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Abstracts

Euroscicon Conference on

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OPTIMIZING ENERGY EFFICIENCY IN TWO-OPERATOR HETEROGENEOUS NETWORKS

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We propose a scheme to optimize the energy efficiency (EE) of two-operator heterogeneous networks where each operator owns a two-tier network (containing macro cells and small cells). We consider the joint cell association and resource blocks (RBs) allocation problem where multiple small base stations (SBSs) of the two operators are distributed in the coverage area of each macro base station (MBS). A typical mobile user (MU) is served by an MBS of a certain network operator. The MU will be associated with any SBS that offers an optimal EE for better performance of the network operator. The EE of each MU that is communication between the MU and the nearby SBSs are calculated. Then, one of the SBSs will be selected as a serving SBS to the MU. We consider two cases for selecting the serving SBS (i) the SBSs that belong to the same operator of the current serving MBS and (ii) the SBSs that belong to the different operator of the current serving MBS. The formulated optimization problem is a mixed integer non-linear programming problem which is hard to solve. Therefore, we relax the integer variable to obtain an upper bound. Then, we transformed the fractional structure of the objective function into a subtractive structure which is a non-convex problem. Lastly, we transformed it into a convex problem by applying the successive convex approximation (SCA) method. The convex problem is solved by Lagrangian dual method to find an optimal RB allocation and using the subgradient method to find a dual optimal point. Since this study is still in progress, no result is presented here. The expected result is that our proposed scheme could achieve a flexible user association with optimal RBs allocation. Consequently, the overall network operators' performance will improve.

Biography

Zaid Mujaiyid Putra Bin Ahmad Baidowi is currently pursuing his PhD in Wireless Communications, Electronic and Electrical Department at The University of Sheffield, United Kingdom. He has completed his Master of Science in Information Security from Universiti Teknologi Malaysia and BSc (Hons) in Data Communication and Networking from Universiti Teknologi MARA, Malaysia, respectively. He was an Academician in Universiti Teknologi MARA, Malaysia before he joined as a PhD student in the year 2016, under the Malaysian Government's scholarship.

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DEVELOPMENT OF A SCREW EXTRUSION-BASED 3D PRINTER AND ITS BIOMEDICAL/MICROFLUIDIC APPLICATIONS

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The printing technology of fused deposition modeling (FDM) is the most widely used additive manufacturing method among all commercial 3D printers. Despite its fast spreading and various development in recent years, there are still some limitations, e.g., restricted materials for printing, instability caused back flow or nozzle clogging issues and lower mechanical strength of printed products etc. A brief review and our strategy will be introduced at the beginning of this presentation. To broaden the printing material selectivity for thermal plastic materials of highly viscous materials (generally with higher melting temperatures), a new 3D printer for Polyether ether ketone (PEEK) has been developed and tested, where PEEK is widely used in biomedical and chemical engineering applications due to its high mechanical strength, thermal performance, and biocompatibility. The screw extrusion method was adapted and developed to overcome those existing problems of the filament-feeding method and excellent flow stability and high printing speed were achieved for PEEK printing. Its guideline to build a 3D printer for highly viscous materials will be presented. Furthermore, a new design of exchangeable printing head was built to cover both line- and plane-printing needs to widen its applications and improve printing surface quality. Highly reproducible mechanical tests of the printing products under well-controlled environment were demonstrated and a record of 96% bulk material strength has been achieved for the first time. Besides, the post annealing process was found to have no significant effect on the mechanical strength and all printed material had a more brittle character in comparison with the bulk material. At the end, different printing products, including porous artificial intervertebral cages with controllable size and distribution for biomedical use and various microfluidic structures of micro-reactor for chemical engineering designs etc., were manufactured to demonstrate its great potential applications.

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FUTURE INTERNET MODEL AND SERVICES: PERSPECTIVE, CHALLENGES AND FUTURE TRENDS

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Current Internet has ossification, inflexibility, security, quality of service, and quality of management as well as many other issues. For tackling the problems of the current rigid layered network architecture, several initiatives are ongoing towards the development of the future internet architecture. There are many implicit dependencies (i.e. tight coupling) between existing mechanisms. However, the problem is not limited to specific protocols or mechanisms but it is an architectural issue. Therefore, we are proposing to rethink about the networks of the future from the scratch as a clean-slate approach. The rest of them have been going towards evolutionary approaches such as 5G, CCN, SDN, etc. where they are providing a new architecture so that today's Internet can exist in that architecture as well until fully being evolve in the future networks. In the clean slate approach, the system is redesigned from scratch to offer improved abstractions and/or performance, while providing similar functionality based on new core principles. The proposed architecture introduces the use of distributed framework to encapsulate the processed information from sensors to smart embedded system and semantic logic to semantic value based on Internet. However, distributed networks and IoT fusion model will infuse the capability of sensing to make the system intelligent. This talk focuses on hybrid network model for embedded systems to support the perspectives of new business models, service architectures, and application procedures as well as association with an emerging technology. In this talk I would like to emphasis following issues: what are the most appropriate distributed architectures to support smart city services? What are the most suitable ways to the management of Global e-Healthcare Monitoring Applications? What is the most appropriate way to improve establish a distributed networks of IoT services? Finally, I will present test-bed and simulation scenarios for the smart city scenario and connected vehicle services.

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CAN I 3D PRINT ?

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In modern world scenario, the demand of 3D designs is increasing progressively. In this research paper, the focus is on recent researches and the current trends going on in 3D printing technology. This paper initiates from defining basics of 3D printing technology and ends with its wide range applications, scope, emerging trends and finally the growth cycle of 3D printing technology in household applications by figuring out various questions such as "Will 3D printing technology reach our homes i.e., will it be used by common or less technically sound people, will we people be able to utilize our creativity to design and print what we actually want?" If yes, then how is it useful to ordinary people? The grown use and decreased cost of these printers has brought a revolution in the field of manufacturing.

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3D PRINTING OF BULK METALLIC GLASSES

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As a frontier of metals research, bulk metallic glasses (BMGs) has aroused intensive research interest and this field is progressing at a fast pace due to their unique atomic disordering structures and numerous outstanding properties including high strength and elasticity, good corrosion, well resistance and excellent magnetic properties etc. However, the applications of BMGs are restricted by size limitation and difficulty in manufacturing of these materials. 3D printing (also called as additive manufacture) based on laser systems provides an alternative opportunity for the fabrication of bulk metallic glasses with large size and complex geometries. In this talk, we will present the recent progress in 3D printing of Fe based; Zr based BMGs and composites using selective laser melting (SLM) technique including 3D printing processing, microstructures and mechanical properties of the BMGs prepared. In addition, functional properties of 3D printed Zr based BMGs are also investigated. As an example, using the 3D porous framework pre-prepared by 3D printing, micro/nano-hierarchical porous structures were fabricated by chemical dealloying, which exhibited excellent catalytic properties towards the degradation of methyl orange (MO) with high reaction rate and very good stability. At last, several challenges in 3D printing of BMGs, such as selection of amorphous powders, defects and crystallization which have great influences on the fabrication and properties of BMGs are also addressed. The solutions to these problems are discussed.

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HOW TO DEAL WITH SECURITY HAZARDS IN IOT? A SELF-ADAPTIVE SOLUTION TO IOT APPLICATIONS

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Internet of things (IoT) has many applications in different industrial and automated systems. Considering the ubiquitous nature of the IoT, it is hard to deal with all possible security threats. However, the industrial IoT can resist against external attacks if its components would be self-adaptive. A self-adaptive system (SAS) is able to adjust its behaviour in response to the environmental changes. It employs different strategies in response to different situations. So, we can refer to self-adaptive systems as self-healing ones. As the IoT has been distributed along with the Internet, an intruder tries its best to execute a set of distributed attacks like distributed denial of service (DDoS). If the industrial IoT is equipped with self-adaptive components, it would be hard to undermine the main functionalities of the system using a distributed attack. In this situation, the systems will respond to the threat by a proper adaptation tactic. Each tactic is a component-based strategy that is designed to deal with a specific external threat. In this paper, we are going to propose a self-adaptive model for industrial IoT that is able to adaptively resist against different cyberattack scenarios. It means that the system can proactively react to cyber threats and decide which strategy is the best at the same time. According to that decision, the system deals with the same threat. We argue that by deploying self-adaptive components in industrial IoT, the security features of the system will be improved. To the best of our knowledge, this is the first research that aims to enhance the security level of an industrial IoT using self-adaptive component. We are going to show the validity of our argument by a series of experiments and security analyses.

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WEARABLES FOR PLANTS AND HUMANS: DOWNSCALING TO NANOSSCALE

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With the growing interest in the use of technology in daily life, the potential of using wearable wireless devices across multiple segments i.e., agriculture, healthcare, sports, child monitoring, military, emergency, consumer electronics, etc. is rapidly increasing. It is predicted that there will be more than billion wearable sensors by 2025, with over 30% of them being new types of sensors that are just beginning to emerge. This talk will be focused on the various challenges for wearable technologies from antenna design, propagation and system modelling, security and sensor development prospective with application in health of both plants and humans. In addition, nano communication paradigm using terahertz waves will also be discussed based on both numerical and experimental results for the communication of future nano devices on the plants and inside the body with application in healthcare and future agriculture domain.

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SECURITY AND PRIVACY OF ELECTRONIC HEALTHCARE RECORDS: CONCEPTS, PARADIGMS AND SOLUTIONS

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Healthcare IT is a growth industry, and the need for guidance in regard to privacy and security is huge. With new federal incentives and penalties tied to the acts, and the implementation of electronic health record (EHR) systems, medical practices and healthcare systems are implementing new software at breakneck speed. Yet privacy and security considerations are often an afterthought putting healthcare organizations at risk of fines, damage to their reputations, serious consequences on patient healthcare, data security and privacy. Various stakeholders are responsible for generating, storing and manipulating the records for the efficient usage and proper care of patients. Access should only be provided to authorized stakeholders as and when required. EHRs consist of various parameters such as clinical notes, patient listings, lab results, imaging results, and screening tests. Any change in the staff (doctors, nurses and care providers) can create problems in the proper access of EHRs pertaining to patients. This keynote speech is the first ever "how to" guide addressing one of the most overlooked practical, methodological, and moral questions in any nations' journeys to maintain privacy and security in the healthcare sector: who can access the information on my EHR? How can I see the information in my record and make sure it's correct? How is it protected from loss, theft and hacking? What should I do if I think my information has been compromised? It differs from other published books as it includes a detailed framework to maintain security and privacy in electronic healthcare records, and comparative case studies with respect to various performance evaluation metrics, such as privacy preservation, scalability, and healthcare legislation.

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