions and corporations in fruitful collaborations and advices, and by all the staff and students of the UET with determination, hard work and patience. Today, our university has built up a solid foundation for a sustainable and dynamic development in coming years. This solid foundation consists of a completed system of well-designed programs at both undergraduate and graduate levels, renovated teaching and learning facilities, a just limited but strong and advanced research infrastructure with state-of-the-art and completed equipment systems, a sustainable and fruitful collaboration with leading research and educational institutions in the country, and a bright, young, well-educated and welltrained faculty who are eager to take on advanced research and studies. All these have made our university a prestigious institution and firmly established its education and research capabilities. This is proved by the facts that only in the last four years our university has established close and solid ties and cooperation with prestigious foreign universities, just to name a few, the University Paris-Sud 11 (France), Japan Advanced Institute of Science and Technology, the National University of Singapore, Nanyang Technological University (Singapore), University of New South Wales and with famous international industrial and technological corporations such as Samsung, Toshiba, NEC, Mitani, Human Resocia, IBM, and other well-known institutions in the region and around the world. This is also proved in a convincing way by the facts that only in the last two years, our university has been granted several significant research projects from various national research programs. Our university has become an attractive destination for talented students at all training levels. We are proud that our university is the only Vietnamese higher-education institution that has one among the 100 best student's teams all over the world participating the World Final of the ACM International Collegiate Programming Contest (rank #29 in 2015). We are also proud that in this year, our faculty has won an award in the National Contest in Information Technology entitled "Vietnamese Talent Award" and three awards in the VNU Science & Technology Award for the period of 2011-2015. In the coming period, we shall put our great efforts to solidify our strength and prestige. We shall widen our training scope while paying significant attention to further improvement on the education quality. We shall strongly enhance our concentrated research activity by exploring efficiently and effectively our well established foundation for a further dynamic development and, thus, contributing our crucial part to the socio-economic development of our nation and fulfilling our great missions clearly assigned by the government in the decision on the establishment of our university. To do that, innovative thinking and acting by all faculty, administrative staff and students are of deciding role and of crucial importance.

18) On the nonlinear stability of eccentrically stiffened functionally graded annular spherical segment

Thi Thuy Anh Vu and Dinh Duc Nguyen (2016).On the nonlinear stability of eccentrically stiffened functionally graded annular spherical segment. In: SW4PHD: the 2016 Scientific Workshop for PhD Students, 26 March 2016, Hanoi.

The nonlinear stability of eccentrically stiffened functionally graded (FGM) annular spherical segment resting on elastic foundations under external pressure is studied analytically. The FGM annular spherical segments are reinforced by eccentrically longitudinal and transversal stiffeners made of full metal or ceramic depending on situation of stiffeners at metal-rich or ceramic-rich side of the shell respectively. Based on the classical thin shell theory, the governing equations of FGM annular spherical segments are derived. Approximate solutions are assumed to satisfy the simply supported boundary condition of segments and Galerkin method is applied to study the stability. Numerical results are given to evaluate effects of homogeneous, dimensional parameters, outside stiffeners, elastic foundations to the stability of the structures.

19) On the linear stability of eccentrically stiffened functionally graded annular spherical shell on elastic foundations

Thi Thuy Anh Vu and Hong Cong Pham and Huy Bich Dao and Dinh Duc Nguyen (2016).On the linear stability of eccentrically stiffened functionally graded annular spherical shell on elastic foundations. Advanced Composite Materials, 25 (6). pp. 525-540. ISSN 0924-3046.

The study deals with the formulation of governing equations of eccentrically stiffened functionally graded materials annular spherical shells resting on elastic foundations and based upon the classical shell theory and the smeared stiffeners technique taking into account geometrical nonlinearity in Von Karman-Donnell sense. The annular spherical shells are reinforced by eccentrically longitudinal and transversal stiffeners made of full metal or full ceramic depending on situation of stiffeners at metal-rich side or ceramic-rich side of the shell respectively. Approximate solutions are assumed to satisfy the simply supported boundary condition and Galerkin method is applied to obtain closed-form relations of bifurcation type of buckling loads. Numerical results are given to evaluate effects of inhomogeneous, dimensional parameters, outside stiffeners and elastic foundations to the buckling of structures.

20) Numerical modeling of 3-D inclusions and voids by a novel adaptive XFEM

Zhen Wang and Tiantang Yu and Quoc Tinh Bui and Ngoc Anh Trinh and Thi Hien Luong Nguyen and Dinh Duc Nguyen and Hong Duc Doan (2016) Numerical modeling of 3-D inclusions and voids by a novel adaptive XFEM. Advances in Engineering Software, 102. pp. 105-122. ISSN 0965-9978

This paper describes an adaptive numerical framework for modeling arbitrary inclusions and holes in three-dimensional (3-D) solids based on a rigorous combination of local enriched partition-of-unity method, a posterior error estimation scheme, and the variable-node hexahedron elements. In this new setting, a posteriori error estimation scheme driven by a recovery strain procedure in terms of extended finite element method (XFEM) is taken for adaptive purpose (local mesh refinement). Refinement is only performed where it is needed, e.g., the vicinity of the internal boundaries, through an error indicator. To treat the mismatch of different meshes-scale in 3-D, the variable-node hexahedron elements based on the generic point interpolation are thus integrated into the present formulation. The merits of the proposed approach such as its accuracy, effectiveness and performance are demonstrated through a series of representative numerical examples involving single and multiple inclusions/holes in 3-D with different configurations. The obtained numerical results are compared with reference solutions based on analytical and standard non-adaptive XFEM methods.

21) On the thermal buckling analysis of functionally graded plates with internal defects using extended isogeometric analysis

Tiantang Yu and Quoc Tinh Bui and Shuohui Yin and Hong Duc Doan and C.T. Wu and Van Thom Do and Satoyuki Tanaka (2016).On the thermal buckling analysis of functionally graded plates with internal defects using extended isogeometric analysis. Composite Structures, 136. pp. 684-695. ISSN 0263-8223

We investigate new numerical results of thermal buckling for functionally graded plates (FGPs) with internal defects (e.g., crack or cutout) using an effective numerical method. The new formulation employs the first-order shear deformation plate theory associated with extended isogeometric analysis (XIGA) and level sets. The material properties of FGPs are assumed to vary continuously through the plate thickness obeying a power function. The internal defects are represented by the level sets, while the shear-locking effect is eliminated by a special treatment, multiplying the shear terms by a factor. In XIGA, the isogeometric approximation enhanced by enrichment is cable of capturing discontinuities in plates caused by internal defects. The internal discontinuity is hence independent of the mesh, and the trimmed NURBS surface to describe the geometrical structure with cutouts is no longer required. Five numerical examples are considered and numerical results of the critical buckling temperature rise (CBTR) of FGPs computed by the proposed method are analyzed and discussed. The accuracy of the method is demonstrated by validating the obtained numerical results against reference solutions available in literature. The influences of various aspect ratios including gradient index, crack length, plate thickness, cutout size, and boundary conditions on the CBTR are investigated.

22) Assessing and selecting interventions for river water quality improvement within the context of population growth and urbanization: a case study of the Cau River basin in Vietnam

Pham Thi Thu Ha, Nomessi Kokutse, Sophie Duchesne, Jean-Pierre Villeneuve, Alain Bélanger, Ha Ngoc Hien, Babacar Toumbou, Duong Ngoc Bach, Environment, Development and Sustainability, DOI 10.1007/s10668-016-9822-7, ISSN 1387-585X.

In this study, a multi-criteria methodology is proposed to identify and prioritize interventions for water quality improvement with the aid of computer simulation models. The methodology can be used to elaborate and compare future socio-economic develop-ment scenarios to select the best interventions based on three criteria: (1) ideas of experts and stakeholders about the importance of scenarios, (2) impacts of each scenario on surface water quality in watershed, and (3) benefit–cost analysis for each scenario. A score is computed for each scenario based on a weighted sum technique which enables to take into consideration different level of importance for the three criteria. The methodology is applied to Cau River basin in Vietnam, with the aid of a computer tool, to assess

inter-ventions for river water quality improvement within the context of population growth and urbanization. The results show that fast future population growth in upstream has signif-icant impacts. In 2020, an increase of 116 % of the population in Bac Kan town can lead to an increase of 120 and 135 % in BOD5 and NH4+ median concentrations, respectively, with the implementation of a treatment plant for 10,000 people in Bac Kan town. Therefore, the increase of the domestic wastewater treatment plant's capacity in Bac Kan town, at least twice as the projection of local government, is necessary. These results will help decision makers to select the best interventions for Cau River basin management.

23) Study for Establishing the Dual-Porosity Model of Bach Ho Oil Fractured Basement Reservoir

Bui Huy Hoang, Ha Ngoc Hien, Nguyen The Duc, Nguyen Van Ut, Phan Ngoc Trung. Tạp chí Khoa học ĐHQGHN: Các Khoa học Trái đất và Môi trường, Tập 32, Số 3 (2016) 25-34

White Tiger is the largest oil and gas fields in Vietnam being put into operation so far. Since 1988, the reservoir simulation model for Bach Ho oilfield was built, improved and upgraded several times by Vietsovpetro. The simulation model has been used effectively in the reservoir design and management. Yet, as well as the majority of the reservoir simulation models for granitoid fractured basement in Vietnam, although they are carefully built, after a period of use, the forecasting results still give the considerable erronous forecasts as compared to reality. The latest model simulation is single-porosity model runs on the Schlumberger's ECLIPSE software. This singleporosity model provided the relatively good simulation results, but still cannot meet the long-term forecasting, because it should be continuously corrected over time. One of the reasons may be the reservoir / fractured oil formation behaves like dual porosity model that model of single-porosity fails to satisfy. Therefore, in this study, a model of dual-porosity for Bach Ho fractured basement reservoir was built based on actual data and the data conversion from single-porosity model. In particular, the parameters of single porosity model are considered as total effective parameters of fractured porous medium. The initial obtained results of the dual-porosity model show that the suitability of the actually measured data are quite good and more reliable than single-porosity model.

24) BODY PARAMETERS WITH APPLICATION OF OPTIMAL DIFFERENTIAL VARIATION METHOD IN SUPER CAVITY MODEL

Tran Thu Ha(1,2,4), Nguyen Anh Son(3), Duong Ngoc Hai(1,4)

[1] Institute of Mechanics -VAST – 264 Doi Can and 18 Hoang Quoc Viet Hanoi, Vietnam

[2] University of Engineering and Technology -VNU,144 Xuan Thuy, Hanoi, Vietnam

[3] National University of Civil Engineering, 55 Giaiphong Str., Hai Ba Trung Hanoi

[4] Institute of Science and Technology

When slender body running very fast under water (velocity is higher than 50m/s) the cavity phenomena is happened. In the cavity model body's length parts L_1, L_2 and the cavitator diameter Dc in motion equations are chosen by the differential variation optimal method so that the velocity of slender body running in cavity under water is maximum.

25) APPLICATION OF DATA ASSIMILATION FOR PARAMETER CORRECTION IN SUPER CAVITY MODELLING

*Tran Thu Ha[1, 2, 4, *], Nguyen Anh Son[3], Duong Ngoc Hai[1, 2, 4], Nguyen Hong Phong[1, 2]*

[1] Institute of Mechanics -VAST – 264 Doi Can and 18 Hoang Quoc Viet Hanoi, Vietnam

[2] University of Engineering and Technology -VNU,144 Xuan Thuy, Hanoi, Vietnam

[3] National University of Civil Engineering, 55 Giaiphong Str., Hai Ba Trung Hanoi

[4] Institute of Science and Technology -VAST 18 Hoang Quoc Viet, Hanoi, Vietnam

*Email: tran_thuha1@yahoo.com

On the imperfect water entry, a high speed slender body moving in the forward direction rotates inside the cavity. The super cavity model describes the very fast motion of body in water. In the super cavity model the drag coefficient plays important role in body's motion. In some references this drag coefficient is simply chosen by different values in the interval 0.8-1.0. In some other references this drag coefficient is written by the formula $k = C_{D0}(1+\sigma)\cos^2\alpha$ with σ is the cavity number, α is the angle of body axis and flow direction, C_{D0} is a parameter chosen from the interval 0.6-0.85. In this paper the drag coefficient $k = k_1 C_{D0}(1+\sigma)\cos^2\alpha$ is written with fixed C_{D0} = 0.82 and the parameter k_1 is corrected so that the simulation body velocities are closer to observation data. To find the convenient drag coefficient the data assimilation method by differential variation is applied. In this method the observing data is used in the cost function. The data assimilation is one of the effected methods to solve the optimal problems by solving the adjoin problems and then finding the gradient of cost function.

26) Recent Space Programs in Vietnam National Satellite Center

Le Xuan Huy, Vu Viet Phuong, Pham Anh Tuan. APRSAF-23 in the Philippines, November 15 - 18, 2016

Due to geographic location and climatic conditions, Vietnam is one of the most vulnerable countries in the world because of global warming and climate change. In particular, several

areas in Vietnam have low – lying coastline where can easily suffer salt water intrusion, floods, soil erosion and other hydrological disasters. Besides, some man-made catastrophes also frequently happen in Vietnam like oil spill, forest fire. This leads to the need to have a necessary tool to monitor, forecast and evaluate the impacts of disaster and climate change in Vietnam. Earth Observation Satellite is a proper and essential solution to take charge of these duties. Utilization of satellite technology to benefit social, economic and industrial interests has also been emphasized by the Government.

In 2006, the event of Vietnam's Prime Minister approved "The Strategy for Research and Application of Space Technology towards 2020" marked an important milestone for the development of space technology in Vietnam. In the next step, the Vietnam National satellite Center (VNSC), a national research agency operating under Vietnam Academy of Science and Technology (VAST), was established in 2011 by the Decision of the Prime Minister. The goal of VNSC is to build critical infrastructure and human resource capability to produce "Made-in-Vietnam" satellites by 2020. In order to achieve this result, VNSC established the Vietnam Space Center Project for satellites procurements/technology transfers, infrastructures and training. In addition, VNSC established the Vietnam Southern Satellite Technology Application Center (STAC) in Ho Chi Minh City. STAC's goal is to develop satellite application studies, especially in the southern region and to participate in the implementation of the Vietnam Space Center Project in the Ho Chi Minh City high-tech zone.

Moreover, VNSC has been implementing several projects related to design and development small Earth observation satellites. This report presents the achieved results and plans for these development programs of satellite technology in VNSC over the next decade.

FACULTY OF ENGINEERING PHYSICS AND NANOTECHNOLOGY **(FEPN)**

ROOM 2.2, E4 BUILDING, VNU UNIVERSITY OF ENGINEERING AND TECHNOLOGY,
144 XUAN THUY ROAD, CAU GIAY DISTRICT, HANOI, VIETNAM.

TEL: + 84 24 3754 9429

EMAIL: VLKT-CNNN@VNU.EDU.VN

WEBSITE: HTTP://FEPN.UET.VNU.EDU.VN

FACULTY MISSION

+ Education and training undergraduate programs for high quality human resources in Engineering Physics and Energy Engineering, postgraduate programs in Nanomaterials and devices, and Nanobiotechnology.

+ Research, technology transfer and application in science and technology related.
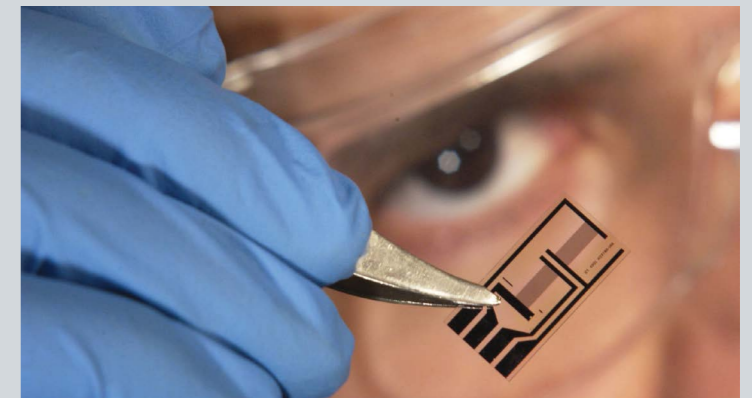
ORGANIZATION

+ Faculty Board and Secretary Office.

+ Council of Science and Training.

+ Departments: Nanophotonics Technology, Nanomagnetic Materials and Devices, Nanosemiconducting Materials and Devices, Nanobiotechnology; and laboratories.

MAIN RESEARCH TOPICS

+ Magnetic, piezoelectric materials and next generation of micro-nano structured composites and devices, integrated system for smart monitoring and control.

+ Photocatalyst, organic light emitting nanostructured materials and devices, energy conversion and storage, environmentally friendly systems.

+ Quantum field theory, nanophotonic materials, graphene and application in food safety.

+ Biomolecular, gene technology and application in biomedical and pharmaceutical.

SCIENTIFIC ACHIEVEMENT IN 2016

+ 9 ongoing research projects.

+ Publication on scientific journals (indexed in ISI, Scopus): > 1 articles/staff.

Publications

+ 21 papers indexed in ISI, Scopus.

+ 7 scientific papers in other journal.

Scientific events

Co-organizing International Workshop on Frontiers in Materials Science (FMS 2016), 28-30 October 2016, Hanoi, Vietnam.

This symposium continues on the success of the previous meetings in Hanoi, Vietnam 2013 and Tokyo, Japan 2015. FMS 2016 is specialized on condensed matter and covers a broad range of research activities in this area of modern physics.

Website: http://phys.hnue.edu.vn/fms2016/

Reseach products

3-axis maritime satellite communication antennas system: angle stabilization accuracy of 0.2 degree enable continous high-performance communication.
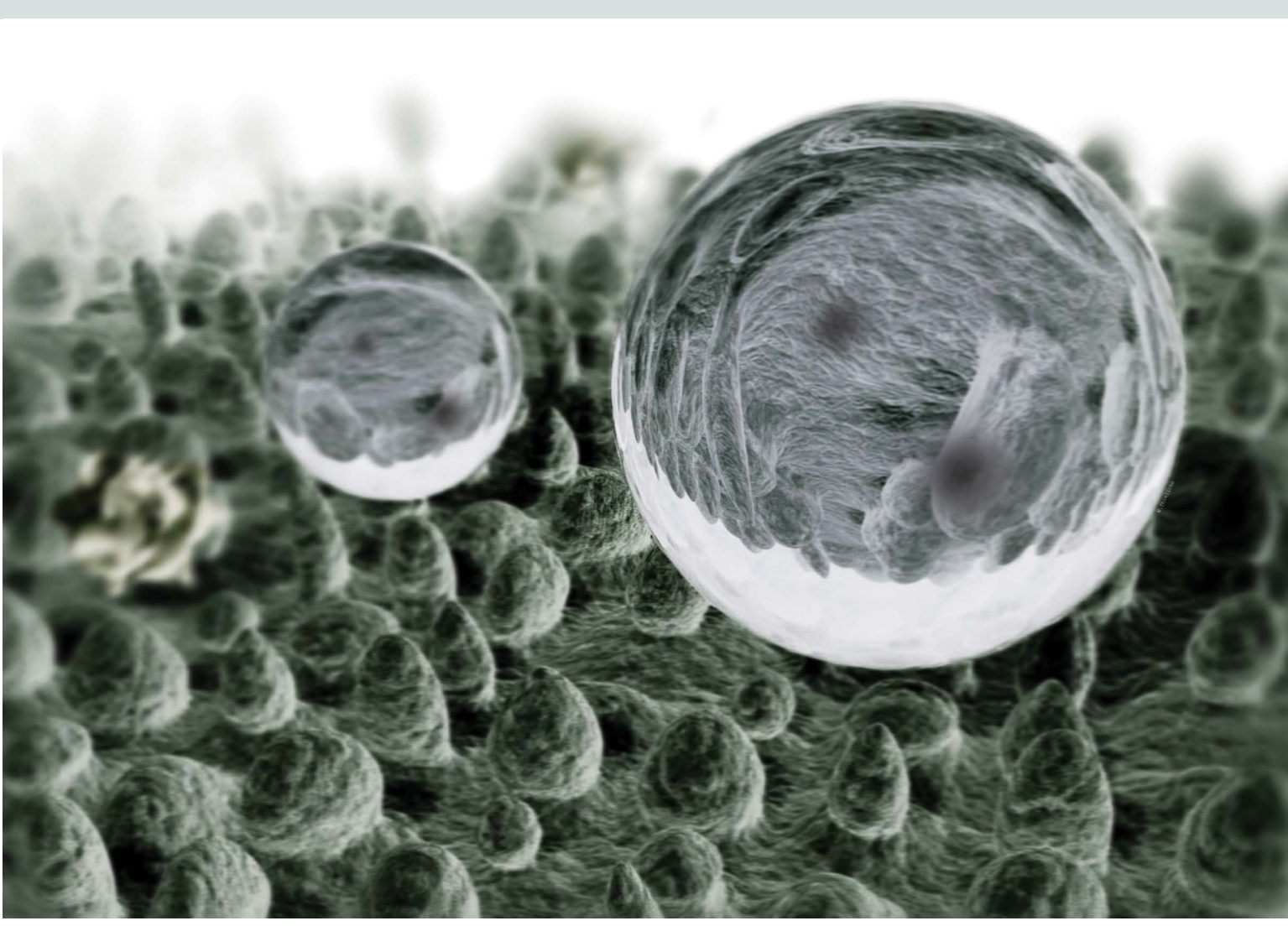
SELECTED PUBLICATIONS

1) B.H. Van, P.V. Ben, L.S. Dang, H.N. Nhat, Thermal dependence of free exciton emission in ultraviolet cathodoluminescence of colloidal ZnS, Journal of Luminescence 178 (2016) 134.

ABSTRACT: Cathodoluminescence properties of the colloidal ZnS nanopowders synthesized by using hydrothermal process, a large scale production method, are reported. The cathodoluminescence spectra were obtained for temperature from 5 to 300 K, where an intensive free exciton originated 326 nm emission was observed. This band did not split under the increase of excitation beam current density and prevailed even at room temperature. The weaker emissions appeared at 331, 333, 337 and 343 nm which were related to excitons bound to neutral acceptor (A^o, X), transition from conduction band to acceptor levels (e, A) and their corresponding (e, A)-1LO, (e, A)-2LO phonon replicas. With increasing temperature the free exciton band shifted towards lower energy and its intensity decreased at 36.5 meV thermal quenching threshold. The dependence of band gap on temperature was also determined.

2) N.D. Tho, D.V. Huong, H.T. Giang, P.Q. Ngan, G.H. Thai, D.T.A. Thu, D.T. Thu, N.T.M. Tuoi, N.N. Toan, P.D. Thang, H.N. Nhat, High temperature calcination for analyzing influence of 3d transition metals on gas sensing performance of mixed potential sensor Pt/YSZ/LaMO$_3$ (M= Mn, Fe, Co, Ni), Electrochimica Acta 190 (2016) 215.

ABSTRACT: In this work, the perovskite-type oxides LaMO3 (M = Mn, Fe, Co, Ni) were utilized for sensing electrodes of the electrochemical gas sensors based on the electrolyte YSZ (ZrO$_2$ + 8%mol Y$_2$O$_3$). The sensors with configuration of Pt/YSZ/LaMO$_3$ were sintered at high temperature of 1200 °C in order to analyze influence of the 3d transition metals (M) on gas-sensing characteristics of the perovskite-type oxide electrodes. The sensors were investigated by exposing to various gases of NO$_2$, NO, CO, C$_3$H$_8$ and CH$_4$. The sensor Pt/YSZ/LaFeO$_3$ had the best sensitive and selective characteristics to NO$_2$ gas. The sensors Pt/YSZ/LaMO$_3$ (M = Mn, Co, Ni) showed poor gas-selectivity. Valence variation of the 3d transition elements was used to explain the gas-sensing performance of the sensors Pt/YSZ/LaMO$_3$. The electrical conductance behavior of the oxides LaMO3 was also considered as an important parameter that affected to sensitivity of the sensors Pt/YSZ/LaMO$_3$, particularly in the high operating temperature.

3) V.V. Hiep, D.T.K. Anh, N.K. Thuan, L.V. Hong, H.N. Nhat, Magnetocaloric effect and the influence of pressure on magnetic properties of La-excess pseudo-binary alloys La$_{1+\delta}$ (Fe$_{0.85}$Si$_{0.15}$)$_{13}$, J. Appl. Phys. 120 (2016) 142120.

ABSTRACT: The La-excess alloys La$_{1+\delta}$(Fe$_{0.85}$Si$_{0.15}$)$_{13}$ (δ=0.06 and 0.09) exhibit large magnetocaloric effect which has been attributed to the occurrence of itinerant-electron metamagnetic transition near the Curie temperature T_C. The maximum entropy change -ΔS_m was shown to be from 4.5 to 11.5 J/kg K for the applied field variation ΔH from 20 to 70 kOe, respectively. The estimated relative cooling power for ΔH=70 kOe was 418 J/kg. The alloys show a typical NaZn$_{13}$-type cubic structure, featuring a doping-induced magnetovolume effect with the increase in T_C. Under the applied pressure up to 2 GPa, the T_C as deduced from resistance measurements decreased linearly, ΔT_C=113 (for δ =0.06) and 111 K (for δ =0.09), together with a corresponding decrease of resistivity, $\Delta \rho$=6.1 μΩ m at room temperature for both samples. At a low pressure, the effect of spontaneous magnetostriction on T_C caused by applying the pressure appeared to have a similar magnitude to that of the negative magnetovolume effect caused by La-excess doping. In comparison with other stoichiometric La(Fe$_{1-x}$Si$_x$)$_{13}$ compounds, the pressure in our case was shown to have a smaller influence on T_C.

4) T.A. Ho, T.L. Phan, P.D. Thang and S.C. Yu, Influence of Pb Doping on the Magnetocaloric Effect and Critical Behavior of $(La_{0.9}Dy_{0.1})_{0.8}Pb_{0.2}MnO_3$, Journal of Electronic Materials 45 (2016) 2328.

ABSTRACT: We used the modified Arrott plot method to analyze the magnetic field dependence of the magnetization, M(H), for a perovskite-type manganite $(La_{0.9}Dy_{0.1})_{0.8}Pb_{0.2}MnO_3$, and determined the critical parameter values $T_C = 248.4$ K, $\beta = 0.484 \pm 0.002$, $\gamma = 0.961 \pm 0.012$, and $\delta = 2.90 \pm 0.01$. With these exponent values, the M(H) data around T_C fall on two universal branches of a scaling function $M(H,\varepsilon)$ $M(H,\varepsilon) = |\varepsilon|^\beta f_\pm(H/|\varepsilon|^{\beta+\gamma})$, where $\varepsilon = (T - T_C)/T_C$ is the reduced temperature, f_+ for $T > T_C$ and f_- for $T < T_C$. Comparing with theoretical models, the exponent values obtained in our work are quite close to those expected from mean-field theory (with $\beta = 0.5$, $\gamma = 1$, and $\delta = 3$). This reveals nearly long-range ferromagnetic order existing in $(La_{0.9}Dy_{0.1})_{0.8}Pb_{0.2}MnO_3$. From the M(H) data, we also found that, around the ferromagnetic–paramagnetic phase-transition temperature (T_C), the magnetic entropy change reaches a maximum value ($|\delta S_{max}|$) of about 1.1 J kg^{-1} K^{-1} for $H = 10$ kOe, corresponding to relative cooling power (RCP) of 50 J/kg. In addition to the above investigation, the temperature dependence of the magnetization, remanent magnetization (M_r), and coercivity (H_c) were recorded to learn about the physical processes taking place in $(La_{0.9}Dy_{0.1})_{0.8}Pb_{0.2}MnO_3$.

5) Mai Ha Hoang, Toan Thanh Dao, Nguyen Thi Thu Trang, Phuong Hoai Nam Nguyen and Trinh Tung Ngo, Synthesis of Gold Nanoparticles Capped with Quaterthiophene for Transistor and Resistor Memory Devices, Journal of Chemistry 2016 (2016) ID 1247175.

ABSTRACT: Recently, the fabrication of nonvolatile memory devices based on gold nanoparticles has been intensively investigated. In this work, we report on the design and synthesis of new semiconducting quaterthiophene incorporating hexyl thiol group (4TT). Gold nanoparticles capped with 4TT (4TTG) were prepared in a two-phase liquid-liquid system. These nanoparticles have diameters in the range 2–6 nm and are well dispersed in the poly(3-hexylthiophene) (P3HT) host matrix. The intermolecular interaction between 4TT and P3HT could enhance the charge-transport between gold nanoparticles and P3HT. Transfer curve of transistor memory device made of 4TTG/P3HT hybrid film exhibited significant current hysteresis, probably arising from the energy level barrier at 4TTG/P3HT interface. Additionally, the polymer memory resistor structure with an active layer consisting of 4TTG and P3HT displayed a remarkable electrical bistable behavior.

6) L.M. Long, N.N. Dinh, T.Q. Trung, Synthesis and Characterization of Polymeric Graphene-Quantum-Dots based Nanocomposites for Humidity Sensing, J. Nanomater. 2016 (2016) 5849018.

ABSTRACT: Graphene quantum dots (GQDs) were synthesized and incorporated with polyethylenedioxythiophene:poly(4-styrenesulfonate) (PEDOT:PSS) and carbon nanotube (CNT) to form a composite that can be used for humidity sensors. The 600 nm thick composite films contained bulk heterojunctions of CNT/GQD and CNT/PEDOT:PSS. The sensors made from the composites responded well to humidity in a range from 60 to 80% at room temperature and atmospheric pressure. With a CNT content of 0.4 wt.% (GPC-1) to 0.8 wt.% (GPC-2) and 1.2 wt.% (GPC-3), the sensitivity of the humidity sensing devices based on CNT-doped graphene quantum dot-PEDOT:PSS composites was increased from 4.5% (GPC-1) to 9.0% (GPC-1) and 11.0% (GPC-2), respectively. The fast response time of the GPC sensors was about 20 s and it was much improved due to CNTs doping in the composites. The best value of the recovery time was found to be of 40 s, for the GPC composite film doped with 1.2 wt.% CNT content.

7) P.T.T. Mai, C.N. Chau, L.V. Boi, N.X. Hoan, P.D. Thang, I. Martin, P. Carrière, Enhancement of polarization property of silane-modified $BaTiO_3$ nanoparticles and its effect in increasing dielectric property of epoxy/$BaTiO_3$ nanocomposites, Journal of Science: Advanced Materials and Devices 1 (2016) 90.

ABSTRACT: The surface modification of synthesized nano-$BaTiO_3$ particles was carried out using γ-aminopropyl trimethoxy silane (γ-APS) in an ethanol/water solution. The modified particles were characterized by FTIR, TGA, surface charge analysis, and by dielectric constant measurement. The silane molecules were attached to the surface of $BaTiO_3$ particles through $Si\_O\_BaTiO_3$ bonds. The γ-APS grafted on $BaTiO_3$ made the dielectric constant of the particles increase at frequencies ≥ 0.3 kHz in a wide range of temperature (25°C–140°C), due to the presence of NH_2 groups. The dependence of the polarization vs. electrical field was measured in order to elucidate the dielectric behavior of the silane treated $BaTiO_3$ in comparison to untreated $BaTiO_3$. The nanocomposite based on epoxy resin containing $BaTiO_3$ nanoparticles untreated and treated with γ-APS was also prepared and characterized. The results indicated that the γ-APS-modified $BaTiO_3$ surfaces significantly enhanced the dielectric property of the nanocomposite.

8) D.T.H. Giang, N.H. Duc, G. Agnus, T. Maroutian, P. Lecoeur, Fabrication and characterization of PZT string based MEMS devices, Journal of Science: Advanced Materials and Devices 1 (2016) 214.

ABSTRACT: String based MEMS devices recently attract world technology development thanks to their advantages over cantilever ones. Approaching to this direction, the paper reports on the micro-fabrication and characterization of free-standing doubly clamped piezoelectric beams based on heterostructures of Pd/FeNi/Pd/PZT/LSMO/STO/Si. The displacement of strings is investigated in both static and dynamic mode. The static response exhibits a bending displacement as large as 1.2 μm, whereas the dynamic response shows a strong resonance with a high quality factor of around 35 depending on the resonant mode at atmospheric pressure. These findings are comparable with those observed in large dimension membrane and cantilever based MEMS devices, which exhibit high potentials in variety of sensor and resonant actuator applications.

9) L.K. Quynh, B.D. Tu, D.X. Dang, D.Q. Viet, L.T. Hien, D.T.H. Giang, N.H. Duc, Detection of magnetic nanoparticles using simple AMR sensors in Wheatstone bridge, Journal of Science: Advanced Materials and Devices 1 (2016) 98.

ABSTRACT: Wheatstone bridges incorporating a serially connected ensemble of simple AMR elements of $Ni_{80}Fe_{20}$ film were produced, targeting an application of a pinned magnetic field along the sensing magnetoresistor length. For the optimal dimension, the magnetoresistive element with length $l = 4$ mm, width $w = 150$ μm and thickness $t = 5$ nm still shows a rather modest AMR ratio (of about 0.85% only). However, the resulting bridge exhibits a sensitivity as large as 2.15 mV/Oe. This is according to a standard sensitivity of 1.80 mV/V/Oe and a detection limit better than 10^{-6} emu, which is almost doubled with respect to that in the typical commercial AMR devices and is comparable with Permalloy based PHE sensor. This is suitable to detect the superparamagnetic fluid of 50 nm-Fe_3O_4-chitosan.

10) D.H. Ninh, T.T. Thao, P.D. Long, N.N. Dinh, Characterization of electrochromic properties of polyaniline thin films electropolymerized in H_2SO_4 solution, Journal of Organic Polymer Materials 6 (2016) 30.

ABSTRACT: Polyaniline (PANI) onto indium-doped tin-oxide (ITO)-coated glass samples were prepared by electroopolymerization in 0.5 M H_2SO_4 solution. Structure and morphology characterization of the PANI films demonstrated that the films were grown onto ITO substrates in the form of polycrystalline microbelts separated by micropores. By analysing the UV-Vis absorption spectra of the PANI films, the energy bandgap was found to be approximately 2.75 eV. The PANI/ITO films exhibited a good reversible electrochromic display (ECD) performance when cycled in 0.1 M $LiClO_4$ + pro-py- lene carbonate. The response time of the ECD coloration was found to be as small as 15 s and the coloration efficiency was found to be 8.85 cm^2 ´ C^{-1}. After 100 cycles of the ECD performance, the cyclic voltammetry curve of the working electrode maintained unchanged. This demonstrates that the electropolymerized PANI films can be served as a good candidate for ECD applications, taking advantage of their excellent properties in terms of chemical stability.

11) N.T. Hang, D.V. Thuong, H.N. Nhat, D.V. Chau, Numerical Simulation of Phase Separation in Bulk Hetero-junction Photoactive Layer, The International Journal of Advanced Culture Technology 4 (2016) 31.

ABSTRACT: Morphology evolution of the active layer in bulk hetero-junction organic photovoltaic is modeled and visualized. The width of the phase domain can be predicted using the relationship of characteristics length and evolution time of the process. The 3D numerical simulation of the PCBM/P3HT blend morphology evolution with respect to time is presented. It is observed that the domain width of composition phase can be predicted by using the relationship between value of characteristic length R(t) and evolution time t.

12) L.T. Hien, L.K. Quynh, V.T. Huyen, B.D. Tu, D.M. Phuong, P.H. Nhung, D.T.H. Giang, N.H. Duc, DNA-magnetic bead detection using disposable cards and the anisotropic magnetoresistive sensor, Advances in Natural Sciences: Nanoscience and Nanotechnology 7 (2016) 045006.

ABSTRACT: A disposable card incorporating specific DNA probes targeting the 16 S rRNA gene of Streptococcus suis was developed for magnetically labeled target DNA detection. A single-stranded target DNA was hybridized with the DNA probe on the SPA/APTES/PDMS/Si as-prepared card, which was subsequently magnetically labeled with superparamagnetic beads for detection using an anisotropic magnetoresistive (AMR) sensor. An almost linear response between the output signal of the AMR sensor and amount of single-stranded target DNA varied from 4.5 to 18 pmol was identified. From the sensor output signal response towards the mass of magnetic beads which were directly immobilized on the disposable card surface, the limit of detection was estimated about 312 ng ferrites, which corresponds to 3.8 μemu. In comparison with DNA detection by conventional biosensor based on magnetic bead labeling, disposable cards are featured with higher efficiency and performances, ease of use and less running

cost with respects to consumables for biosensor in biomedical analysis systems operating with immobilized bioreceptor.

13) H.N. Tran, V.H. Nguyen, B.H. Nguyen and D.L. Vu, Light trapping and plasmonic enhancement in silicon, dye-sensitized and titania solar cells, Advances in Natural Sciences: Nanoscience and Nanotechnology 7 (2016) 013001.

ABSTRACT: The efficiency of a solar cell depends on both the quality of its semiconductor active layer, as well as on the presence of other dielectric and metallic structural components which improve light trapping and exploit plasmonic enhancement. The purpose of this work is to review the results of recent research on light trapping and plasmonic enhancement in three types of solar cells: thin-film silicon solar cells, dye-sensitized solar cells and solid-state titania solar cells. The results of a study on modeling and the design of light trapping components in solar cells are also presented.

14) B.H. Nguyen and V.H. Nguyen, Advances in graphene-based optoelectronics, plasmonics and photonics, Advances in Natural Sciences: Nanoscience and Nanotechnology 7 (2016) 013002.

ABSTRACT: Since the early works on graphene it has been remarked that graphene is a marvelous electronic material. Soon after its discovery, graphene was efficiently utilized in the fabrication of optoelectronic, plasmonic and photonic devices, including graphene-based Schottky junction solar cells. The present work is a review of the progress in the experimental research on graphene-based optoelectronics, plasmonics and photonics, with the emphasis on recent advances. The main graphene-based optoelectronic devices presented in this review are photodetectors and modulators. In the area of graphene-based plasmonics, a review of the plasmonic nanostructures enhancing or tuning graphene-light interaction, as well as of graphene plasmons is presented. In the area of graphene-based photonics, we report progress on fabrication of different types of graphene quantum dots as well as functionalized graphene and graphene oxide, the research on the photoluminescence and fluorescence of graphene nanostructures as well as on the energy exchange between graphene and semiconductor quantum dots. In particular, the promising achievements of research on graphene-based Schottky junction solar cells is presented.

15) V.H. Nguyen, B.H. Nguyen and N.D. Dinh, Theory of Green functions of free Dirac fermions in graphene, Advances in Natural Sciences: Nanoscience and

Nanotechnology 7 (2016) 015013.

ABSTRACT: This work is the beginning of our research on graphene quantum electrodynamics (GQED), based on the application of the methods of traditional quantum field theory to the study of the interacting system of quantized electromagnetic field and Dirac fermions in single-layer graphene. After a brief review of the known results concerning the lattice and electronic structures of single-layer graphene we perform the construction of the quantum fields of free Dirac fermions and the establishment of the corresponding Heisenberg quantum equations of these fields. We then elaborate the theory of Green functions of Dirac fermions in a free Dirac fermion gas at vanishing absolute temperature T = 0, the theory of Matsubara temperature Green functions and the Keldysh theory of non-equilibrium Green functions.

16) V.H. Nguyen, Recent advances in experimental basic research on graphene and graphene-based nanostructures, Advances in Natural Sciences: Nanoscience and Nanotechnology 7 (2016) 023001.

ABSTRACT: The present work is a review of the results achieved in the experimental basic research on following rapidly developing modern topics of nanoscience and nanotechnology related to graphene and graphene-based nanosystems: reduction of graphene oxide and investigation of physical properties of reduced graphene oxide; fabrication and investigation of graphene quantum dots; study of light emission from excited graphene; fabrication and investigation of graphene nanopores; preparation and investigation of graphene oxide-liquid crystals as well as aqueous graphene oxide dispersions. Besides presenting the scientific content of the above-mentioned five topics in detail, we briefly mention promising and interesting works, demonstrating that the area of basic research on graphene and graphene-based nanostructures is still being enlarged.

17) B.H. Nguyen and V.H. Nguyen, Promising applications of graphene and graphene-based nanostructures, 7 (2016) 023002.

ABSTRACT: The present article is a review of research works on promising applications of graphene and graphene-based nanostructures. It contains five main scientific subjects. The first one is the research on graphene-based transparent and flexible conductive films for displays and electrodes: efficient method ensuring uniform and controllable deposition of reduced graphene oxide thin films over large areas, large-scale pattern growth of graphene films for stretchble transparent electrodes, utilization of graphene-based transparent conducting films and graphene oxide-based ones in many photonic and optoelectronic devices and equipments such as the window

electrodes of inorganic, organic and dye-sensitized solar cells, organic light-emitting diodes, light-emitting electrochemical cells, touch screens, flexible smart windows, graphene-based saturated absorbers in laser cavities for ultrafast generations, graphene-based flexible, transparent heaters in automobile defogging/deicing systems, heatable smart windows, graphene electrodes for high-performance organic field-effect transistors, flexible and transparent acoustic actuators and nanogenerators etc. The second scientific subject is the research on conductive inks for printed electronics to revolutionize the electronic industry by producing cost-effective electronic circuits and sensors in very large quantities: preparing high mobility printable semiconductors, low sintering temperature conducting inks, graphene-based ink by liquid phase exfoliation of graphite in organic solutions, and developing inkjet printing technique for mass production of high-quality graphene patterns with high resolution and for fabricating a variety of good-performance electronic devices, including transparent conductors, embedded resistors, thin-film transistors and micro supercapacitors. The third scientific subject is the research on graphene-based separation membranes: molecular dynamics simulation study on the mechanisms of the transport of molecules, vapors and gases through nanopores in graphene membranes, experimental works investigating selective transport of different molecules through nanopores in single-layer graphene and graphene-based membranes toward the water desalination, chemical mixture separation and gas control. Various applications of graphene in bio-medicine are the contents of the fourth scientific subject of the review. They include the DNA translocations through nanopores in graphene membranes toward the fabrication of devices for genomic screening, in particular DNA sequencing; subnanometre trans-electrode membranes with potential applications to the fabrication of very high resolution, high throughput nanopore-based single-molecule detectors; antibacterial activity of graphene, graphite oxide, graphene oxide and reduced graphene oxide; nanopore sensors for nucleic acid analysis; utilization of graphene multilayers as the gates for sequential release of proteins from surface; utilization of graphene-based electroresponsive scaffolds as implants for on-demand drug delivery etc. The fifth scientific subject of the review is the research on the utilization of graphene in energy storage devices: ternary self-assembly of ordered metal oxide-graphene nanocomposites for electrochemical energy storage; self-assembled graphene/carbon nanotube hybrid films for supercapacitors; carbon-based supercapacitors fabricated by activation of graphene; functionalized graphene sheet-sulfure nanocomposite for using as cathode material in rechargeable lithium batteries; tunable three-dimensional pillared carbon nanotube-graphene networks for high-performance capacitance; fabrications of electrochemical micro-capacitors using thin films of carbon nanotubes and chemically reduced

graphenes; laser scribing of high-performance and flexible graphene-based electrochemical capacitors; emergence of next-generation safe batteries featuring graphene-supported Li metal anode with exceptionally high energy or power densities; fabrication of anodes for lithium ion batteries from crumpled graphene-encapsulated Si nanoparticles; liquid-mediated dense integration of graphene materials for compact capacitive energy storage; scalable fabrication of high-power graphene micro-supercapacitors for flexible and on-chip energy storage; superior micro-supercapacitors based on graphene quantum dots; all-graphene core-sheat microfibres for all-solid-state, stretchable fibriform supercapacitors and wearable electronic textiles; micro-supercapacitors with high electrochemical performance based on three-dimensional graphene-carbon nanotube carpets; macroscopic nitrogen-doped graphene hydrogels for ultrafast capacitors; manufacture of scalable ultra-thin and high power density graphene electrochemical capacitor electrodes by aqueous exfoliation and spray deposition; scalable synthesis of hierarchically structured carbon nanotube-graphene fibers for capacitive energy storage; phosphorene-graphene hybrid material as a high-capacity anode material for sodium-ion batteries. Beside above-presented promising applications of graphene and graphene-based nanostructures, other less widespread, but perhaps not less important, applications of graphene and graphene-based nanomaterials, are also briefly discussed.

18) B.H. Nguyen, V.H. Nguyen and H.N. Tran, Rich variety of substrates for surface enhanced Raman spectroscopy, Advances in Natural Sciences: Nanoscience and Nanotechnology 7 (2016) 033001.

ABSTRACT: The efficiency of the application of surface enhanced Raman spectroscopy (SERS) technique to each specified purpose significantly depends on the choice of the SERS substrate with an appropriate structure as well as on its performance. Until the present time a rich variety of SERS substrates was fabricated. They can be classified according to their structures. The present work is a review of main types of SERS substrates for using in the trace analysis application. They can be classified into 4 groups: (1) Substrates using gold nanoparticles (AuNPs) with spherical shape such as colloidal AuNPs, AuNPs fabricated by pulsed laser deposition, by sputtering or by capillary force assembly (CFA), substrates fabricated by electrospinning technique, substrates using metallic nanoparticle arrays fabricated by electron beam lithography combined with CFA method, substrates using silver nanoparticle (AgNP) arrays grain by chemical seeded method, substrates with tunable surface plasmon resonance, substrates based on precies subnanometer plasmonic junctions within AuNP assemblies, substrates fabricated by

simultaneously immobilizing both AuNPs and AgNPs on the same glass sides etc. (2) Substrates using nanostructures with non-spherical shapes such as gold nanowire (NW), or highly anisotropic nickel NW together with large area, free-standing carpets, substrates with obviously angular, quasi-vertically aligned cuboid-shaped TiO_2 NW arrays decorated with AgNPs, substrates using gold nanoprism monolayer films, substrates using silver nanocube dimmers or monodisperse close-packed gold nanotriangle monolayers. (3) Substrates using multiparticle complex nanostructure such as nanoparticle cluster arrays, gold nanoflowers and nanodendrites. (4) Flexible substrate such as paper-based swab with gold nanorods, adhesive polymer tapes fabricated by inkjet printing method and flexible and adhesive SERS tapes fabricated by decorating AuNPs via the conventional drop-dry method.

19) V.H. Nguyen, Basics of quantum field theory of electromagnetic interaction processes in single-layer graphene, Advances in Natural Sciences: Nanoscience and Nanotechnology 7 (2016) 035001.

ABSTRACT: The content of this work is the study of electromagnetic interaction in single-layer graphene by means of the perturbation theory. The interaction of electromagnetic field with Dirac fermions in single-layer graphene has a peculiarity: Dirac fermions in graphene interact not only with the electromagnetic wave propagating within the graphene sheet, but also with electromagnetic field propagating from a location outside the graphene sheet and illuminating this sheet. The interaction Hamiltonian of the system comprising electromagnetic field and Dirac fermions fields contains the limits at graphene plane of electromagnetic field vector and scalar potentials which can be shortly called boundary electromagnetic field. The study of S-matrix requires knowing the limits at graphene plane of 2-point Green functions of electromagnetic field which also can be shortly called boundary 2-point Green functions of electromagnetic field. As the first example of the application of perturbation theory, the second order terms in the perturbative expansions of boundary 2-point Green functions of electromagnetic field as well as of 2-point Green functions of Dirac fermion fields are explicitly derived. Further extension of the application of perturbation theory is also discussed.

20) B.H. Nguyen and V.H. Nguyen, Two-dimensional hexagonal semiconductors beyond graphene, Advances in Natural Sciences: Nanoscience and Nanotechnology 7 (2016) 043001.

ABSTRACT: The rapid and successful development of the research on graphene and graphene-based nanostructures has been substantially enlarged to include many other two-dimensional hexagonal semiconductors (THS): phosphorene, silicene, germanene, hexagonal boron nitride (h-BN) and transition metal dichalcogenides (TMDCs) such as MoS_2, $MoSe_2$, WS_2, WSe_2 as well as the van der Waals heterostructures of various THSs (including graphene). The present article is a review of recent works on THSs beyond graphene and van der Waals heterostructures composed of different pairs of all THSs. One among the priorities of new THSs compared to graphene is the presence of a non-vanishing energy bandgap which opened up the ability to fabricate a large number of electronic, optoelectronic and photonic devices on the basis of these new materials and their van der Waals heterostructures. Moreover, a significant progress in the research on TMDCs was the discovery of valley degree of freedom. The results of research on valley degree of freedom and the development of a new technology based on valley degree of freedom-valleytronics are also presented. Thus the scientific contents of the basic research and practical applications os THSs are very rich and extremely promising.

21) V.H. Nguyen, B.H. Nguyen, N.D. Dinh, N.A.H. Pham and V.T. Ngo, Two-point Green functions of free Dirac fermions in single-layer graphene ribbons with zigzag and armchair edges, Advances in Natural Sciences: Nanoscience and Nanotechnology 7 (2016) 045004.

ABSTRACT: Green function technique is a very efficient theoretical tool for the study of dynamical quantum processes in many-body systems. For the study of dynamical quantum processes in graphene ribbons it is necessary to know two-point Green functions of free Dirac fermions in these materials. The purpose of present work is to establish explicit expressions of two-point Green functions of free Dirac fermions in single-layer graphene ribbons with zigzag and armchair edges. By exactly solving the system of Dirac equations with appropriate boundary conditions on the edges of graphene ribbons we derive formulae determining wave functions of free Dirac fermions in above-mentioned materials. Then the quantum fields of free Dirac fermions are introduced, and explicit expressions of two-point Green functions of free Dirac fermions in single-layer graphene ribbons with zigzag and armchair edges are established.
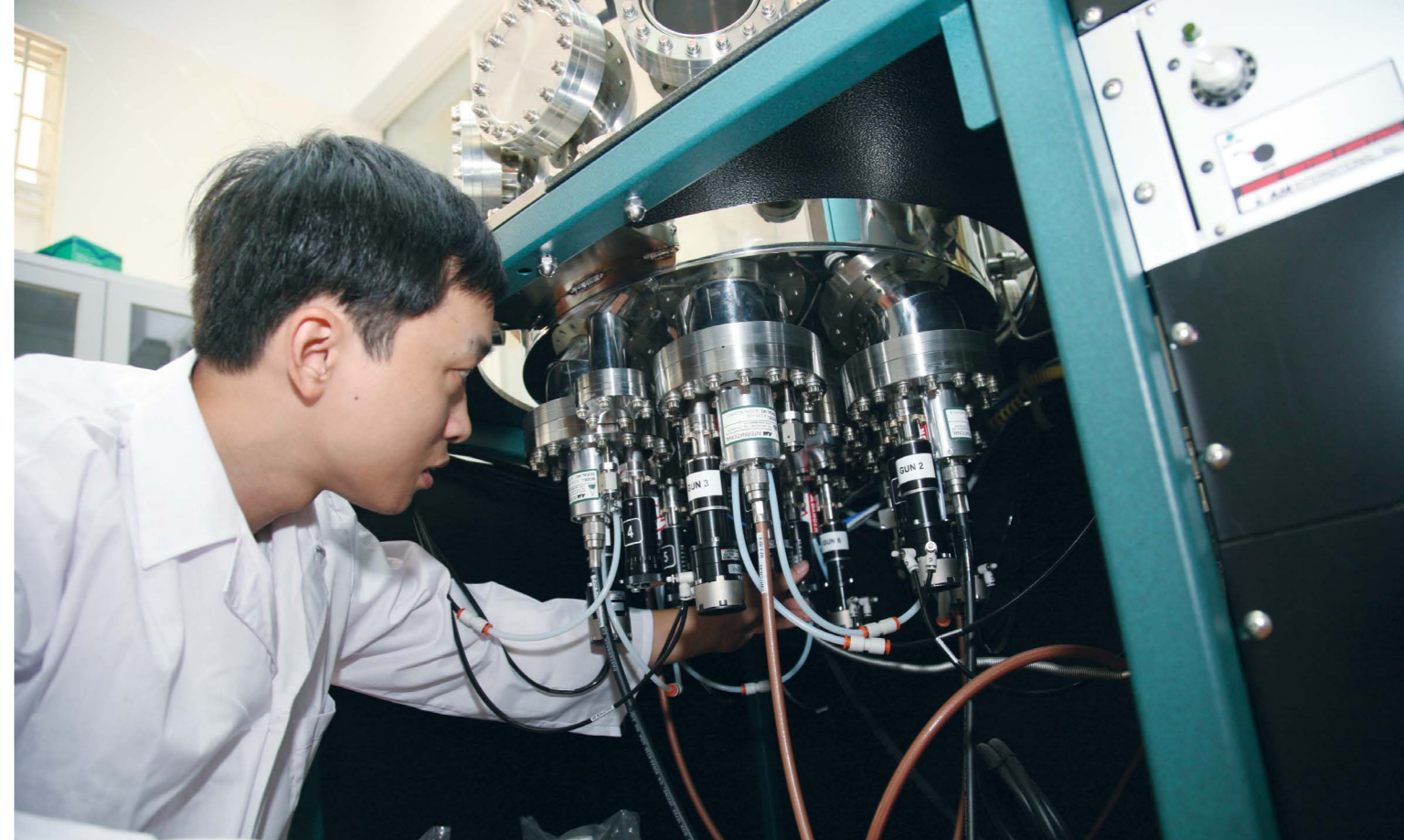
OTHER PUBLICATIONS

1) L.D. Trong, N.N. Dinh, D.H. Thanh, Preparation and characterization of $La_{0.67-x}Li_{3x}TiO_3$ solid-state electrolyte used for electrochromic mirrors, Materials Science and Applications 7 (2016) 702.

ABSTRACT: With the aim of producing all-solid-state electrochromic mirrors, $La_{0.67-x}Li_{3x}TiO_3$ (LLTO) and the WO3 were prepared by electron beam deposition. The LLTO (with x = 0.11) powder was synthesized by thermally ball-grinding method and the Li^+ ionic conductivity of the LLTO ceramic targets was found to be of ca. 3.25×10^{-3} S/cm. Using LLTO targets for e-beam evaporation, 300 nm-thick films with the Li^+ ionic conductivity of 5.50×10^{-5} S/cm were deposited. Combining LLTO films with WO3/ITO and $LiMn_2O_4$ layers, all-solid-state electrochromic mirrors with a laminar structure of $Al/LiMn_2O_4/LLTO/WO_3/ITO$ were prepared. The reversible reflectance of the mirrors was well controlled by applying polarized potentials onto the ITO electrode. The obtained results suggest useful applications for electrochromic windows working as a smart reflectance mirror that can be used for auto rear-view mirrors.
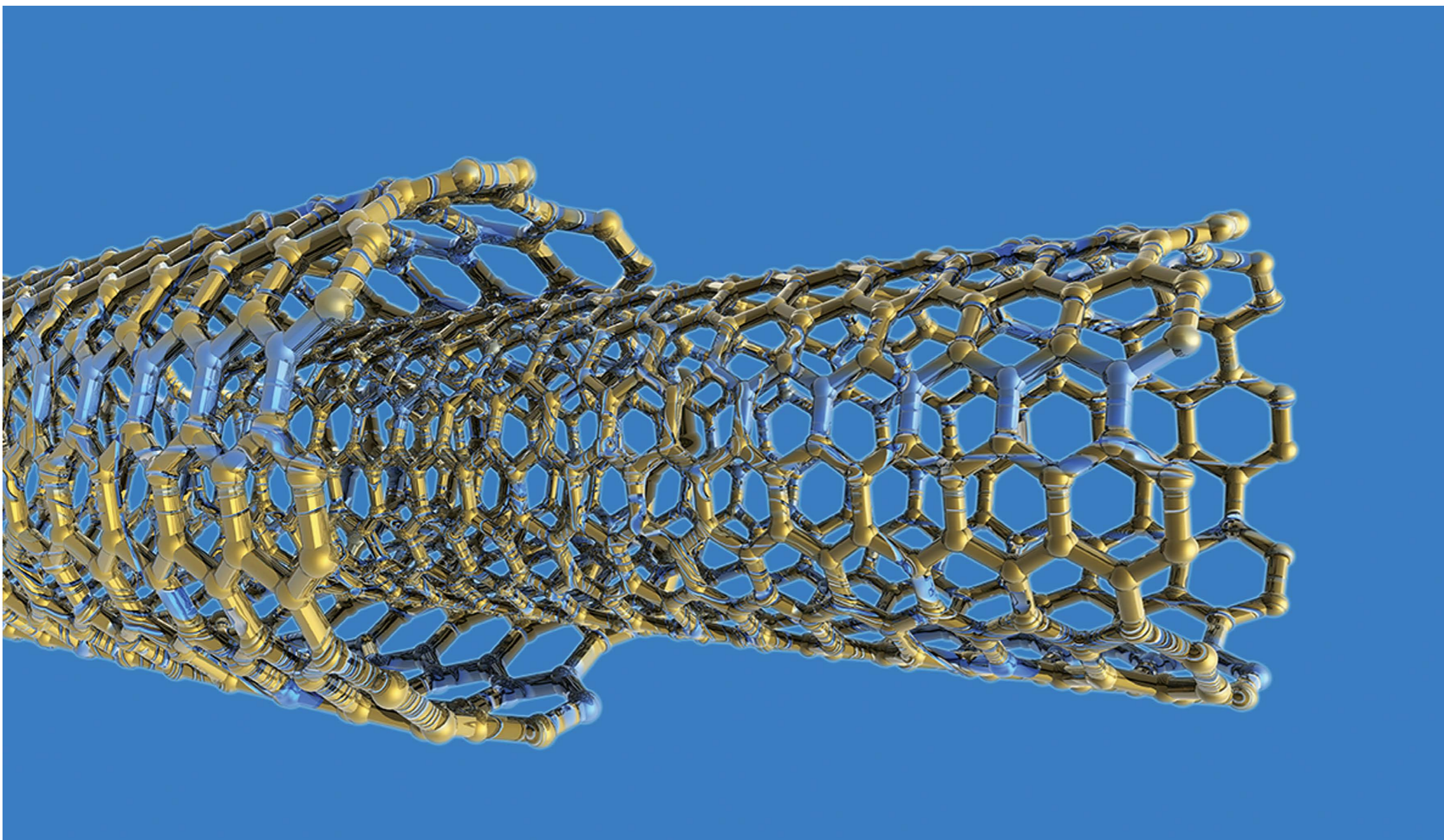
2) V.A. Tuan, B.H. Van, P.V. Ben, L.V. Hong, H.N. Nhat, Extinction of photoemission of Mn-Doped ZnS nanofluid in weak magnetic field, AIP Conference Proceedings 1763 (2016) 020001.

ABSTRACT: The observation of extinction of photoluminescence of Mn-doped ZnS nanofluid under applying of weak magnetic field is reported. At a constant field of 270 Gauss and above, the exponential decays of photoluminescent intensity was observed in disregard of field direction. About 50% extinction was achieved after 30 minute magnetization and a total extinction after 1 hour. The memory effect preserved for more than 2 hours at room temperature. This extinction was observed in a system with no clear ferromagnetic behavior.

3) T.T. Thao, D.D. Long, V.V. Truong, N.N. Dinh, Preparation and characterization of nanorod-like TiO_2 and ZnO films used for charge- transport buffer layers in P3HT based organic solar cells, AIP Conference Proceedings 1763 (2016) 030002.

ABSTRACT: With the aim of findingout the appropriate buffer layers for organic solar cells (OSC), TiO_2 and ZnO on ITO/glass were prepared as nanorod-like thin films. The TiO_2 films were crystallyzed in the anatase phase and the ZnO films, in the wurtzite structure. The nanorods in both the fims have a similar size of 15 to 20 nm in diameter and 30 to 50 nm in length. The nanorods have an orientation nearly perpendicular to the ITO-substrate surface. From UV-Vis data the bandgap of the TiO_2 and ZnO films were determined tobe 3.26 eV and 3.42 eV, respectively. The laminar organic solar cells with added TiO_2 and ZnO, namely ITO/TiO_2/P3HT:PCBM/LiF/Al (TBD) and ITO/ZnO/P3HT:PCBM/LiF/Al (ZBD)were made for characterization

Kagome lattice spin-1/2 XY model with a four-site ring-exchange interaction using quantum Monte Carlo simulation. We found the second order phase transition from superfluid state to a Z2 quantum spin liquid phase driven by the four-site ring exchange interaction. We have characterized the QSL by its vanishing order parameters such as the spin-spin structure factor, the plaquette-plaquette structure factor. Moreover, we have found the large anomalous exponent $\eta_{XY^*} \approx 1.325$ which belongs to a different universality class other than 3D XY universality class. There is no signal of supersolid phase intervening between the superfluid state and QSL state.

7) H.T. Quyen, H.T.M. Tu, Selection of lactic acid bacteria producing bacteriocin, Journal of Vietnamese Environment 8 (2016) 271.

ABSTRACT: In this work, lactic acid bacteria were isolated from 10 samples of the traditionally fermented foods (5 samples of Vietnamese fermented pork roll and 5 samples of the salted field cabbage) and 5 samples of fresh cow milks. These samples were collected from households in Vietnam. 22 strains of lactic acid bacteria were isolated for inhibition to Lactobacillus plantarum JCM 1149. Of these, only 2 strains including DC1.8 and NC1.2 have rod shape, the others have coccus shape. There were 7 strains showing higher antibacterial activity and selected forchecking spectrum of antibacteria with indicator bacteria consistting of Bacillus subtilis ATCC 6633, Enterococcus faecium JCM 5804 and Staphylococcus aureus TLU. . . By which, 3 strains including NC3.5 (from Vietnamese fermented pork roll), DC1.8 (from salted field cabbage) and MC3.19 (from fresh cow milk) were selected because of their higher antibacterial ability. However, the antibacterial activity of the lactic acid bacteria can be based on disposable compounds of them and some other antibacterial compounds produced during of their growth (such as lactic acid, H_2O_2, bacteriocins,...). For seeking lactic acid bacteria with capability of producing bacteriocins, antibacterial compounds with protein nature, 3 above strains were checked sensitive to proteases (including protease K, papain, α - chymotrypsin and trypsin). Because bacteriocins are proteinaceous antibacterial compounds, so their antibacterial activity will be reduced if proteases are added. The result showed DC1.8 and MC3.19 were capable of producing bacteriocin during culture process. These two strains were classified to species based on analysis chemical characterisitcs by standard API 50 CHL kit and phylogeny relationship by 16s rRNA sequences. DC1.8 was identified as Lactobacillus acidophilus and MC3.19 as Lactococcus lactis.

of the energy conversion performance. As a result, comparing to TiO_2,the nanorod-like ZnO film was found to be a much better buffer layer that made the fill factor improve from a value of 0.60 for TBD to 0.82 for ZBD, and consequently the PCE was enhanced from 0.84 for TBD to 1.17% for ZBD.

4) N.N. Dinh, L.M. Long, H.T. Thu, H.T.M. Hoa, T.Q. Trung, Synthesis and characterization of Ag/PEDOT:PSS films used for NH_3 selective sensing, Comm. Phys. 26 (2016) 173.

ABSTRACT: Nano-Ag/PEDOT-PSS films were prepared by spin-coating technique. SEM surface morphology, Raman spectra and gas sensing of methanol, humidity and NH_3 were studied. The obtained results showed that the resistance of Ag/PEDOT:PSS sheets exposed to gases related to the generation of electrons from the gases adsorption that eliminated holes as the major carriers in PEDOT:PSS. For NH_3 gas the largest change of the resistance of Ag/PEDOT:PSS was observed. The less sensitivity of humidity and ethanol sensing was explained due to less dedoping reaction between H_2O and ethanol vapor with Ag/PEDOT:PSS, respectively. This suggests a potential application of the nano-Ag/PEDOT-PSS sensors for the selective monitoring NH_3 gas in environment.

5) T. Dung, D. Long, Electric-field control of a spin "bit" configuration in MERAM model: A Monte Carlo study, VNU Journal of Science 32 (2016) 61.

ABSTRACT: Magnetoelectric (ME) effect can be realized in multiferroic composites composed of the alternative ferromagnetic (FM) and ferroelectric (FE) multilayer such as FM layer grown on top of FE layer (FM/FE). In this work, we have shown that the spin orientation in FM layer can be controlled by using the electrical field indirectly via the elastic mechanism between these layers. There is a critical electric field for each FM layer such as Fe, Fe_3O_4, which is the minimum electric field to switch the spin to the different directions in space. TheMonte Carlo simulation has been applied for the anisotropy model taken into account the magnetocrystalline anisotropy and shape anisotropy as well as the effective anisotropy field. The particular spin switching, i.e. an angle of 90 degree switching, corresponding to bit "0" and "1" switching in magnetoelectric random access memory (MERAM) will be discussed.
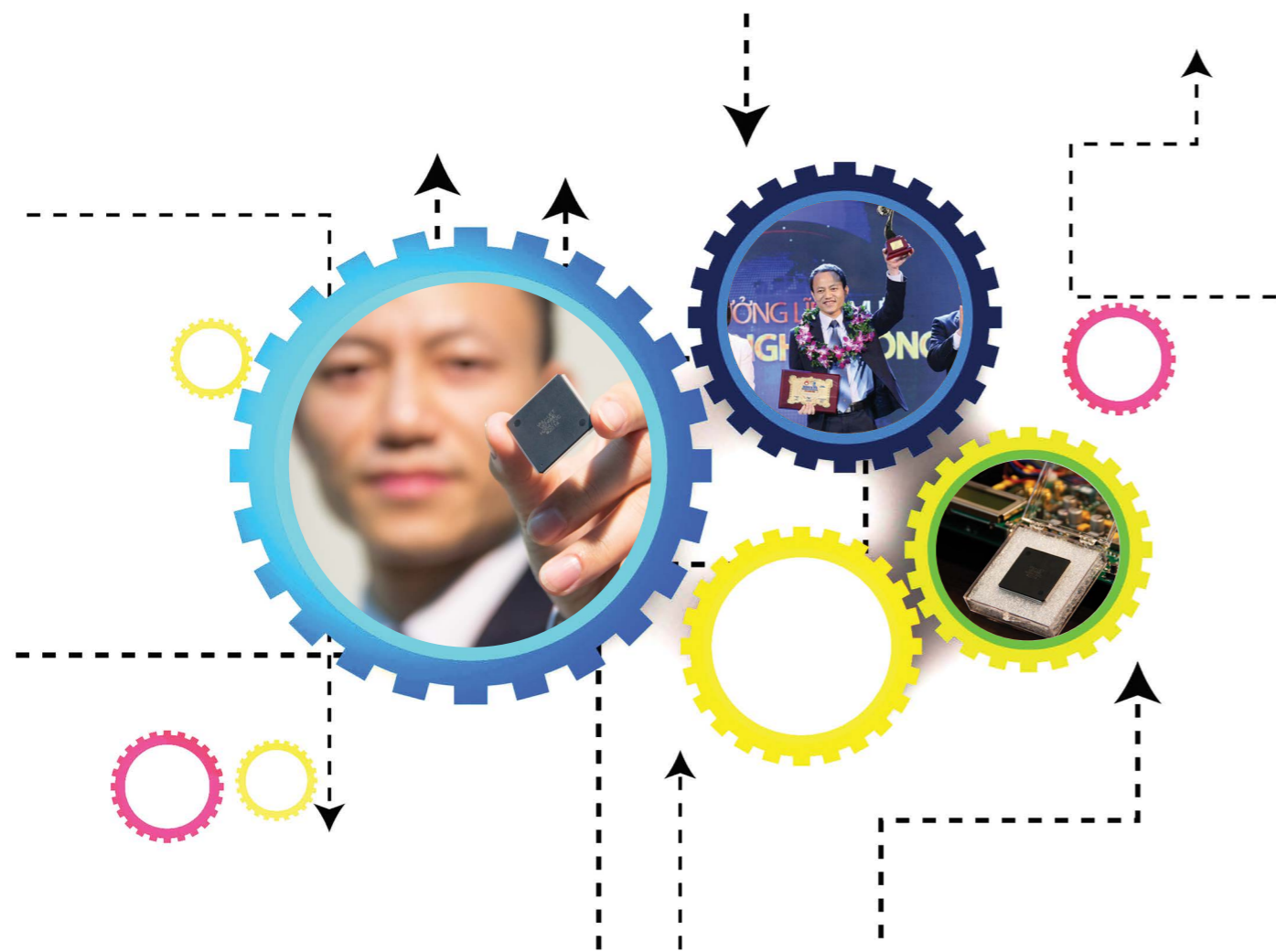
6) N.T.K. Oanh, P.T. Dai, D.D. Long, The physics of spin-1/2 XY model with four-site exchange interaction on the Kagome lattice, Journal of science and Technology 54 (2016) 17.

ABSTRACT: The quantum spin liquid (QSL) state, proposed more than three decades ago by Fazekas and Anderson remains surprisingly elusive. Although recent experiments provide a strong evidence of their existence in the frustrated spin systems, the microscopic model for this state is still rare. The extensive theoretical framework, developed over decades, continues to extend further motivated by these and other discoveries from large-scale computer simulations of a relatively small number of models. In this work, we discuss the physics of the ground-state phase diagram of a two-dimensional

Founded in 2008, the Laboratory for Smart Integrated Systems, University of Engineering and Technology has been re-established as VNU Key Laboratory for Smart Integrated Systems (SISLAB) in April 2016. SISLAB is one of 7 key laboratories of Vietnam National University Hanoi (VNU).

MISSION & VISION

Vision:

Become one of the national leading laboratories in the design, development, and applications of smart integrated circuits and systems.

Mission:

Organizing and fostering research and development activities in advanced and emerging technologies in the fields of smart integrated circuits and systems, computer engineering, artificial intelligence… according to the scientific strategies of VNU as well as of the country.

Establishing and sustaining a culture of "innovative and collaborative value creation" to attract and connect scientific experts to promote R&D activities as well as high-level education (i.e. PhD supervision).
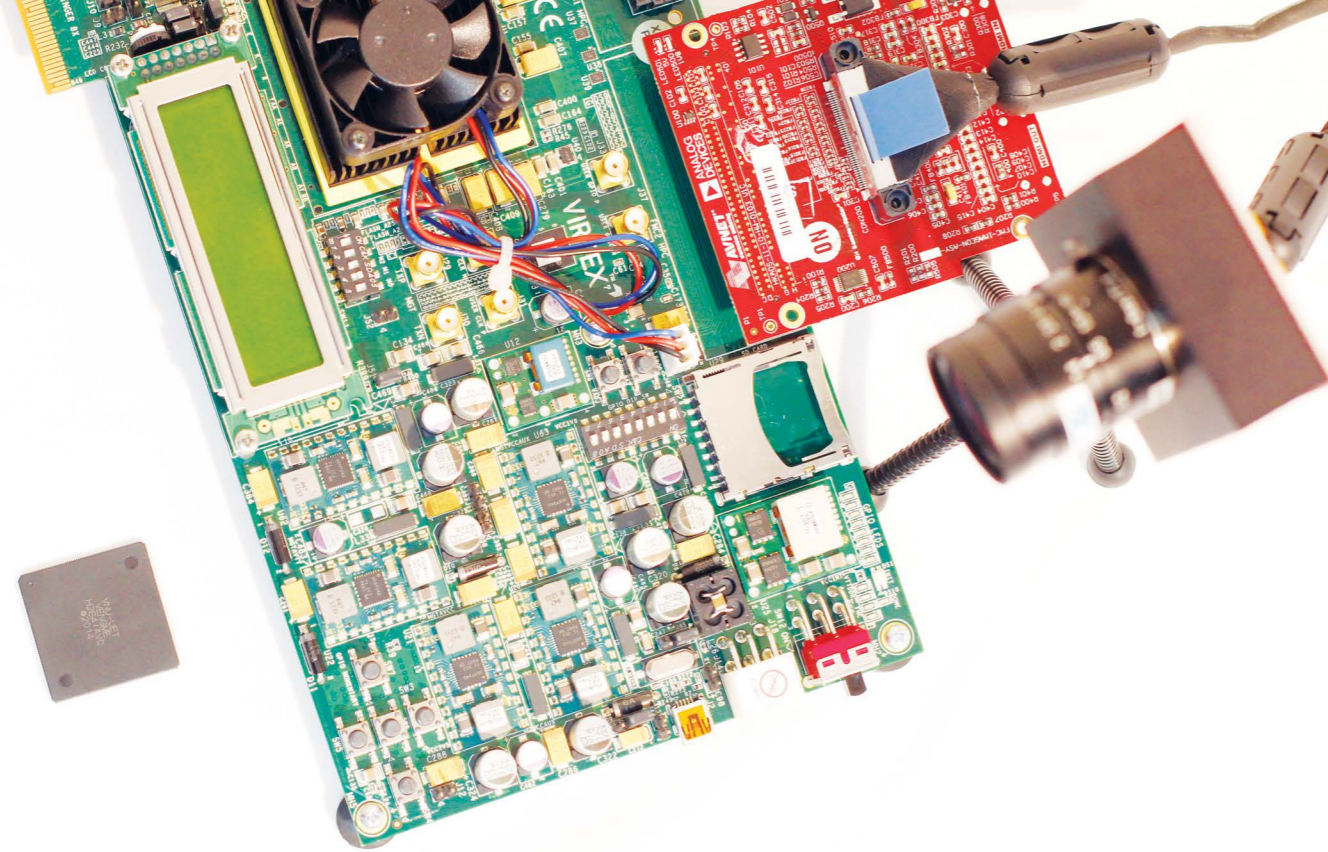
Developing key technological products which are able to be transferred or commercialized; providing scientific consultant services.

VNU KEY LABORATORY FOR
SMART INTEGRATED SYSTEMS (SISLAB)

ADDRESS: ROOM 2.1, BUILDING E4, 144 XUAN THUY ROAD, CAU GIAY DISTRICT, HANOI, VIETNAM

TELEPHONE: +84-24-3754 9664

FAX: +84-24-3754 7460

EMAIL: SISLAB@VNU.EDU.VN

WEBSITE: HTTP://WWW.SIS.UET.VNU.EDU.VN

ORGANIZATIONAL STRUCTURE

- Director

- Scientific Advisory Board

- Office

- Research groups:

    o System Design and Integration

    o Digital Design

    o Analog Design

- Laboratories

    o VNU Campus Laboratory

    o Hoa Lac High-Tech Park Laboratory

Ultra low-power and low-energy 32-bit datapath AES architecture for IoT applications (collaborated with CEA-LETI)

Security and power/energy consumption are some of the main enablers for IoT. In this work, we propose a novel Advanced Encryption Standard (AES) microarchitecture with 32-bit datapath optimized for low-power and low-energy consumption targeting securing IoT applications. The implementation results in TSMC 65nm technology show that our design saves 20% of area or 20% of energy per bit at the same area when compared with the current 32-bit datapath designs. Our architecture provides medium throughput (28Mbps@10MHz@1.3V@120μW) with the core area equivalent to 8-bit designs for RFID and IoT applications.
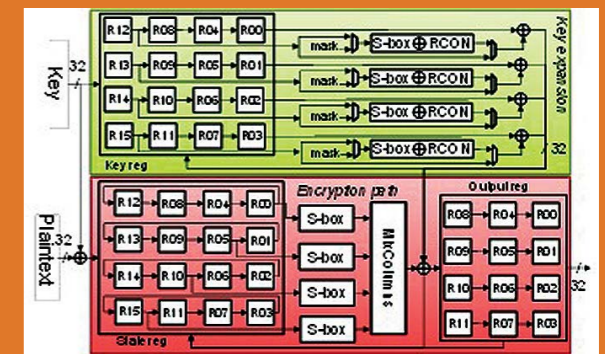
Our proposed AES 32-bit datapath architecture

RESEARCH DIRECTIONS

- Systems-on-Chips, Networks-on-Chips;

- Hardware Architectures for Multimedia Applications;

- Low Power Techniques;

- Internet-of-Things and Applications;

- Cryptography;

- Design-for-Test/Testability;

- Mixed-Signal Design;

- Asynchronous/Synchronous VLSI design.

OUTSTANDING ACHIEVEMENTS IN 2016

• Number of journal and international conference articles: 9

• Number of ISI / Scopus articles: 1

• Number of doctoral students successfully defended their doctoral dissertation in the year: 1

• Events, conferences / seminars chaired by or co-chaired by:

  o The 2016 International Conference on Advanced Technologies for Communications (ATC), Hanoi, Vietnam.

  o The 2016 IEEE International Conference on Integrated Circuits Design and Technology (ICICDT), Ho Chi Minh city, Vietnam.

• Science and Technology Awards in the year:

  o VNU Science and Technology Award for a period of Five Years.

• **Staff & students exchange**. Coming-in: 2 students from UEC, Japan. Going-out: 1 PhD student at CEA-LETI, France; 1 PhD student at the University of Aizu; 1 PhD student at NII, Japan; and a MSc student at UEC, Japan.

SELECTED PUBLICATIONS

1) Kiem Hung Nguyen and Xuan Tu Tran (2016). An Efficient Implementation of Advanced Encryption Standard on the Coarse-grained Reconfigurable Architecture. VNU Journal of Computer Science and Communication Engineering, 32 (2). ISSN 0866-8612.

The Advanced Encryption Standard (AES) is currently considered as one of the best symmetric-key block ciphers. The hardware implementation of the AES for hand-held mobile devices or wireless sensor network nodes is always required to meet the strict constraints in terms of performance, power and cost. Coarse-grained reconfigurable architectures are recently proposed as the solution that provides high flexibility, high performance and low power consumption for the next-generation embedded systems. This paper presents a flexible, high-performance implementation of the AES algorithm on a coarse-grained reconfigurable architecture, called MUSRA (Multimedia Specific Reconfigurable Architecture). First, we propose a hardware-software partitioning method for mapping the AES algorithm onto the MUSRA. Second, the parallel and pipelining techniques are considered thoughtfully to increase total computing throughput by efficiently utilizing the computing resources of the MUSRA. Some optimizations at both loop transformation level and scheduling level are performed in order to make better use of instruction-, loop- and task- level parallelism. The proposed implementation has been evaluated by the cycle-accurate simulator of the MUSRA. Experimental results show that the MUSRA can be reconfigured to support both encryption and decryption with all key lengths specified in the AES standard. The performance of the AES algorithm on the MUSRA is better than that of the ADRES reconfigurable processor, Xilinx Virtex-II, and the TI C64+ DSP.

2) Duy Hieu Bui and Diego Puschini and Simone Bacles-Min and Edith Beigne and Xuan Tu Tran (2016) Ultra Low-Power and Low-Energy 32-bit Datapath AES Architecture for IoT Applications. In: The 2016 IEEE International Conference on Integrated Circuit Design and Technology, 27-29 June 2016, Ho Chi Minh city, Vietnam.

In this paper, we propose a novel AES microarchitecture with

32-bit datapath optimized for low-power and low-energy consumption targeting IoT applications. The proposed design uses simple shift registers for key/data storage and permutation to minimize the area, and the power/ energy consumption. These shift registers also minimize the control logics in the key expansion and the encryption path. The proposed architecture is further optimized for area and/or power/energy consumption by selecting a suitable implementation of S-boxes and applying the clock gating technique. The implementation results in TSMC 65nm technology show that our design can save 20% of area or 20% of energy per bit at the same area when compared with the current 32-bit datapath designs. Our design also occupies smaller core area with lower energy per bit and at least 4 times higher in throughput in comparison with other 8-bit designs in the same technology node

3) Thi Thuy Nguyen and Van Thanh Vu Le and Kiem Hung Nguyen and Xuan Tu Tran (2016) Routing-path Tracking and Updating Mechanism in Reconfigurable Network-on-Chips. **In: The 2016 IEEE International Conference on Integrated Circuit Design and Technology, 27-29 June 2016, Ho Chi Minh city, Vietnam.**

As the rapid advancement in semiconductor technology leads to shrinking of transistor sizes and the integration scale is over one billion transistors, Reconfigurable Network-on-Chips becomes a new methodology providing adaptive infrastructure resources as well as flexible network protocols to adapt to dynamic environment. In this paper, we propose a routing-path tracking and updating mechanism for reconfigurable Network-on-Chips. The hardware architectures used to implement the proposed mechanism such as modified RNoC routers and Network Interfaces are introduced. With this routing-path tracking and updating mechanism, packet transmission delay can be reduced from 4.92% to 33.33% depending on the data structures.

4) Hai Phong Phan and Xuan Tu Tran (2016) Fuzzy-Logic based Low Power Solution for Network-on-Chip Architectures. **In: the 2016 International Conference Advanced Technologies for Communications (ATC), 12-14 October 2016, Hanoi, Vietnam.**

Network-on-Chip (NoC) paradigm allows designers to integrate efficiently more intellectual properties (IPs) into a single chip system. However, the power consumption has become one of the most critical issues for designing such large complex systems. Low power design can be achieved by scaling the voltage and frequency of the target components. The question is how to make the voltage-frequency scaling adaptable to the required performance of the system at run-time while reducing as much as possible the power consumption. This paper presents a novel solution for NoC architectures to reduce power consumption using fuzzy-logic algorithms. As the communication traffic is not equally distributed over the network architecture, depending on the communication load, each router in the network will be applied with a corresponding voltage and frequency to minimize the power consumption while keeping necessary communication throughput.

OTHER PUBLICATIONS

1) Duy Hieu Bui and Diego Puschini and Simone Bacles-Min and Edith Beigne and Xuan Tu Tran (2016) *Ultra Low-Power and Low-Energy 32-bit Datapath AES Architecture for IoT Applications*. In: The 2016 IEEE International Conference on Integrated Circuit Design and Technology, 27-29 June 2016, Ho Chi Minh city, Vietnam.

2) Van Thanh Vu Le and Xuan Tu Tran (2016) *Kiến trúc mới cho giải pháp tái cấu hình mạng trên chip*. In: SW4PHD: the 2016 Scientific Workshop for PhD Students, 26 March 2016, Hanoi.

3) Kiem Hung Nguyen and Xuan Tu Tran (2016) *Design and Implementation of a Hybrid Switching Router for the Reconfigurable Network-on-Chip*. In: the 2016 International Conference Advanced Technologies for Communications (ATC), 12-14 October 2016, Hanoi, Vietnam.

4) Kiem Hung Nguyen and Xuan Tu Tran (2016) *An Efficient Implementation of Advanced Encryption Standard on the Coarse-grained Reconfigurable Architecture*. VNU Journal of Computer Science and Communication Engineering, 32 (2). ISSN 0866-8612

5) Thi Thuy Nguyen and Van Thanh Vu Le and Kiem Hung Nguyen and Xuan Tu Tran (2016) R*outing-path Tracking and Updating Mechanism in Reconfigurable Network-on-Chips*. In: The 2016 IEEE International Conference on Integrated Circuit Design and Technology, 27-29 June 2016, Ho Chi

Minh city, Vietnam.

6) Hai Phong Phan and Xuan Tu Tran (2016) *Fuzzy-Logic based Low Power Solution for Network-on-Chip Architectures*. In: the 2016 International Conference Advanced Technologies for Communications (ATC), 12-14 October 2016, Hanoi, Vietnam. (In Press)

7) Hai Phong Phan and Xuan Tu Tran (2016) *Thiết kế và mô hình hoá bộ xử lý lô-gic mờ trong điều khiển tần số - điện áp*. In: SW4PHD: the 2016 Scientific Workshop for PhD Students, 26 March 2016, Hanoi.

8) KN Dang, M Meyer, Y Okuyama, AB Abdallah (2016) *Reliability Assessment and Quantitative Evaluation of Soft-Error Resilient 3D Network-on-Chip Systems*, Asian Test Symposium (ATS), 2016 IEEE 25th, 161-166.

9) KN Dang, Y Okuyama, AB Abdallah (2016) *Soft-error resilient Network-on-Chip for safety-critical applications*. 2016 International Conference on IC Design and Technology (ICICDT), 1-4.

VNU KEY LABORATORY FOR MICRO AND NANOTECHNOLOGY
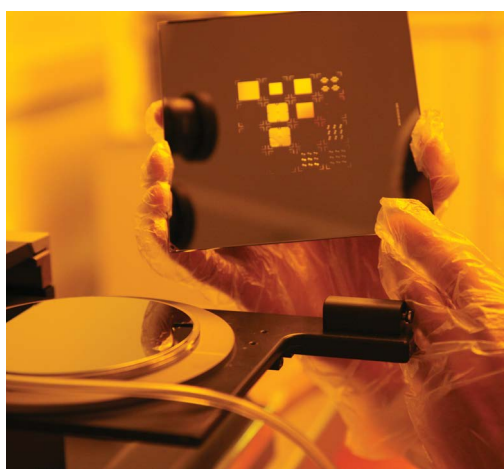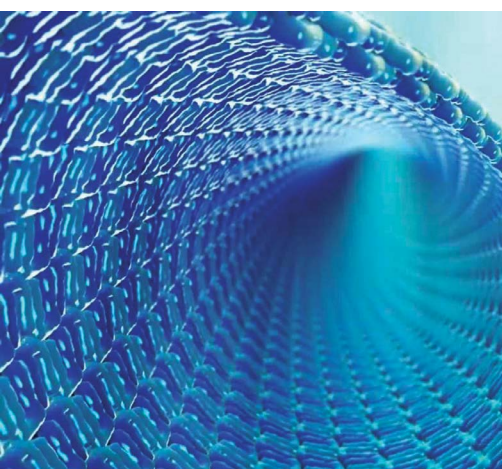
LABORATORY MISSION

+ Incorporate research and postgraduate training, develop applications in micro-nano devices and scientific instruments.

+ Promote technology transfer, commercialization and start-up.

LABORATORY ORGANIZATION

+ Director board.

+ Scientific Advisory Board.

+ Administration office

+ Reserach groups.

LABORATORY MAIN RESEARCH TOPICS

+ Spintronics and spinstrainics.

+ Scientific instruments and integrated system for measuring, control, biomedical diagnostics.