Conference Program

The 2nd International Conference
on Future Networks and Distributed Systems

The Premier Conference on Next Generation Networking Technologies

Amman, Jordan June 26 - 27, 2018 www.icfnds.org
Conference Sponsors

Academic Organizers

Middle East University
Amman, Jordan
Tel: +96 264 790 222
www.meu.edu.jo

Manchester Metropolitan University (MMU)
Manchester M15 6BH, UK
Tel: +44 161 247 2000
www.mmu.ac.uk

Academic Partners

Journal of Sensor and Actuator Networks
4052 Basel, Switzerland
Tel: +41 61 683 77 34
http://www.mdpi.com/journal/jsan

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Technopole Brest-Iroise
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Industrial-sponsorship

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Modwen Road Salford,
Greater Manchester, M5 3EZ
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E: enquiry@cyraatek.com
T: 0330 043 0032
https://cyraatek.com/
Conference registration takes place at the Conference, building “B” at the Middle East University.

**Tuesday**  
9:00 – 10:00

**Wednesday**  
9:00 – 10:00

The conference registration fee includes participation in all keynote speeches, parallel sessions, coffee breaks and lunches, and conference proceedings in USB flash drive.

### Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conference Sponsors</td>
<td>2</td>
</tr>
<tr>
<td>Conference Organization</td>
<td>4</td>
</tr>
<tr>
<td>Program Committee</td>
<td>6</td>
</tr>
<tr>
<td>Message from the General Chairs</td>
<td>9</td>
</tr>
<tr>
<td>Message from the Program Co-Chairs</td>
<td>10</td>
</tr>
<tr>
<td>Program at a Glance</td>
<td>11</td>
</tr>
<tr>
<td>Detailed Program</td>
<td>13</td>
</tr>
<tr>
<td>Keynote Speeches</td>
<td>20</td>
</tr>
<tr>
<td>Conference Abstracts</td>
<td>26</td>
</tr>
<tr>
<td>Information for Delegates</td>
<td>62</td>
</tr>
<tr>
<td>Places of Interest</td>
<td>68</td>
</tr>
<tr>
<td>Acknowledgement</td>
<td>70</td>
</tr>
</tbody>
</table>
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Middle East University
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National School of Applied Sciences, Morocco

Sharefa Murad
Middle East University, Jordan

Publication Chair

Ahmed Alhmouz
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  Adobe Systems, India
• Abdelilah Maach
  University Mohamed V, Morocco
• Reem Abu Al-ragheb
  Middle East University, Jordan
<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
</tr>
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<tbody>
<tr>
<td>Sarah Mount</td>
<td>King's College London, UK</td>
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<td>Gregory Epiphaniou</td>
<td>University of Bedfordshire, UK</td>
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<td>Salim Bitam</td>
<td>University of Biskra, Algeria</td>
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<tr>
<td>Zan Li</td>
<td>Xidian University, China</td>
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<tr>
<td>Bamidele Adebisi</td>
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<tr>
<td>Carlo Alberto Boano</td>
<td>Graz University of Technology, Austria</td>
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<tr>
<td>Vincent C. Emeakaroha</td>
<td>University College Cork, Ireland</td>
</tr>
<tr>
<td>Neetesh Saxena</td>
<td>Georgia Institute of Technology, USA</td>
</tr>
<tr>
<td>Sunday Ekpo</td>
<td>Manchester Metropolitan University, UK</td>
</tr>
<tr>
<td>Bader Sebastian</td>
<td>Mid Sweden University, Sweden</td>
</tr>
<tr>
<td>Paolo Bellavista</td>
<td>DISI - University of Bologna, Italy</td>
</tr>
<tr>
<td>Ghazanfar Safdar</td>
<td>University of Bedfordshire, UK</td>
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<tr>
<td>Nauman Aslam</td>
<td>Northumbria University, UK</td>
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<td>Soufiene Djahel</td>
<td>Manchester Metropolitan University, UK</td>
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<tr>
<td>Haciali Mantar</td>
<td>Gebze Technical University, Turkey</td>
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<td>Yasar Becerikli</td>
<td>Kocaeli University, Turkey</td>
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<td>Mohammed Ali Imran</td>
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<td>Ahmad Alzoubi</td>
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<td>Yousef Awwad Daraghmi</td>
<td>Palestine Technical University, Palestine</td>
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<td>Peihan Qi, Xidian University</td>
<td>China</td>
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<td>Yue Zhao, Xidian University</td>
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<td>Chris Denett</td>
<td>University of Wolverhampton, UK</td>
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<td>Lei Guan</td>
<td>Xidian University, China</td>
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<tr>
<td>Hazem El-Gendy</td>
<td>Ahram Canadian University, Egypt</td>
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<tr>
<td>Weilong Hu</td>
<td>Xidian University, China</td>
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<tr>
<td>Muhammad Ijaz</td>
<td>Manchester Metropolitan University, UK</td>
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<tr>
<td>Pengwu Wan,</td>
<td>Xidian University, China</td>
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<tr>
<td>Jamal Ahmad Diab</td>
<td>American University in the Emirates, UAE</td>
</tr>
<tr>
<td>Laila Benhlima</td>
<td>Mohammed V University, Morocco</td>
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<td>Mehmet Aydin</td>
<td>University of the West of England, UK</td>
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<td>Rupak Kharel</td>
<td>Manchester Metropolitan University</td>
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<tr>
<td>Sohail Jabbar</td>
<td>Kyungpook National University, South Korea</td>
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<td>Amna Eleyan</td>
<td>Manchester Metropolitan University, UK</td>
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Message from the General Chairs

The 2nd edition of the International Conference on Future Networks and Distributed Systems (ICFNDS) will be held in Amman, Jordan from 26 – 27 June 2018 under the patronage of Her Highness Princess Sumaya bint El Hassan. In addition to the main two day program of oral and poster presentations, plenary talks, demos and social functions, ICFNDS 2018 has two co-located workshops.

The main objective of this conference is to bring together, at a truly international level, people with shared interests in future networks and distributed systems. ICFNDS continues to grow and attract high quality submissions fulfilling the steering committee vision of establishing ICFNDS as a premier meeting that encourages researchers and practitioners to exchange and share their experiences.

The conference has been very successful in terms of paper submissions, and the technical program committee has set up a program which features very high-quality sessions disseminating the latest research results in the areas of distributing systems, future networks, Internet of Things, sensor networks, cloud computing, amongst others. We are honored to have prominent international scholars as our keynote speakers, their dedication is highly appreciated.

ICFNDS will continue to strive to become one of the most impactful conference on all aspects of future networks and distributed systems. Papers accepted for publication in this conference are the hard work of many outstanding researchers from around the world.

The conference would not have happened without the earnest efforts of the local organisers behind the scenes. We had an excellent team that has worked very hard to organise ICFNDS 2018. We would like to thank all members of the local organising committee who have done an outstanding job in carrying out the logistical tasks. We are very grateful to other Chairs of the Organizing Committee including, Honorary General Chairs Professor Muhammad Imran and Dr Yacoub Nasereddin; Technical Program chairs: Mohammad Hammoudeh, Sharefa Murad and Mounir Arioua; Steering Committee George Angelos Papadopoulos, Anne James, Vaclav Prenosil, Ahmed Nasereddin, Derar Eleyan, Mohammad Al-Hileh and Hesham Abusaimeh; and Publication Chair Ahmed Alhmouz.

We also wish to thank our patrons and sponsors for their support. In particular, we would like to thank the Journal of Sensor and Actuator Networks (JSAN) for their full support to the conference year after year. JSAN are sponsoring the best paper award and one of our international keynote speakers. Finally, we thank all conference participants for making ICFNDS a success, and we hope that you have an enjoyable and fruitful stay in Amman, one of the middle east’s most dynamic and vibrant cities.

Finally, We are very delighted to report that ICFNDS 2019 will be held in France. This is to be organized by Prof Ahcène Bounceur and his team from the University of Western Brittany. We hope to see you all in France.

Dr Abdelrahman Abuarqoub, Middle East University, Jordan
Dr Bamidele Adebisi, Manchester Metropolitan University, UK
On behalf of the technical program committee, it is our great pleasure to welcome you to Amman for the 2nd International Conference on Future Networks and Distributed Systems (ICFNDS). ICFNDS 2018 continues to feature a high-quality technical program across a broad range of research topics in future networks and communications. Following the huge interest generated in 2017, this year, the conference has received 160 papers, of which 61 were accepted to the main technical program after a thorough review process. The competitive acceptance rate of 38% reflects the quality and popularity of ICFNDS to the networks research community. The papers included in this year's program represent the forefront of networking and communications research, as they explore important new topics and trends in the field.

ICFNDS has a dedicated team of 123 experienced reviewers from the broader computer networks and distributed systems community. The original list of reviewers was extended with reviewers recommended by the Program Chairs to add required expertise for papers where appropriate reviewers were not initially available. The review process was similar to the previous year. Each paper was reviewed by at least three experts in the relevant field based on its originality, timeliness, significance, relevance, and clarity of presentation to ensure the publication of only top quality contributions. When a paper is accepted at least one of the authors has to register to the conference and deliver the related talk.

Over 500 reviews have been written, with each paper receiving at least 3, and as many as 6, reviews. We are grateful to all of the reviewers and members of the technical program committee for their enthusiastic support and contributions. We would like to express our sincere gratitude our distinguished reviewers Laurent Etienne, David Palma, Salim Bitam, Patrick Martineau, Bader Sebastian, Mehmet Aydin, Paolo Bellavista, Ahmad Alzoubi, Vincent Emeakaroha, Nizar Messai, F.Xavier Trias and Helen Karatza for their exceptionally high quality and very detailed comments to authors. Handling the review process of a large number of submission could not have been completed within such a tight schedule without their helps and cooperation. We also highly appreciate the great effort by session chairs who accepted our request to manage sessions of the conference.

We hope that you will find this year’s program interesting and stimulating. We also hope that the conference will provide you with a valuable opportunity to share ideas with other researchers and practitioners from all over the world.

Finally, we would like to extend our invitation to all reviewers and authors to continue to engage with the future editions of ICFNDS, your contributions are indispensable for the success of the conference.

Dr Mohammad Hammoudeh, Manchester Metropolitan University, UK
Dr Sharefa Murad, Middle East University, Jordan
Dr Mounir Arioua, National School of Applied Sciences, Morocco
<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00 – 10:00</td>
<td>Registration &amp; Arrival Refreshments</td>
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</tr>
<tr>
<td>10:00</td>
<td>National Anthem of Jordan</td>
<td></td>
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<tr>
<td>10:00 – 10:05</td>
<td>Opening &amp; Welcome Message: Dr Abdelrahman Abuarqoub (General Chair)</td>
<td>Main Theater</td>
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<tr>
<td>10:05 – 10:35</td>
<td>Opening Keynote: Dr Bamidele Adebisi (General Chair)</td>
<td>Main Theater</td>
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<tr>
<td>10:35 – 10:45</td>
<td>HRH Princesses Sumaya bint El Hassan</td>
<td>Main Theater</td>
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<tr>
<td>10:45 – 11:00</td>
<td>Coffee Break</td>
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<tr>
<td>11:00 – 11:45</td>
<td>Keynote: Ahcène Bounceur</td>
<td>Smart Zone</td>
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<tr>
<td>11:50 – 13:30</td>
<td>Session: Future Networks</td>
<td>Room: B102</td>
</tr>
<tr>
<td></td>
<td>Session: Cloud, Distributed and Parallel Systems</td>
<td>Room: B027</td>
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<tr>
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<td>Session: Internet of Things</td>
<td>Room: B103</td>
</tr>
<tr>
<td>13:30 – 14:30</td>
<td>Lunch</td>
<td></td>
</tr>
<tr>
<td>14:30 – 15:10</td>
<td>Keynote: Irina Gudkova</td>
<td>Smart Zone</td>
</tr>
<tr>
<td>15:10 – 16:30</td>
<td>Session: Future Networks</td>
<td>Room: B102</td>
</tr>
<tr>
<td></td>
<td>Session: Cloud, Distributed and Parallel Systems</td>
<td>Room: B027</td>
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<tr>
<td></td>
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<td>Room: B103</td>
</tr>
<tr>
<td>Time</td>
<td>Event</td>
<td>Location</td>
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<tr>
<td>10:00 – 10:45</td>
<td>Keynote: Thar Baker</td>
<td>Smart Zone</td>
</tr>
<tr>
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<td>Coffee Break</td>
<td>Main Theater</td>
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<td>Room: B103</td>
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<td>Lunch</td>
<td>Main Theater</td>
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<tr>
<td>14:30 – 15:10</td>
<td>Keynote: Kelvin Anoh</td>
<td>Smart Zone</td>
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<td>15:10 – 16:30</td>
<td>Session: Future Networks</td>
<td>Room: B102</td>
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<td>Session: General Track</td>
<td>Room: B027</td>
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<tr>
<td>16:30 – 17:30</td>
<td>Session: Best Paper Awards and Closing Remarks</td>
<td>Smart Zone</td>
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</tbody>
</table>
### Detailed Programme

**Tuesday, June 26th 2018**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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</thead>
<tbody>
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<td>Coffee Break</td>
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<td>11:00 – 11:45</td>
<td>Keynote: Ahcène Bounceur</td>
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#### Session: Future Networks (Session Chair: Jibran Saleem)

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>11:50 – 13:30</td>
<td>Ant Colony based Optimization techniques to mitigate Dynamic Routing Challenges in Packet based Networks (Inam Ullah Khan, Ijaz Mansoor Reshi, Muhammad Asghar Khan, Syed Bilal Hussain Shah, Imran Shafque Ansari, Muhammad Hamza Akhlaq)</td>
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<td>Design of a Warfare Car Robot using Sensor Network Connectivity (Laiqa Binte Imran, Muhammad Farhan, Rana M. Amir Latif, Ahsan Rafiq)</td>
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<td>A Lightweight Only Receiver Clock Synchronization Technique for Wireless Sensor Networks (Habib Aissaoua, Ahcène Bounceur, Makhlouf Aliouat, Reinhardt Euler, Abdelkader Laouid, Farid Lalem and Abdelkamel Tari)</td>
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<td>WiMax Technology for Maritime Intelligent Transport Systems Communication (Ayoub Bahnasse, Abdelmajid Badri, Mohamed Talea, Fatima Ezzahraa Louhab, Adel Harbi, Khiat Azeddine and Said Broumi)</td>
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<td>An adaptive opportunistic routing scheme for reliable data delivery in WSNs (Malik Hasnain, Mazhar Hussain Malik and Mehmet Emin Aydin)</td>
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**Room: B102**
# Detailed Programme

## Session: Cloud, Distributed and Parallel Systems (Session Chair: Ahmed Alhmouz)

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Room</th>
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<tbody>
<tr>
<td>11:50 – 13:30</td>
<td>Discrete Time Markov Chain Model for Analyzing Characteristics of RACH Procedure under Massive Machine Type Communications (Ekaterina Medvedeva, Elvira Zaripova, Irina Gudkova, Oksana Semenova, Anastasiya Vlaskina and Yuliya Gaidamaka)</td>
<td>B027</td>
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<td>Virtual Microgrids: A Management Concept for Peer-to-Peer Energy Trading (Kelvin Anoh, Augustine Ikpehai, Dragana Bajovic, Olamide Jogunola, Bamidele Adebesi, Dejan Vukobratovic and Mohammad Hammoudeh)</td>
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<td>An Efficient Privacy Preserving Cryptographic Approach in Cloud Computing (Ashalatha Ramegowda, Jayashree Agarkhed and Siddarama Patil)</td>
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<td>Evaluating Health Information Apps On Real Life Smart Phone Use (Reda Shaheen, Safina Kanwal, Rimsha Iftikhar, Muhammad Rehman Shahid)</td>
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<td>Loop Unrolling Effect On Parallel Code Optimization (Karim Soliman, Marwa El Shenawy and Ahmed Abou El Farag)</td>
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## Session: Internet of Things (Session Chair: Ahmad Al-Khasawneh)

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Room</th>
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</thead>
<tbody>
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<td></td>
<td>Detecting Gaps and Voids in WSNs and IoT Networks: the Angle-based Method (Madani Bezoui, Ahcene Bounceur, Loic Lagadec, Reinhardt Euler, Mohammad Hammoudeh, Abdelkader Laoudi and Abdelkamel Tari)</td>
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<td>A Review of Data Security and Cryptographic Techniques in IoT based devices (Ghulam Mustafa, Rehan Ashraf, Muhammad Azyed Mirza, Abid Jamil)</td>
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<td>A Survey on IoT contribution in smart goods ordering cycle in GCC – Amazon buttons (Duha Shubair, Imtiaz Ahmed and Maytham Safar)</td>
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<td>A Study of Current Trends in the Design of Processors for the Internet of Things (M. Tariq Banday)</td>
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13:30 – 14:30 Lunch

Skylight
## Session: Future Networks (Session Chair: Abdukodir Khakimov)

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
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<tr>
<td>14:30 – 15:10</td>
<td>Keynote: Irina Gudkova</td>
<td>Smart Zone</td>
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<tr>
<td>15:10 – 16:30</td>
<td>Enhanced Routing Algorithm Based on Depth Traversal in Software Defined Wireless Sensor Networks</td>
<td>Raffi Al-Qurran, Amr Abu Abdo and Wail Mardini</td>
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<td>Parallel Genetic Algorithm with Elite and Diverse Cores for Solving the Minimum Connected Dominating Set Problem in Wireless Networks Topology Control</td>
<td>Abdel-Rahman Hedar and Gamal El-Sayed</td>
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<td></td>
<td>Clustering algorithm for AODV Routing Protocol based on Artificial Bee Colony in MANET</td>
<td>Dr Amjad Rattrout, Prof. Adwan Yasin, Mahmoud Abu-Zant, Mariam Yasin and Mohammed Dwaikat</td>
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<td></td>
<td>A Comprehensive study of Cyber Attacks &amp; Counter Measures for web systems</td>
<td>Abid Jamil, Kashif Asif, Rehan Ashraf, Sheraz Mehmood, Ghulam Mustafa</td>
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## Session: Cloud, Distributed and Parallel Systems (Session Chair: Maria Makolkina)

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<th>Time</th>
<th>Topic</th>
<th>Speaker(s)</th>
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<tbody>
<tr>
<td>15:10 – 16:30</td>
<td>Scheduling Techniques for Complex Workloads in Distributed Systems</td>
<td>Georgios L. Stavrinides and Helen Karatza</td>
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<td></td>
<td>Quicker Re-allocation of Regions in OpenSimulator Framework</td>
<td>Umar Farooq, Ihsan Rabbi, Kashif Zia, Zohra Israr and Muniba Shereen</td>
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<td></td>
<td>Information Security Management System Challenges Within a Cloud Computing Environment</td>
<td>Mais Arafat</td>
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<td>A Distributed Security Protocol Designed for the Context of Internet of Things</td>
<td>Laouid Abdelkader, Muath Alshaikh, Farid Lalem, Ahmed Bounceur, Reinhardt Euler, Madani Bezoui and Habib Aissaoua</td>
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### Session: General Track (Session Chair: Ekaterina Markova)

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<tr>
<th>Time</th>
<th>Title</th>
<th>Room</th>
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<tbody>
<tr>
<td>15:10 – 16:30</td>
<td>Graphical Authentication Based on Anti-Shoulder Surfing Mechanism (Wen Bin Goh, Sohail Safdar, Rehan Akbar and Suresh Subramanian)</td>
<td>B103</td>
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<td></td>
<td>Malware Detection using DNS Records and Domain Name Features (Khulood Al Messabi, Ayesha Al Yousif, Monther Aldwairi, Anoud Thoban and Fatna Belqasmi)</td>
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<td>CryptDBaaS: Query Over Encrypted DBaaS Without Third-Party (Fadi Draidi, Mohammad Hmedat, Barakat Abwe and Amr Jamal)</td>
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<td>An Adaptive and Efficient Fully Homomorphic Encryption Technique (Mohamed-Lamine Yagoub, Okba Kazar, Abdelkader Laouid, Ahcene Bounceur, Reinhardt Euler and Muath Alshaikh)</td>
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<td>Detection of bowler’s strong and weak area in cricket through commentary (Subhan Arif, Gufran Ahmad, Muhammad Umair, Ahmad Ikram)</td>
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### Wednesday, June 27th 2018

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<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>09:00 – 10:00</td>
<td>Registration &amp; Arrival Refreshments</td>
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<tr>
<td>10:00 – 10:45</td>
<td>Keynote: Thar Baker</td>
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<td>10:45 – 11:00</td>
<td>Coffee Break</td>
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### Session: Future Networks (Session Chair: Hesham Abusaimeh)

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Room</th>
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<tbody>
<tr>
<td>11:00 – 13:30</td>
<td>A Traffic Tracking Algorithm for a Fast Detection of Active Network Sources (Ayah Atiyah and Sufyan Almajali)</td>
<td>B102</td>
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<td></td>
<td>SDN multi-controller networks with load balanced (Ammar Muthanna, Abdelhamied Ashraf, MariaMakolkina, Anastasia Vybornova, Ekaterina Markova, Alexander Gogol and Andrey Koucheryavy)</td>
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<td>Multipath Routing in a 3D Torus Network on Chip (Khaled Day, Nasser Alzeidi and Abderezak Touzene)</td>
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<td>Social Vehicle-to-Everything (V2X) communication model for Intelligent Transportation Systems based on 5G scenario (Naeem Raza, Sohail Jabbar, Jihun Han, Kijun Han)</td>
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<td>Time</td>
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<tr>
<td>11:00 – 13:30</td>
<td>Deployment of reliable, simple, and cost-effective medium access control protocols for multi-layer flying ad-hoc networks (Muhammad Asghar Khan, Inam Ullah Khan, Ijaz Mansoor Qureshi, Syed Bilal Shah, Muhammad Shafiq)</td>
<td>B102</td>
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<td></td>
<td>Integrating Smart City Applications in 5G Networks (Muhammad Usman, Muhammad Rizwan Asghar, Fabrizio Granelli and Khalid Qaraqe)</td>
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<td>Li-Local: Green Communication Modulations for Indoor Localization (Muhammad Irshad, Wenyuan Liu, Lin Wang, Syed Bilal Hussain Shah, Muhammad Noman Sohail, Muhammad Mosa Uba)</td>
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<tr>
<td><strong>Session: Internet of Things (Session Chair: Ahmad Alzoubi)</strong></td>
<td>IoT Standardisation - Challenges, Perspectives and Solution (Jibran Saleem, Mohammad Hammoudeh, Umar Raza, Bamidele Adebisi and Ruth Ande)</td>
<td>B027</td>
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<tr>
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<td>Low-Energy Smart Trash Bin Architecture for Dynamic Waste Collection System (Slamet Kristanto Tirto Utomo, Takeo Hamada and Noboru Koshizuka)</td>
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<td>Real-time RDF Adaptation Model for Smart Human-Care Querying in IoT based Mobile Applications (Sohail Jabbar and Kaleem Malik)</td>
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<td>11:00 – 13:30</td>
<td>IoT-Fog based system structure with SDN enabled (Abdukodir Khakimov, Abdelhamied Ashraf, Ammar Muthanna, Irina Gudkova, Ekaterina Markova and Andrey Koucheryavy)</td>
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<td>LPBR: Location Prediction Based Routing Protocol for Mobile IoT Systems (Hamza Aldabbas)</td>
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<td>Embedded key Cryptosystem for Cloud Computing Applications (Hamza Abbass Al-Sewadi, Shadi Rasheed Masadeh and Mohammed Abbass Al-Husainy)</td>
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<td>Distributed solution of scalar multiplication on elliptic curves over Fp for resource-constrained networks (Mohamed Ramdani, Mohamed Benmohammed, Nadjia Benblidia)</td>
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### Session: General Track (Session Chair: Ammar Muthanna)

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<th>Time</th>
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<tr>
<td>11:00 – 13:30</td>
<td>Organizational Management Role In Information Security Management System (Mais Arafat, Abdallah Qusef and Samar Al-Taher)</td>
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<td>Room: B103</td>
<td>A New Mechanism for Textual Password Hardening Using Adopted Typing Rhythm (Khalid Mansour)</td>
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<td>Analysis of Social Network for Telecommunication Companies (Aktham Sawan and Rashid Jayousi)</td>
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<td>Detection and Prevention of Malicious Cryptocurrency Mining on Internet-Connected Devices (Abedalqader Swedan, Ahmad N. Khuffash, Othman M.M. Othman and Ahmed Awad)</td>
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<td>&quot; Hop Count &quot; Dynamic Double Trickle Timer Algorithm Use Case: Data Aggregation In Smart Green House (Haneen Shehadeh, Wail Mardini, Muneer Bani Yaseen, Doaa Habeeb Allah and Waed Bani Yaseen)</td>
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<td>Market Segmentation and Analysis of Online Shopping in Jordan and the Region (Lina Sharawi and George Sammour)</td>
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<td>KNN- fuzzy classification for cloud service selection (Humaira Nadeem, Imran M Rabbani, Muhammad Aslam and Ana Maria Martinez Enriquez)</td>
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<tr>
<td>13:30 – 14:30</td>
<td>Lunch</td>
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<td>Skylight</td>
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<tr>
<td>14:30 – 15:10</td>
<td>Keynote: Kelvin Anoh</td>
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<td>Smart Zone</td>
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### Session: Future Networks (Session Chair: Ekaterina Medvedeva)

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<tr>
<th>Time</th>
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<tr>
<td>15:10 – 16:30</td>
<td>Key solutions for light limitations - Toward Tactile Internet system realization (Abdelhamied Ashraf, Anastasia Vybornova, Ammar Muthanna, Ekaterina Markova, Irina Gudkova, Alexander Gogol and Andrey Koucheryavy)</td>
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<tr>
<td>Room: B102</td>
<td>Unconsciousness Detection Supervision System Using Faster RCNN (Rana Ghani and Wafaa Salih)</td>
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<td>(Syed Bilal Hussain Shah, Chen Zhe, Lina Xu, Yin Fuliang, Muhammad Faheem, Seema Begum)</td>
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<td></td>
<td><strong>Session: Internet of Things (Session Chair: Helen Karatza)</strong></td>
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<td>15:10 – 16:30</td>
<td>DDoS Attacks on the Internet of Things and their Prevention Methods</td>
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<td>(Hanan Mustapha and Ahmed Alghamdi)</td>
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<td>IoT system to control Greenhouse Agriculture based on the needs of Palestinian farmers</td>
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<td>(Waleed Abdallah, Mohamad Khdair, Mos’Ab Ayyash and Issa Asad)</td>
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<td></td>
<td>An IoT Based Monitoring and Controlling System for Water Chlorination Treatment</td>
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<td>(Nael Zidan, Mohammed Maree and Subhi Samhan)</td>
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<td></td>
<td><strong>Session: General Track (Session Chair: Wail Mardini)</strong></td>
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<tr>
<td>15:10 – 16:30</td>
<td>Feature Selection Using Binary Particle Swarm Optimization with Time Varying Inertia Weight Strategies</td>
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<td>(Majdi Mafarja, Radi Jarrar, Sobhi Ahmed and Ahmed Abusnaina)</td>
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<td>Training Neural Networks Using Salp Swarm Algorithm for Patter Classification</td>
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<td>(Ahmed A. Abusnaina, Sobhi Ahmad, Radi Jarrar and Majdi Mafarja)</td>
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<td>Rank Based Binary Particle Swarm Optimisation for Feature Selection in</td>
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<td>Classification (Majdi Mafarja and Nasser Sabar)</td>
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<tr>
<td>16:30 – 17:30</td>
<td><strong>Session: Best Paper Awards and Closing Remarks</strong></td>
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Dr. Bamidele Adebisi is a Reader in Electrical and Electronic Engineering and Director of Engineering & Material Research Centre, with experience in the academics, R&D, and telecommunication. He received PhD in Communication Systems and Master’s in Advanced Mobile Communication Engineering, both from Lancaster University. He was a Work Package Leader of a successfully completed EU FP7 Smart Grid Project. A key achievement from this project was the development of an IPv6 based system, which uses Narrowband PLC for communication to support Smart Grid applications. The significant grants secured by his team over the past three years – either solely or as part of a consortium – include: a £500K Innovate UK/EPSRC funded project to develop a Smart In-building micro-grid for energy management; €23M EU H2020 project on Smart Cities and Communities (Triangulum); £1.5M UK-South Korean EPSRC project on Peer to Peer (P2P) Energy Trading/Sharing (Prosuming) in partnership with Oxford, Bath and Imperial College; a £500K KTP project to develop Smart System for Water Management. He is also a Co-Investigator on City Verve, a £10M Innovate UK-funded Internet of Things/“Smart City” project with 23 partners across Greater Manchester. He has co-authored journal, conference, and report papers in the areas of Powerline Communication, signal processing, smart grid, smart cities, smart home, and IoT. Dr. Adebisi is a Chartered Engineer and a Senior Member of IEEE.

**Transactive Energy Systems: What has communications got to do with it?**

The smart grid vision is unveiling new possibilities in the ways utilities and consumers interact with energy; transactive energy (TE) being one of them. In TE system, economic and control mechanisms are combined in such a way as to allow dynamic balance of supply and demand across the entire electrical infrastructure using value as a key operational parameter. The central theme of TE is that by actively engaging prosumers and exploiting...
their roles in the energy value chain the grid can become more flexible; this adds economic and social dimensions to the grid operations. Although TE is currently at nascent stage, its development and delivery are being shaped by the emergence of distributed energy management techniques such as Virtual Power Plant (VPP) and Peer-2-Peer (P2P) energy trading. In these systems, rather than the vertical hierarchical flow of electricity found in traditional grid, the TE element also allows market-driven horizontal interactions between energy producers and consumers.

In this talk, the various challenges that the industry stakeholders must confront in a bid to maintain technical, social and economic equilibrium in the TE sector will be discussed. This includes definition of TE scenarios and reference design, development of common platform model and the requisite regulatory framework to accommodate TE services in the grid. These challenges are not trivial, adequately addressing them will inspire new economic processes and business models that not only rewards prosumers but also protects the utilities from abrupt or unexpected contingencies. For the market makers, one of the key questions is to determine how VPP and P2P create new opportunities for TE. Overlaying the TE services over the power network suggests that ICT-driven trading platform must be available to provide the needed interface between energy buyers and potential sellers within the network. Therefore, in order to maximize the benefits of TE to the operators and prosumers, communication network design paradigms must be developed to support the transactive exchanges between producers and consumers. A rethinking of existing ICT infrastructure and technologies with a view to retrofitting them for TE is be presented.
Ahcène Bounceur is an associate professor of Computer Science at the university of Brest (UBO). He received a Ph.D. in Micro and nano electronics at Grenoble INP, France in 2007. He received the M.S. degrees from ENSIMAG, Grenoble, France in 2003. From April 2007 to August 2008, he was a postdoctoral fellow at TIMA Laboratory. From September 2007 to August 2008, he was with Grenoble INP, France where he was a temporary professor. He has obtained the 3rd place of the Annual IEEE Test Technology Technical Council (TTTC-IEEE) Doctoral Thesis Contest, VLSI Test Symposium, Berkeley, USA, May 2007. His current research activities are focused in: Tools for parallel and physical simulation of Wireless Sensor and IoT Networks, sampling methods for Big Data mining. He is the coordinator of the project ANR PERSEPTEUR and a partner of the project Suidia.

Leader Election for the Surveillance of Frontiers using an IoT Network
The Leader Election is a real challenge in Wireless Sensor and IoT networks since it depends on the nature of the application domain and the energy consumption. In the case of real time applications, the choice will be based on the speed of election, and in the case where the time is not important, the choice will be based on the energy consumption. The Minimum Finding Algorithm is one of the classical algorithms allowing to elect such a node. In this algorithm, each node sends its value in a broadcast mode each time a better value is received. This process is very energy consuming and not reliable since it may be subject to an important number of collisions and lost messages. In this talk, we propose four new algorithms: 1) LOGO (Local Minima to Global Minimum), 2) BROGO (Branch Optima to Global Optimum), 3) DoTRo (Dominating Tree Routing) and 4) WBS (Wait-Before-Starting). These algorithms are based on simple routing protocols and they are more reliable since they require a small number of broadcast messages and a reduced number of nodes that send broadcast messages at the same time. The obtained results show that the proposed algorithms can reduce the energy consumption with rates that can exceed 94% compared with the classical Minimum Finding Algorithm. Finally, we will demonstrate on the CupCarbon simulator how to use the proposed algorithms to determine the starting node of a network required to run the D-LPCN algorithm, which is used to determine the boundary nodes of an IoT network.
Irina Gudkova received her M.Sc. degree in applied mathematics and Cand.Sc. degree in applied mathematics and computer sciences from the Peoples’ Friendship University of Russia (RUDN University) in 2009 and 2011, respectively. She is currently an Associate Professor with the Applied Probability and Informatics Department, RUDN University. She has co-authored multiple research works. Her current research interests include mathematical modelling and performance analysis of 4G/5G networks, smart cities, spectrum sharing, multicast services, radio access, teletraffic theory, and queuing theory. gudkova_ia@pfur.ru


The new generation of communication technologies, named 5G, brings along a variety of emerging applications and services from both human and machine perspectives. The growing demand for bandwidth in 5G may therefore lead to massive deficiency in wireless spectrum availability despite its underutilization in urban areas. The novel licensed shared access (LSA) framework that has attracted recent industrial and academic attention may become a feasible solution to leverage such underutilized spectrum more efficiently. We analyze the effects of applying LSA by proposing the appropriate mathematical models. The proposed analytical framework allows to capture the probabilities of rare events during such operation by providing with a high level of precision in the resulting performance estimates.
Dr Thar Baker is a Senior Lecturer in Software Systems Engineering and a leader of Computer Science Research Group at the Department of Computer Science, and a member of Applied Computing Research Group (ACRG) at Liverpool John University (LJMU). He has received his PhD in Autonomic Cloud Applications from LJMU in 2010. Since then, Dr Baker has published numerous refereed research papers in multidisciplinary research areas including: Cloud Computing, Algorithm Design, and IoT. His current research interests lies actively on “things” mutation, agentification, and federation in the context of IoT. Also, he is been working on Ad-hoc Fog optimisation and scheduling. He is an Editor in a number of peer reviewed international journals including (FGCS of Elsevier; IJITWE of IGI Global; IJCAC of IGI Global) and is on programme committee for a number of international conferences including CCGrid. He is Expert Evaluator in the Future Internet Research and Experimentation (FIRE) initiative at the European H2020 Framework, and ICTFunds of UAE.

Everything-as-a-Resource (*aaR) paradigm: Foundation and illustration through the IoTs

I am presenting Everything-as-a-Resource (*aaR) as a new paradigm for designing collaborative applications on the Web. Abstracting these applications’ various physical and logical entities, resources are defined in a way that permits their discovery, composition, and participation in business scenarios. Compared to Everything-as-a-Service (*aaS) in cloud computing, resources are categorized into computational, consumed, and produced, have trackable lifecycles as per their respective category, and are customized in order to consider the characteristics of future resource-based collaborative applications to develop. From a capacity perspective, a computational resource processes data, a produced resource abstracts data, and a consumed resource captures data. Along with their capacities, resources expose methods that other resources and/or applications’ stakeholders call. The proper call of methods is ensured through restrictions like limited and non-shareable. This talk exemplifies the new *aaR paradigm with a case study that revolves around the use of Internet-of-Things (IoT) in the healthcare domain.
Dr Kelvin Anoh received MSc degree in Data Telecommunications and Networks from the University of Salford – UK in 2010. Kelvin received PhD degree in Telecommunications Engineering from the University of Bradford – UK, in 2015. He joined the Communications and Smart Systems Research Group in Manchester Metropolitan University (MMU), UK in 2016 as a Postdoctoral Research Associate where he worked on a recently completed Innovate UK and EPSRC project (“Smart in-building micro-grid for energy management”) in collaboration with two other industrial partners. The project received the MMU Knowledge Exchange Project Award and the MMU Outstanding Knowledge Exchange Project Award of year 2016. Presently, Kelvin works on the ongoing Peer-to-Peer Energy Trading and Sharing – 3M (Multi-times, Multi-scales, Multi-qualities) EPSRC UK-Korea project in collaboration with Oxford, Imperial College and Bath Universities (UK) including South Korean partners. Kelvin has published over 60 peer-reviewed conference and journal papers. His interests are in the areas of smart-grid, communications systems, machine learning and distributed energy systems.

**Advances in PAPR Reduction for OFDM Systems with Machine Learning**

Multicarrier modulation demultiplexes a wide bandwidth into many narrowbands increasing the spectral efficiency by up to 50%. The narrowbands results in extended symbol time, which is useful for combating intersymbol interference. Unfortunately, this scheme suffers from peak-to-average power ratio (PAPR) problem. The PAPR problem is particularly prevalent in orthogonal frequency division multiplexing (OFDM) systems and several different approaches for reducing the PAPR problem have been reported in literature. The problem is significantly detrimental to high power amplifiers (HPA) causing the HPA system to consume high power. In addition, HPAs may distort the OFDM signal amplitude leading to diminished signal quality at the receiver. By reducing the PAPR of OFDM systems, high power consumption of HPAs can be reduced. The speech will discuss different multicarrier kernels recently used in the design of OFDM–like systems for reducing the PAPR problem with some tolerable trade-offs. The speech will also present the use of machine learning tools for PAPR reduction.
Leader Election for the Surveillance of Frontiers using an IoT Network  
**Ahcène Bounceur**

11:00 – 11:45 | Tuesday, June 26th 2018 | Room: Smart Zone

**Session: Future Networks**

11:50 – 13:30 | Tuesday, June 26th 2018 | Room: B102 | Chair: Jibran Saleem

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Ant Colony based Optimization techniques to mitigate Dynamic Routing Challenges in Packet based Networks

Inam Ullah Khan, Ijaz Mansoor Reshi, Muhammad Asghar Khan, Syed Bilal Hussain Shah, Imran Shafque Ansari, Muhammad Hamza Akhlaq

**Abstract:**

Efficient and effective routing protocols play a crucial and central role to measure the quality of service of the networks. Recent development in networking technologies like Software defined networks (SDN), Internet of things (IoT) and advancements in mobile and wireless communication has raised questions and concerns about the performance, scalability and reliability of the traditional routing schemes and protocols being used for years. The aim of this paper is to gauge the performance of various state of the art routing algorithms like distance vector, link state and session routing with ant colony-based optimization techniques used earlier for shortest path detection in various arrangements.
Design of a Warfare Car Robot using Sensor Network Connectivity

Laiqa Binte Imran, Muhammad Farhan, Rana M. Amir Latif, Ahsan Rafiq

Abstract:

Robots remain the focus of researchers and developers, and now they are moving towards IoT based devices and mobile robots to take advantage of the different sensor enables facilities. A robot is a machine capable of carrying out a complex series of actions automatically, especially one programmable by a computer. A robot can be controlled by a human and can be modified by its functionality at runtime by the operator. From past few decades, researchers are contributing towards Robotics. There is no end of technology, creativity, and innovation. The project is designed to develop a robot using android application for remote operation attached to the wireless camera for monitoring purpose. Surveillance using the camera can help the soldier team to make strategies at run-time. This kind of robot can be helpful for spying purpose in war fields. The android application loaded on mobile devices can connect to the security system and easy to use GUI and visualization of the Warfield. The security system then acts on these commands and responds to the user. The camera and the motion detector are attached to the system for remote surveillance using wireless protocol 802.11, ZigBee and Bluetooth protocols. This robot is having the functionality of mines detection, object detection, GPS used for location and navigation and a gun to fire the enemy at the runtime.

A Lightweight Only Receiver Clock Synchronization Technique for Wireless Sensor Networks

Habib Aissaoua, Ahcène Bounceur, Makhlof Aliouat, Reinhardt Euler, Abdelkader Laouid, Farid Lalem and Abdelkamel Tari

Abstract:

Since the birth of computer networks and distributed systems, the clock synchronization issue has been considered as a major challenge. Unlike classical networks, which aim to provide high quality service without power restriction, the primary purpose of most sensor network protocols is to economize as much as possible the energy in order to enhance the network's lifetime. In fact, the importance to have clocks synchronized resides in the fact that a wide range of communication protocols and applications necessitate a common notion of time for the overall network nodes to operate perfectly. In this paper, we propose a new clock synchronization algorithm, referred to as Lightweight Only Receiver Clock Synchronization (LORCS). As communication between nodes consumes
significant amounts of energy, our technique aims to minimize the number of exchanged timing messages during a synchronization round. To this end, neighbor nodes in LORCS synchronize their local clocks with the reference point by only receiving synchronization messages without transmitting any such message. Simulation results show the effectiveness of LORCS compared to the RBS protocol, a standard benchmark clock synchronization protocol.

WiMax Technology for Maritime Intelligent Transport Systems Communication
Ayoub Bahnasse, Abdelmajid Badri, Mohamed Talea, Fatima Ezzahraa Louhab, Adel Harbi, Khiat Azeddine and Said Broumi

Abstract:
Intelligent transport systems offer effective solutions for the management of road, air and sea traffic. Despite their great success, these systems have several constraints and the multiple challenges that are not limited only to the security of the exchanges but also in the optimization of the routing. Autonomous vessels are currently in the interest of the researchers, several works were dealing with collision avoidance or improved routing, however, little work has been done on the aspect of telecommunication between different autonomous vessels or between the same vessels and a centralized management point located in the port using WiMax technology (IEEE 802.16). In this paper, we carry out a comprehensive study of the reliability provided by WiMax technology in the routing of data from autonomous vessels.

An adaptive opportunistic routing scheme for reliable data delivery in WSNs
Malik Hasnain, Mazhar Hussain Malik and Mehmet Emin Aydin

Abstract:
With the emergence of miniature technologies such as sensor nodes powered with limited batteries, many applications came into existence such as detection of mine reconnaissance, pollution monitoring, data gathering from remote locations, etc. Sensor nodes are the necessary components of the wireless sensor networks (WSNs) in which efficient battery consumption by the nodes remains as the major challenge for reliable data communication. The batteries are mostly consumed in communication over long distances, redundant transmissions, ineffective selection of routing path between a source and a destination. This makes energy efficiency one of the core components of routing strategies designed for WSNs. In this paper, we proposed an opportunistic routing scheme for
WSNs to ensure the reliable data communication with efficient node battery dissipation. This scheme minimizes the data loss by nominating a set of forwarder nodes, which manages mitigating re-transmissions from the network communication. In order to avoid the duplicate packets at the destination, the nodes are prioritised based on the holding time. To verify and validate the proposed routing scheme, experimental simulations have been conducted to measure energy consumption, packet delivery ratio and end to end delay. The results demonstrate that the proposed scheme outperforms the counter-part schemes under consideration in terms of energy and packet delivery ratio.

**Session: Cloud, Distributed and Parallel Systems**

11:50 – 13:30 | Tuesday, June 26th 2018 | Room: B027 | Chair: Ahmed Alhmouz

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**Paper 1**

**Full Paper**

**Discrete Time Markov Chain Model for Analyzing Characteristics of RACH Procedure under Massive Machine Type Communications**

Ekaterina Medvedeva, Elvira Zaripova, Irina Gudkova, Oksana Semenova, Anastasiya Vlaskina and Yuliya Gaidamaka

**Abstract:**

The growth of interconnections in wireless mobile networks significantly increases both signaling and user data load on the network infrastructure of operators. The great influence on the radio access network has the transmission of small data between M2M. To reduce the cost of servicing this type of traffic and to improve the performance measures, such as access success probability and access delay, the development of analytical methods for the analysis of the transmission of M2M traffic is actual. The paper contains the mathematical model in term of Markov chain, which consider session initiation procedure in random access radio channel and allows to calculate mentioned performance measures using obtained expressions. Given examples show the dependence of the obtained measures on the collision probability and possible retransmission of service messages.
Virtual Microgrids: A Management Concept for Peer-to-Peer Energy Trading

Kelvin Anoh, Augustine Ikpehai, Dragana Bajovic, Olamide Jogunola, Bamidele Adebisi, Dejan Vukobratovic and Mohammad Hammoudeh

Abstract:

The proliferation of distributed energy resources (DERs) and smart technologies has enabled the integration of microgrid generation into the energy supply chain. This paper proposes the use of energy trading agents (ETA) in the overlaying communication system in a neighbourhood area network (NAN) in which a number of microgrids (MGs) are grouped together into logical clusters called virtual MGs (VMGs) to minimize operational costs. To decouple the communication network from the grid topology and study the communication performance, each VMG is assigned an ETA such that prosumers in a VMG exchange messages only with the ETA rather than uncontrolled messaging in the network. Although this reduces the amount of network traffic, a key question is on how to determine the optimal location of the ETAs. For VMGs of regular shapes, we formulate this as a simple minimization problem of Euclidean distances of regular shapes. Our results show that by employing ETAs, the model reduces the distance traversed by a prosumer by 40%.

An Efficient Privacy Preserving Cryptographic Approach in in Cloud Computing

Ashalatha Ramegowda, Jayashree Agarkhed and Siddarama Patil

Abstract:

Cloud computing beFull Papers to distributed network technology for computing and storage capabilities purpose. It is a kind of cost-effective technology dedicated to information technology. Using the Internet, the accessibility and retrieving of cloud data have become much more accessible. The service providers can expand the storage space in a cloud environment. Security is well-thought-out to be the essential attribute in a distributed system. Cryptography can be described as a method of securing the data from attackers and eavesdroppers. Third Party Auditor is responsible for the authentication of secret files in cloud system on behalf of the data owner. The data auditability technique allows the user to make the data integrity check using a third party. Cloud computing offers unlimited data space for storage to its users and also serves sharing of data and planned use of heterogeneous resources in distributed systems. This paper describes privacy-preserving enabled public auditing method using cryptographic techniques for low-performance based end devices.
Evaluating Health Information Apps On Real Life Smart Phone Use

Reda Shaheen, Safina Kanwal, Rimsha Iftikhar, Muhammad Rehman Shahid

Abstract:

As the population is increasing day by day and the people are more interesting to know about their health information especially the elderly people so they interact with the online technologies. Now it is important to design the Interface in such a way that the people not feel frustrated by using them moreover the interface should be user friendly and the people will not require any training in using these online technologies to view their health information. In this study the role of emotional valence and arousal, their satisfaction level, the applications usability and what is the reason the different age group people prefer a specific interface format over others will be identified. As the term usability is concerned with both functional and pleasure related terms so, in this research different questionnaires such as SUS, QUIS, SAM will be conducted among the young and the older adults and their outcomes will also analyze on gender base. So, there should be need to design the interface in such a way that provide the easy navigational facility to the people that increase their satisfaction with their own ability to seek and use sources of health information.

LOOP UNROLLING EFFECT ON PARALLEL CODE OPTIMIZATION

Karim Soliman, Marwa El Shenawy and Ahmed Abou El Farag

Abstract:

Parallel code optimization has many challenges to improve the code performance. Loop unrolling is an optimization technique applied to the loops to reduce the frequency of branches. This optimization is a useful technique to enhance the performance of the applications especially with the increase of pipeline depth in modern processors. The proposed approach is to perform the loop unrolling optimization over understudied problems Sparse Dense Matrix Multiplications SpDM, and Dense Matrix Multiplication with cache oblivious algorithm using Peano Curves, and measure the effects on both sequential and parallel execution. The proposed approach enhanced the problem execution up to 86% in SpDM on the same computer architecture, and up to 6% in Peano Curves application.
Towards Fog Driven IoT Healthcare: Challenges and Framework of Fog Computing in Healthcare
Mohammed Al-Khafajiy, Lee Webster, Thar Baker and Atif Waraich

Abstract:
As we are within the era of the internet of things (IoT) its increasing integration to our everyday lives means that the devices involved produce massive amounts of data every second from billions of devices. The current approach used to handle this data is cloud computing. However because of its requirement of data centres this can become infeasible for the processing of data from IoT due to distance between these IoT smart objects (e.g., sensors) and the data centre. If this data holds any importance to minimal delay then the travel time between the end device and the clouds data centre could affect the relevance of that data. Therefore, to deal with these issues a new network paradigm placed closer to the IoT end devices is introduced called «Fog computing» to help address these challenges. If introduced effectively then fog computing can lead to the improvements in the quality of service (QoS) offered to systems that require the processing of delay sensitive data like healthcare systems that could benefit from the quick processing of data from sensors to allow the monitoring of patients. This paper has a main focus on healthcare systems. An architecture containing three layers; things (i.e., sensors), fog nodes and a cloud data centre is proposed aFull Paperside a framework incorporating this architecture. This framework offers collaboration among fog nodes with optimal management of resources and job allocation, which is able to achieve a high QoS (i.e., low latency) within the scenario of a healthcare system.

Detecting Gaps and Voids in WSNs and IoT Networks: the Angle-based Method
Madani Bezoui, Ahcene Bounceur, Loic Lagadec, Reinhardt Euler, Mohammad Hammoudeh, Abdelkader Laouid and Abdelkamel Tari

Abstract:
A random deployment of Wireless Sensor Networks (WSNs) is often the basic structure used in the context of fire forest detection, military applications or any situation where the zone-of-interest is not accessible by humans. The main problematic in this kind
of deployment is the formation of gaps or voids, which represent a zone which is not covered in the network. This reduces significantly its Quality of Service and can lead to serious problems, like a non-detected starting fire, the presence of unexpected persons or attacks, etc. Therefore, detecting zones that are not covered by the WSN is of great importance. In this paper, we present a new method allowing to detect gaps and voids in WSNs or in IoT networks by using some characteristics of the angles of the polygon formed by the boundary as determined by the D-LPCN algorithm. These angles can be interior or exterior. Characterizing the angles of the polygon formed by these boundary nodes allows to specify whether this boundary is a gap or a void, in case where the obtained polygon is interior. Since D-LPCN is fault-tolerant, the simulation results show that it is possible to use it for the detection of faulty nodes and intrusions.1

A Review of Data Security and Cryptographic Techniques in IoT based devices

Ghulam Mustafa, Rehan Ashraf, Muhammad Ayzed Mirza, Abid Jamil

Abstract:

The idea of the Internet of Things (IoT) is to connect or give access to everything to the Internet. IoT environment not only provides the facility of Human to Machine connectivity, however, it also creates Machine to Machine connectivity. As everything is going to connect to the Internet and also generating the data. So, the data generating by these devices is growing up rapidly, that huge amount of data is called Big Data. This data has huge Volume, High Velocity, and different Variety. The security of this data is a risk. As we know that, the IoT devices have constraints like low power and less computational speed and the traditional encryption algorithms like DES, 3DES, and AES are more complex. Traditional encryption algorithm seems not feasible for IoT devices. So, we need to develop Lightweight encryption algorithm for IoT devices for secure communication and secure data transmission in IoT environment. Cryptography and Steganography techniques are used for securing the data over the Internet. Cryptography encrypts the data by using a key and make a ciphertext that cannot be readable by the normal user. Steganography hides the data by concealing it into another medium like data, image, audio, video, or mixed. This paper provides a review of important lightweight cryptographic techniques used for IoT devices.
A Survey on IoT contribution in smart goods ordering cycle in GCC – Amazon buttons
Duha Shubair, Imtiaz Ahmed and Maytham Safar

Abstract:
Internet of Things (IoT) is an emerging technology with a wide range of applications including smart homes, cars, offices and so on. It plays an important role in data gathering regardless of time and environment. Amazon Dash button is one of the smart outcomes of IoT technology that started to show in US market in April 2015 to enable users to shop for their frequently requested items by a press of a Wi-Fi connected button. In this paper, we present a survey about Amazon Dash button in terms of the operation itself and its marketing value in Gulf Cooperation council (GCC) countries. We highlight the limitations of its usage to enhance and automate the goods ordering cycle within the same area such as ordering without a prior notice of item price change and other technical or item delivery issues. In addition, we compare Amazon Dash buttons to the common shopping trends available in GCC. This comparison contributes in involving customers’ experience while improving a tool to serve their needs. In order to build our work on actual recent data, we have conducted an internet survey that was completed by 144 internet users. We aim to understand how people can perceive these buttons and how we can improve them with extra automation enhancements to help the consumers order their items by a single click or maybe without it. This means that there is a chance to improve the buttons in the future by eliminating the button press and making it completely smart. We can also modify the architecture of the button by adding a GSM connection feature instead of Wi-Fi.

A Study of Current Trends in the Design of Processors for the Internet of Things
M. Tariq Banday

Abstract:
The advent of processors in early 70s has made a significant impact on our society. Since then, the continuous increase in integration density and speed, lower power consumption and better integrability with advances in communication technologies have paved the way for the Internet of Things (IoT) - a pervasive presence of interconnected and uniquely identifiable physical devices. The type of processors deployed inside connected devices is largely influenced by the type of required sensing and communication features. As such they often integrate memory, peripherals both digital and analog, sensing/actuation logic and communication interfaces (both wired and wireless). The processors and architectures used by IoT devices define many of their capabilities, such as whether they
are capable of strong security and encryption, whether they are sophisticated enough to support an operating system, remotely upgradable firmware, high programmability and embedded device management agents. Due to wide variety of IoT applications and diverse set of available processors, architectures and programming platforms determining an appropriate processor is very challenging. This paper explores current trends in the design of processors in terms of basic hardware, architecture, ISA, energy consumption, communication interfaces, security mechanisms, etc. that are advantageous for the Internet of Things. This paper further introduces feature set of present-day IoT processors.

**Keynote Speaker**


**Irina Gudkova**

14:30 – 15:10 | Tuesday, June 26th 2018 | Room: Smart Zone

**Session: Future Networks**

15:10 – 16:30 | Tuesday, June 26th 2018 | Room: B102 | Chair: Abdukodir Khakimov

**Enhanced Routing Algorithm Based on Depth Traversal in Software Defined Wireless Sensor Networks**

Raffi Al-Qurran, Amr Abu Abdo and Wail Mardini

**Abstract:**

Internet of Things (IoT) is being introduced in recent era at the networking field which carries the idea of connecting things together from personal hand-held devices to large household machines that are connected to the Internet. Many applications uses the IoT implementation such as Wireless Sensor Network (WSN), which is an ad-hoc network that consists of smart sensors with limited computation and communication abilities. Sensor nodes are deployed in various environments for different applications to achieve the goal of collecting data and send it to a base station. The sensor nodes communicate with each other via routing protocols which must be a low power consuming protocols because of the sensor’s limited energy, in order to prolong the network’s lifetime a Software Defined Network (SDN) is used to control the WSN forming a network called Software Defined Wireless Sensor Network (SD-WSN), to achieve smooth network management,
enhance network coverage, as well as solve the node energy consumption problem. In this paper, we propose an enhanced routing protocol for SD-WSN in which the battery level is taken into consideration to choose the next node in the path from source to destination. The experiments revealed the improvement of SD-WSN network via reducing the energy depleted from sensor nodes, thus improving the reliability of the WSN.

Abstract:

Finding an efficient communication structure among wireless network access points and wireless sensor nodes is essential in optimizing energy consumption and minimizing broadcast latency. Wireless networks can control their nodes for efficient resource utilization via Topology Control. A topology control based on obtaining Minimum Connected Dominating Set (MCDS) is an efficient approach for constructing wireless network virtual backbone. A virtual backbone reduces energy consumption, reduce communication interference, reduce routing latency, and increase the bandwidth. We propose a new parallel genetic algorithm with elite and diverse cores for constructing wireless network virtual backbone based on finding MCDS of wireless nodes to be used in wireless network topology control. There are predefined number parallel workers, an elite core and a diverse core. All parallel components run Genetic operators, and the elite core selects elite solutions among processed sub-population. On the other hand diverse core looks for new solutions upon receiving elite solution in addition to received processed sub-population. Experimental results show that this algorithm gives better results compared to other methods, particularly for high dimension graph, which is the case in wireless sensor networks. In addition to that, the algorithm is very stable as each result match the average result.
Clustering algorithm for AODV Routing Protocol based on Artificial Bee Colony in MANET

Dr Amjad Rattrout, Prof. Adwan Yasin, Mahmoud Abu-Zant, Mariam Yasin and Mohammed Dwaikat

Abstract:

One of the most important challenges that MANET face is how to connect nodes together also how to adapt the dynamically changes in the network topology. A novel clustering algorithm that ensures an increase in stability and adaptability of MANET has been proposed, it depends on the Artificial Bee Colony (ABC) to determine the Cluster Head (CH) in each cluster taking into consideration a group of parameters to calculate the proposed fitness function also to manage control traffic messages.

Comparative Analysis of Routing Protocols for Under-Water Wireless Sensor Networks

Hala Joudeh, Aisha Mikkawi, Ahmed Awad and Othman M.M. Othman

Abstract:

Underwater Sensor Networks (UWSNs) are significantly different from terrestrial sensor networks in the following aspects: low bandwidth, high latency, node mobility, high error probability, and 3-dimensional space. These new features bring many challenges to the network protocol design of UWSNs. The communication range of underwater wireless sensor networks (UWSNs) is limited, and the nodes are equipped with limited power battery whose replacement is expensive due to underwater harsh environment. Moreover, the networks including small number of nodes have communication problems for long ranges. In this paper, we evaluate the performance of three classical location-based routing protocols (namely, VBF, HH-VBF, and VBVA) for underwater wireless sensor networks in terms of three critical performance metrics for dynamic network topology. Our comparison includes energy consumption, end-to-end delay, and packet delivery ratio.
A Comprehensive study of Cyber Attacks & Counter Measures for web systems
Abid Jamil, Kashif Asif, Rehan Ashraf, Sheraz Mehmood, Ghulam Mustafa

Abstract:
Technology is growing rapidly and data is being stored on online servers. As technology is evolving, on the other side it is opening doors for cybercrimes. Attackers are continually developing new methods, tools and techniques to deface online systems. A website with compromised security and Vulnerabilities can give opportunities to hackers to get access to your network. There are a lot of techniques that doesn’t required prior knowledge of hacking. These techniques can be applied using little knowledge about these attack. These attacks can be performed by any user if there exits some vulnerable code in website. In this paper, we presented a different type of cyber-attacks, loopholes due to which hacking become possible and countermeasures to prevent hacking attacks. We perform different experiments to detect these attacks, and to test countermeasures. This countermeasure should be used by developers, Penetration Testers & security experts to ensure the security of web systems.

Scheduling Techniques for Complex Workloads in Distributed Systems
Georgios L. Stavrinides and Helen Karatza

Abstract:
Effective scheduling techniques are very important in distributed systems, as they directly affect the system performance and the utilization of resources. Particularly important is the scheduling of jobs in the case of complex workloads. This paper concentrates on the study of workloads in a distributed system, which consist of parallel jobs of gang type, as well as single-task computationally intensive jobs. Simulation is employed to evaluate the performance of two scheduling techniques for different cases of system load and service time variability. The simulation results show that the scheduling strategy that takes into account the degree of parallelism of a job performs better than the other method that does not take into account individual job characteristics.
Quicker Re-allocation of Regions in OpenSimulator Framework

Umar Farooq, Ihsan Rabbi, Kashif Zia, Zohra Israr and Muniba Shereen

Abstract:
Scalability is one of the major issues to cope with, in digital spaces, called virtual worlds. In our previous work, we developed a framework for scaling these environments and implemented it using the OpenSimulator framework. It switches-off a region before a transfer and brings it back after the successful re-allocation. The players in the transferring region are moved to an intermediate region during the transfer. Extended removal strategies for the OpenSimulator framework were developed that significantly reduced the time taken by the re-allocation process. This work extends the remaining two expensive operations in scaling process, named, the content load and players transferring mechanisms using the current multi-core architecture. The basic aim is make the re-allocation process more faster. The evaluation results demonstrated improvement of the extended methods against their basic sequential approaches. The inclusion of the proposed methods, also greatly reduced, the total time taken by the re-allocation process compared with the existing methods.

Information Security Management System Challenges Within a Cloud Computing Environment

Mais Arafat

Abstract:
Scalability is one of the major issues to cope with, in digital spaces, called virtual worlds. In our previous work, we developed a framework for scaling these environments and implemented it using the OpenSimulator framework. It switches-off a region before a transfer and brings it back after the successful re-allocation. The players in the transferring region are moved to an intermediate region during the transfer. Extended removal strategies for the OpenSimulator framework were developed that significantly reduced the time taken by the re-allocation process. This work extends the remaining two expensive operations in scaling process, named, the content load and players transferring mechanisms using the current multi-core architecture. The basic aim is make the re-allocation process more faster. The evaluation results demonstrated improvement of the extended methods against their basic sequential approaches. The inclusion of the proposed methods, also greatly reduced, the total time taken by the re-allocation process compared with the existing methods.
A Distributed Security Protocol Designed for the Context of Internet of Things

Laouid Abdelkader, Muath Alshaikh, Farid Lalem, Ahcène Bounceur, Reinhardt Euler, Madani Bezoui and Habib Aissaoua

Abstract:
In the field of Internet of Things (IoT), many encryption protocols for distributed wireless communication technology have been proposed for use in various applications such as monitoring, health-care, product management, workplace, home support and surveillance. An IoT system can be looked at as a highly dynamic distributed and networked system composed of a large number of smart devices. In fact, such connected devices suffer from the limitation of resources in terms of computing, energy, bandwidth and storage. Hence, IoT application scenarios require methods to adapt to highly diverse contexts with different available resources and possibly dynamic environments. In this paper, we address these issues by proposing an efficient technique for data protection in the context of IoT. A distributed network architecture is used, where each node is in charge to deliver and/or forward data. The aim is to use efficient operations to protect the exchanged data. The proposed technique ensures the exchanged data to be effectively and securely controlled with a low overhead compared to the classical approaches. The proposed protocol shows its efficiency in terms of overhead, speed, energy and security measurements.

A Distributed Security Protocol Designed for the Context of Internet of Things

Khurram Shahzad, Abdul Moiz, Usman Ahmed, Syed Jawad Hussain, Khalid Hussain, Athasham Sajid

Abstract:
The paper presents the automatic detection of a violent object observed in a video. The approach can be applied on certain institutions like educational, restricted areas, banks and any other crowded place where the chance of violent behavior may occur. Artificial Intelligence is used to detect such objects depending upon the number of taken positive and negative images of that particular object to train the data but probability of best accuracy rate depends upon the taken positive and negative images i.e. (more the positive and negative images more will be the accuracy). Haar Cascade Classifier technique is implemented and the results were quiet impressive.
Graphical Authentication Based on Anti-Shoulder Surfing Mechanism

Wen Bin Goh, Sohail Safdar, Rehan Akbar and Suresh Subramanian

Abstract:

Authentication is one of the most important mechanisms to ensure system accessibility by legitimate users. There are various authentication tools existing that are based on numerous techniques. Distinguishing factors of such authentication tools are the underlying passwords that they imply. These passwords can be textual based, graphical based, hardware based or biometric based. All such password types have their pros and cons. The principle focus of this research is picture-based graphical passwords, since they are easy to remember and can overcome the limitations of using long textual passwords for stronger security. However, mostly the picture based passwords suffer from shoulder surfing attacks and are therefore vulnerable. If this vulnerability is overcome then such graphical passwords are highly useful because of their strength and ease of use as compared to long textual passwords. The main objective of this research is to propose and develop a picture-based authentication scheme with anti shoulder surfing capability. The proposed authentication scheme consists of both password creation and usage. Both the stages are supported by specialized technical constructs that overcome the anti shoulder surfing attack even if the attacker is standing next to the legitimate user.

Malware Detection using DNS Records and Domain Name Features

Khulood Al Messabi, Ayesha Al Yousif, Monther Aldwairi, Anoud Thoban and Fatna Belqasmi

Abstract:

One of the core components of the Internet is the Domain Name System (DNS) is basically a technology that manages public web sites names. It also allows users to type in names in web browsers and then the address on the Internet is found by the computer automatically. The emergence of DNS malwares caused huge loss to individuals and companies. As hundreds of thousands of people face this issue in a daily basis which prevents them from access- ing desired websites. Several studied proposed solutions for DNS malware detection, but all of them failed to provide an optimum system that does not have drawbacks. One of the studies intro- duced the exposure system which is very
dependent since it relies on sharing data from different networks. Another study suggested an anomaly-based approach for botnet detection, that only focuses on the activities related to botnets. Furthermore, Snort is one of the signature-based detections that failed to detect new infections other that the established signature queries. In addition to that, patterns correlation with malicious activity study was bias as it excluded dynamic DNS services. Also, DNS traffic detection system unfortunately only focuses on DNS resolvers as the DNS traffic not passing through DNS resolvers is not considered. Moreover, a DNS monitoring system called Kopics was proposed in one of the papers, however it only collects the traffic at the top-level-domain (TLD). Thus, an access to authority-level DNS traffic has to be granted. Finally, Infoblox DNS firewall was introduced by Infoblox In. and the only drawback of this system is that setting it up is complicated. After reviewing all of these papers, it seems that there should be an optimum system that successfully detects malwares in DNS. This paper will provide such system, where malwares are detected and analyzed effectively. In this paper, a convenient system was applied to detect malicious domain names, by using 9 features that were extracted from a malicious domain database. These features permit the categorization of malicious domain names and how they are queried. We developed our own version of the detection of malicious domain names, and experimented with five weeks of real-world data. Our experimental results show that Python programming language can achieve a reasonable detection rate by script writing our predicted statements. In addition, Weka was used to validate our predictions and analyze our data in a format that is highly comprehensible 77.5% and low false positive rates 22.4%.

**Paper III**

**Full Paper**

**CryptDBaaS: Query Over Encrypted DBaaS Without Third-Party**

Fadi Draidi, Mohammad Hmedat, Barakat Abwe and Amr Jamal

**Abstract:**

Information storage systems usually take great care for protecting their sensitive or confidential data, even users personal data. Hence the need to implement the concept of information security as part of the system. Information security primary focus is the balanced protection of the confidentiality, integrity and availability of stored data (CIA). Cloud system is one of the platforms that provides a data-base as a service (DBaaS), typically it takes care of scalability and high availability of the database. The confidentiality and integrity of stored data is still not guaranteed by some cloud systems because there is no trust between data owners and third-party platforms (Cloud systems). CryptDBaaS is a security model integrating cloud computing with cryptography to provide a security mechanism for data owners, which aims to guarantee the confidentiality of stored data in the cloud from unauthorized access or misuse of data from third party. CryptDBaaS...
model illustrates how to encrypt your data before storing it using secure and suitable encryption algorithms based on data type and allows to execute queries and performs some mathematical and logical operations over encrypted database. CryptDBaaS is evaluated by conducting a simulation to measure performance and accuracy of queries and search techniques Crypt- DBaaS provides. Evaluation step shows that CryptDBaaS has a high performance with respect to the encryption and search algorithms. The queries are executed as if they were executed over plain text data, so the obtained accuracy is 100% for all queries and operators except the search one which has 50% or 100% of accuracy based on chosen technique.

An Adaptive and Efficient Fully Homomorphic Encryption Technique
Mohamed-Lamine Yagoub, Okba Kazar, Abdelkader Laouid, Ahcene Bounceur, Reinhardt Euler and Muath Alshaikh

Abstract:
The huge amount of generated data offers special advantages mainly in dynamic and scalable systems. In fact, the data generator entities need to share the generated data with each other which leads to the use of cloud services. A cloud server is considered as an untrusted entity that offers many advantages such as large storing space, computation speed...etc. Hence, there is a need to cope with how to protect the stored data in the cloud server by proposing adaptive solutions. The main objective is how to provide an encryption scheme allowing the user to maintains some functions such as addition, multiplication and to preserve the order on the encrypted cloud data. Many algorithms and techniques are designed to manipulate the stored encrypted cloud data. This paper presents an adaptive and efficient fully homomorphic encryption technique to protect the user’s data stored in the cloud, where the cloud server executes simple operations.

Detection of bowler’s strong and weak area in cricket through commentary
Subhan Arif, Gufran Ahmad, Muhammad Umair, Ahmad Ikram

Abstract:
In late days because of wide watcher deliver and vast business potential in sports has turned into a dynamic research subject in sports information. In each game analysis of the performance of particular player is fundamental to discover out the shortcomings and qualities of the players, which supports the selectors to do their work perfectly. The data mining issue with regards to sports data analysis is to separate helpful data covered
up in the editorial of cricket match database. In this paper we have used association rule mining technique to gain different factors for example venue, bowling position, wickets per inning and so forth. Measurable or statistical software will be utilized for data analysis after text extraction. Result after data analysis will help the team selector in decision making to select the appropriate combination of team in given condition.

**Keynote Speaker**

Everything-as-a-Resource (*aaR) paradigm: Foundation and illustration through the IoTs

**Thar Baker**

10:00 – 10:45 | Wednesday, June 27th 2018 | Room: Smart Zone

**Session: Future Networks**

11:00 – 13:30 | Wednesday, June 27th 2018 | Room: B102 | Chair: Hesham Abusaimeh

**Paper I**

**Full Paper**

**A Traffic Tracking Algorithm for a Fast Detection of Active Network Sources**

Ayah Atiyah and Sufyan Almajali

**Abstract:**

Denial of Service attack is a cyber-attack that overwhelms the victim resources (system resources and network bandwidth) and makes them unavailable to legitimate users. To take the edge of this problem, packet filtering schemes at the front end of network monitoring systems (such as an Intrusion Detection System) have been proposed. Detecting suspicious activities and abnormal high traffic activities are challenging tasks as existing packet filtering and monitoring algorithms perform poorly when the given time budget of execution is minimum. Satisfying such a standard requires a packet filtering algorithm to be capable of controlling its execution time to provide much superior average case performance. Our proposal consists of developing a traffic monitoring algorithm that uses Binary Search Tree along with a shortcut to speed up the detection of active traffic sources in the network. The research paper presents the performance efficiency and the time complexity of the proposed algorithm. Results show that the shortcut traffic monitoring algorithm will result in performance improvement compared to the conventional algorithms of detecting top active nodes. This can be utilized in detecting quickly suspicious active nodes and take early actions.
SDN multi-controller networks with load balanced
Ammar Muthanna, Abdelhamied Ashraf, Maria Makolkina, Anastasia Vybornova, Ekaterina Markova, Alexander Gogol and Andrey Koucheryavy

Abstract:
Software defined networking (SDN) is a recent paradigm, providing various advantages over the traditional networks. This makes the SDN one of the key solutions for the fifth generation (5G) cellular system. Employing single centralized controller for the SDN networks introduces many problems concerning scalability, reliability and other system-related performance, especially for large scale networks. A single controller represents the bottleneck problem. Thus, employing distributed controllers will serve as a vital solution. The recent trend in the SDN networks is the deployment of distributed controllers; however, there are some issues related to this structure. The main problem with the distributed controllers is how to balance the load among these controllers. In this work, we will provide a dynamic clustering algorithm to balance the load among the distributed controllers in the SDN network. The system employs two levels of controllers; that is, distributed controllers and a master controller. A master controller manages and performs the clustering of the distributed controllers. The decision of clusters’ reconstruction lies in the master controller’s responsibility, based on the workload of the distributed controllers. The simulation results prove that the proposed algorithm is more efficient in balancing load among controllers, as compared to the existing static clustering techniques.

Multipath Routing in a 3D Torus Network on Chip
Khaled Day, Nasser Alzeidi and Abderezak Touzene

Abstract:
We propose an efficient multipath routing algorithm for routing multiple data packets in parallel over node-disjoint paths on a 3D torus Network-on-Chip (NoC). We show how to build node-disjoint paths between any two nodes of the 3D torus topology and how to use these paths to build routing tables. Analytical performance evaluation results for the proposed multipath routing algorithm are derived showing its effectiveness in reducing communication delays and increasing throughput when transferring large amounts of data in a 3D NoC based multi-core system.
Social Vehicle-to-Everything (V2X) communication model for Intelligent Transportation Systems based on 5G scenario

Naeem Raza, Sohail Jabbar, Jihun Han, Kijun Han

Abstract:
Vehicular-to-Everything (V2X) communications are the emerging paradigm for the Intelligent Transportation System (ITS) used to enhance the traffic efficiency and reliability of timely data delivery by implementing a complete set of communication mechanism in all the devices and infrastructure involved in traffic control, monitoring, and management. The aims of this research article is to avoid road accidents and to improve traffic efficiency by introducing social behavior in V2X communications and with the provision of automated information, surveillance, triggering of required actions based on ultra-high speed and ultra-low latency 5G scenario of networking technologies (Mobile Edge Computing (MEC) /Fog computing, Software Defined Networking (SDN) and cloud Computing) of integrated entities such as road users (Vehicles such as Cars, Buses, Trucks, Motorcycles, and even the pedestrians), roadside infrastructure (Traffic lights, traffic signs, barriers and gates), Road Side Unit (RSU) and all the other network units (MEC /Fog Server, V2X application Server (AS), SDN switches, and SDN controllers). The proposed model will support all kinds of communications such as a vehicle to vehicle (V2V) communications, vehicle to pedestrian communications (V2P), a vehicle to infrastructure (V2I) communications and vehicle to network (V2N) communications in a social internet of vehicles (SIOV) environment.

Deployment of reliable, simple, and cost-effective medium access control protocols for multi-layer flying ad-hoc networks

(Muhammad Asghar Khan, Inam Ullah Khan, Ijaz Mansoor Qureshi, Syed Bilal Shah, Muhammad Shafiq)

Abstract:
Driven by the recent advances in electronics and emergence of several radio communication technologies, the production of small unmanned aerial vehicles (UAVs) has paved the way for the creation of low-cost flying ad-hoc networks (FANETs). Mobility, lack of central control and self-organizing nature between the UAVs are the main features of FANETs, which could expand the connectivity and extend the communication range at infrastructure-less area. On one hand, in case of disastrous situations when ordinary communication infrastructure is not available, FANETs can be used to provide a rapidly deployable, flexible, and self-
managed communication network for real-time data transmission. On the other hand, connecting UAVs in ad-hoc mode in such a way to achieve a desired level of Quality-of-Service (QOS) requirements in a cost-effective manner is a daunting task. At the moment complex, expensive and unreliable wireless communication protocols at MAC layer are practiced. However, to enable FANETs system ubiquitous, it is necessary to have a reliable, simple and cost-effective MAC protocols. This paper introduces a novel idea of employing both IEEE 802.15.1 and IEEE 802.11 for multilayer FANETs scenarios. In this approach, data transmission between the member UAVs is done by deploying a low cost and simple 802.15.1, whereas the backbone UAVs will be connected using 802.11 MAC protocol. The proposed scheme considerably reduces communication budget and optimizes network performance. The simulation results also authenticate that the proposed MAC protocols could significantly increase the performance of flying ad hoc networks in terms of delay and throughput.

**Integrating Smart City Applications in 5G Networks**

Muhammad Usman, Muhammad Rizwan Asghar, Fabrizio Granelli and Khalid Qaraqe

**Abstract:**

Typical smart city applications generally require two different communications infrastructures, a wide area cellular network to provide connectivity and long-range communications and efficient communication strategies for transmitting short data packets, particularly in case of Internet of Things (IoT) devices. The cellular infrastructure is optimized for high data rates and large data sizes while IoT devices mostly exchange small data packets with high energy efficiency and low data rates. To fully exploit both communication infrastructures together, different strategies related to 5G and Device-to-Device (D2D) communication are proposed in literature. In this paper, we survey these strategies and provide useful considerations for seamless integration of smart city applications in 5G networks. Moreover, we present smart city scenarios, their communication requirements and the potential impact on the life of citizens. Finally, we elaborate big data impact on smart cities with possible security and privacy concerns.
Li-Local: Green Communication Modulations for Indoor Localization

Muhammad Irshad, Wenyuan Liu, Lin Wang, Syed Bilal Hussain Shah, Muhammad Noman Sohail, Muhammad Mosa Uba

Abstract:
Localization or Location-based services using Electromagnetic spectrum has attracted many researchers in recent years. Considering the current era, the most trending domain is Wi-Fi. The radio spectrum is being congested due to enormous data traffic load, which is called “Spectrum Crunch”. Consequently, designation of Wi-Fi signals may be carcinogenic and it’s been reported by WHO (World Health Organization). To address this issue, a short range wireless communication based on light illumination from LED’ which has been introduced recently. This new technology is called Light-Fidelity (Li-Fi). Which is considered as a green technology that comes up with more ecologically & economically friendly solutions. The edge of using Li-Fi over Wi-Fi for localization is; generally there are many more LED luminaries in a building in comparison to the number of Wi-Fi AP’s, which is cost effective. There is now developing of interest in all over the World including; within the bodies’ such as the Wireless world Research Forum (WWRF) and the Visible Light Communications Consortium (VLCC). In this paper, we outline the basic light system and its modulation techniques; Li-Fi’ specific in the indoor environment, review the state of art and discuss appropriate physical layer modulations schemes in the context of indoor localization.

Session: Internet of Things
11:00 – 13:30 | Wednesday, June 27th 2018 | Room: B027 | Chair: Ahmad Alzoubi

IoT Standardisation - Challenges, Perspectives and Solution

Jibran Saleem, Mohammad Hammoudeh, Umar Raza, Bamidele Adebisi and Ruth Ande

Abstract:
The success and widespread adoption of the Internet of Things (IoT) has increased many folds over the last few years. Industries, technologists and home users recognise the importance of IoT in their lives. Essentially, IoT has brought vast industrial revolution and has helped automate many processes within organisations and homes. However, the rapid growth of IoT is also a cause for significant concern. IoT is not only plagued with security, authentication and access control issues, it also doesn’t work as well as it
should with fourth industrial revolution, commonly known as Industry 4.0. The absence of effective regulation, standards and weak governance has led to a continual downward trend in the security of IoT networks and devices, as well as given rise to a broad range of privacy issues. This paper examines the IoT industry and discusses the urgent need for standardisation, the benefits of governance as well as the issues affecting the IoT sector due to the absence of regulation. Additionally, through this paper, we are introducing an IoT security framework (IoTSFW) for organisations to plug the current lack of guidelines in the IoT industry. Implementation of the guidelines, defined in the proposed framework, will assist organisations in achieving security, privacy, sustainability and scalability within their IoT networks.

**Low-Energy Smart Trash Bin Architecture for Dynamic Waste Collection System**

Slamet Kristanto Tirto Utomo, Takeo Hamada and Noboru Koshizuka

**Abstract:**

Currently, most of waste collection systems are static, which are inefficient and expensive. Performing dynamic waste collection has proven to be more efficient. In order to implement and sustain dynamic waste collection, a low power smart trash can is required. This study identifies this problem and proposes an architecture design for smart trash can systems and an algorithm for reducing the energy consumption of the smart trash can. According to the results of our measurement, the power consumption of the system is low and its lifetime is up to 5 times longer than the systems suggested in previous work. Our proposed smart trash can has a low power consumption characteristic, which is essential for implementing a dynamic waste collection system.

**Real-time RDF Adaptation Model for Smart Human-Care Querying in IoT based Mobile Applications**

Sohail Jabbar and Kaleem Malik

**Abstract:**

Majorly, nowadays, the collected raw data through mobiles is huge based on sensors embedded in devices and IoT based applications. These applications use Internet of Things (IoT) and Big Data analytics services and daily activities as routines for recording and analyzing real-time data for human-care. Nowadays, mobile is having services built on sensors to reduce human involvement in data collection. Many issues concerning security and privacy can be resolved if we use data analytics in services to represent data
as Resource Description Framework (RDF). The automated transformation mechanism in relational database taken from mobile sensors and applications into semantically annotated RDF stores. This study is comprised of a methodology for refining compatibility between different data models by introducing real-time RDF context model for adopting data to smart querying in mobile applications. Smart querying capabilities come from transformation between sensors with activity services data and RDF data store for mobile applications. Whereas, case study built-up out of applications data is used to show data adaptation process for smart querying for human-care in mobile devices. Multiple queries are used to extract mobile video information smartly and efficiently. According to results shows if standard deviation gets greater than mean that tend of values is spreading over a wider range of values.

**IoT-Fog based system structure with SDN enabled**

Abdukodir Khakimov, Abdelhamied Ashraf, Ammar Muthanna, Irina Gudkova, Ekaterina Markova and Andrey Koucheryavy

**Abstract:**

IoT is a new communication paradigm that gains a very high importance in the past few years. Fog computing is a form of edge computing that is developed to provide the computing, storage and management capabilities near to users. Employing Fog computing in IoT networks as an intermediate layer between IoT devices and the remote cloud becomes a demand to make use of the edge computing benefits. In this work, we provide a framework for IoT system structure that employs an edge computing layer of Fog nodes. The system employs SDN network with a centralized controller and distributed OpenFlow switches; these switches are enabled with limited computing and processing capabilities. The network is operated based on a data offloading algorithm, that allocates certain processing and computing tasks to some OpenFlow switches that has unused resources. The proposed work achieves various benefits to the IoT network such as the latency reduction and higher efficiency of resources utilization. We perform an experiment over a developed testbed to validate the proposed system and results show that the proposed system achieves higher efficiency in terms of latency and resource utilization.
LPBR: Location Prediction Based Routing Protocol for Mobile IoT Systems

Hamza Aldabbas

Abstract:
Recent advances in the Internet of Things (IoT) had created unparalleled opportunities and new applications. Low power communication technologies for IoT are critical for this success of IoT application. IoT communication scenarios include mobile IoT Nodes in many applications. This paper reviews state of the art for communication mechanisms in low power mobile scenarios of IoT nodes. Such mobile scenarios demand low power routing based on metrics like node movement directions, speeds and energy optimizations. This paper proposes rank optimization function called LPBR, based on location predictions. This proposed mechanism is evaluated through simulation and results are presented in the paper. A simulation study shows more than 10% improvement in performance in terms of throughput.

Distributed solution of scalar multiplication on elliptic curves over Fp for resource-constrained networks

Mohamed Ramdani, Mohamed Benmohammed, Nadjia Benblidia

Abstract:
Elliptic curve cryptography (ECC) is an approach to public-key cryptography used for data protection to be unintelligible to any unauthorized device or entity. The encryption/decryption algorithm is publicly known and its security relies on the discrete logarithm problem. ECC is ideal for weak devices with small resources such as phones, smart cards, embedded systems and wireless sensor networks (WSN), largely deployed in different applications. The advantage of ECC is the shorter key length to provide same level of security than other cryptosystems like RSA. However, cryptographic computations such as the multiplication of an elliptic curve point by a scalar value are computationally expensive and involve point additions and doublings on elliptic curves over finite fields. Much works are done to optimize their costs. Based on the result of these works, including parallel processing, we propose two new efficient distributed algorithms to reduce the computations in resource-constrained networks having as feature the cooperative processing of data. Our results are very conclusive and can provide up to 125\% of reduction of consumed energy by each device in a data exchange operation.
Detecting Gaps and Voids in WSNs and IoT Networks: the Minimum x-Coordinate based Method

Ahcène Bounceur, Madani Bezoui, Loic Lagadec, Reinhardt Euler, Abdelkader Laouid, Mahamadou Traore and Mounir Lallali

Abstract:

When we deal with the deployment structure of Wireless Sensor Networks (WSNs) used in applications where the zone-of-interest is not accessible by humans, like forest fire detection, military applications, etc., random deployment is often the main or even the only practical solution that can be chosen. One of the main issues in this deployment is that it can lead to a formation of gaps or voids, which represent non-covered zones in the network. This can be very problematic, since it is not possible to detect some serious and dangerous problems, like a starting fire, the presence of non-desired persons or cybersecurity attacks, etc. Therefore, detecting non-covered zones is of high importance. In this paper, we present a new method that allows to detect gaps and voids in WSNs and IoT networks after executing the D-LPCN algorithm and using some characteristics related to the value of the angle formed by the node of the gap having the minimum x-coordinate.

Organizational Management Role In Information Security Management System

Mais Arafat, Abdallah Qusef and Samar Al-Taher

Abstract:

This research proposes an organizational management model for implementing the Information Security Management System (ISMS) Plan, Do, check and Act (PDCA) framework to achieve an improved balance between the effectiveness and efficiency of an organization’s ISMS. Specifically describing the role of managerial structure and organizational structure in realizing the ISMS framework. Demonstrating the drawbacks in organizational structure that were reduced and the enhanced workflow within the organization due to the improved managerial role distinction regarding information security management. Projecting the effects of the proposed parallel loosely coupled approach when managing an ISMS related project within an organization.
A New Mechanism for Textual Password Hardening Using Adopted Typing Rhythm

Khalid Mansour

Abstract:

This paper presents a novel mechanism for hardening text-based passwords using an adopted password keying style or rhythm. The proposed mechanism uses the adopted rhythm of keying a password along with the password itself for authenticating users. The proposed approach is distinguished from other related approaches in that the user in our approach is required to select a certain password keying pattern during registration and needs to repeat the same keying pattern at the sign-in time. The adopted password style is recorded as a series of discrete symbols that correspond to the length of the elapsed time between two consecutive keystrokes - latency time - of password characters. This time is classified as either S for slow or F for fast based on certain criteria such as a threshold value. In addition to the proposed mechanism for password hardening, an empirical approach is proposed for selecting a global threshold value that can be used to classify latency times. Moreover, local threshold values are introduced and tested as well. The empirical results show that both local threshold values and global threshold value perform similarly. However, using local threshold values is recommended.

Analysis of Social Network for Telecommunication Companies

Aktham Sawan and Rashid Jayousi

Abstract:

Social Network Analysis (SNA) is defined as the science of grouping members and finding influencers member inside each group by utilizing advanced set of algorithms. Most specialized data mining software firms, such as IBM, SAS, python and R, create their own predefined algorithms for generating the SNA groups, but none of them is dedicated for the telecom industry. The aim of this paper is to develop a customized SNA algorithm for the telecom industry, since the predefined commercial algorithm failed to generate satisfactory results when used to generate the SNA groups for the Palestinian mobile service provider company (Jawwal), such as a low capture rate (only 55%), and failed to even capture high value customers generating and receiving hundreds of calls and SMS’s. In addition to customizing the SNA algorithm for the telecom industry, relation strength and extenders have been used to enhance results in this paper. In order to reach the finest telecom SNA model, oracle SQL-PL/SQL software have been utilized, and various experiments have been tested based on different specific telecom parameters, such as
group size, call duration, call count, and the ratio between duration and count. To test the new developed algorithm, 300 million call detailed record (CDR) for 4 million user in three consecutive months have been collected and used, and a result comparison with the IBM SNA model is added. Results for the new algorithm have increased coverage of network to be 75.9% instead of around 55% for IBM algorithm; moreover, all high value customers have included in the results for the new algorithm. We believe that this paper is relevant to track two cloud Distributed and Parallel systems.

Detection and Prevention of Malicious Cryptocurrency Mining on Internet-Connected Devices

Abedalqader Swedan, Ahmad N. Khuffash, Othman M.M. Othman and Ahmed Awad

Abstract:
As technology evolves, more and more devices are connected to the Internet. The popularity and increasing significance of cryptocurrencies are drawing attention, and cybercriminals are trying to utilize the resources and steal the processing power of these devices. It is highly likely that there are billions of devices that are maliciously mining cryptocurrency for the benefit of a cybercriminal without noticing the damage they may be causing. This paper is proposed because there is a huge need to professionally defend and protect against the misuse of assets in order to avoid losses, both financially and operationally, and how it is possible to mitigate with this rising trend.

“Hop Count”, Dynamic Double Trickle Timer Algorithm Use Case: Data Aggregation in Smart Green House

Haneen Shehadeh, Wail Mardini, Muneer Bani Yaseen, Doaa Habeeb Allah and Waed Bani Yaseen

Abstract:
With the development of technology and its entry into most areas of life, it becomes necessary to provide special protocols and algorithms for each field. The field of agriculture is one of these fields, which still needs the algorithms to meet its needs such as the availability of a quick and accurate algorithm for doing data aggregation. This paper suggested Hop Count Dynamic Double Timer Algorithm (HCDDA) that is a copy of the developer is about Trickle Timer algorithm that is an algorithm used in routing protocol for Low Power and Lousy Networks (RPL), its basic function is to control and regulate the flow
of messages within the network. This is suffering from some problems in their performance such as time and large consumption of large amount of energy. This work is an attempt for the development of this algorithm to overcome these problems and giving the best results. The idea of HCDDA is based on making this algorithm more dynamic and not relies on fixed values. HCDDA was proposed as a supported algorithm in Data aggregation field in smart Green House. The Cooja 2.7 simulator was used to measure the results of the HCDDA algorithm to evaluate the results of the simulation. Algorithm performance was evaluated by three measures, convergence time, power consumption and packet delivery ratio (PDR) Within different densities are 10, 20, 30 and 40. The results showed a remarkable working of algorithm in terms of reducing the consumption of time and energy and increasing the volume of successful transmission in the network.

Market Segmentation and Analysis of Online Shopping in Jordan and the Region

Lina Sharawi and George Sammour

Abstract:
This paper aims at studying the market strength of eight countries from the Middle East, in addition to utilizing Data Mining (DM) tools to come up with a model for market segmentation, for that Weka software was used and Simple K Means clustering technique was utilized. The analysis results highlighted and differentiated markets’ strength and weights, and it elucidated the market segments for the logistics services company, which in turn would enhance targeted marketing campaigns, future collaborations and possible offers.

KNN- fuzzy classification for cloud service selection

Humaira Nadeem, Imran M Rabbani, Muhammad Aslam and Ana Maria Martinez Enriquez

Abstract:
Cloud computing is an emerging technology that provides services to its users via Internet. It also allows sharing of resources there by reducing cost, money and space. With the popularity of cloud and its advantages, the trend of information industry shifting towards cloud services is increasing tremendously. Different cloud service providers are there on internet to provide services to the users. These services have certain parameters to provide better usage. It is difficult for the users to select a cloud service that is best suited to their requirements. Our proposed approach is based on data mining classification technique
with fuzzy logic. Proposed algorithm uses cloud service design factors (security, agility and assurance etc.) and international standards to suggest the cloud service. The main objective of this research is to enable the end cloud users to choose best service as per their requirements and meeting international standards. We test our system with major cloud provider Google, Microsoft and Amazon.

**Key solutions for light limitations - Toward Tactile Internet system realization**

Abdelhamied Ashraf, Anastasia Vybornova, Ammar Muthanna, Ekaterina Markova, Irina Gudkova, Alexander Gogol and Andrey Koucheryavy

**Abstract:**

Enabling haptic communication as well as voice and data over the future 5G cellular system become a demand. Tactile Internet is one of the main use cases of the 5G system that will allow the transfer of haptic communications in real time. The end-to-end latency of 1ms remain the main challenge toward the Tactile Internet system realization, not only for the processing and coding delays but mainly for the limitations of light. In this work, we analyze the key solutions to overcome the light limitations and enable the Tactile Internet over any distances with the required latency. Building a virtual model or model mediated for the remote environment at the edge cloud unit near to the end user is the main solution. By means of AI the virtual model can predict the behavior of the remote environment and thus the end user can interact with the virtual environment with a high system experience. We review the exiting work for the model mediated bilateral systems and discuss its availability for the Tactile Internet system. Finally, we suggest a structure for the Tactile Internet system with the deployment of model mediated.
Unconsciousness Detection Supervision System Using Faster RCNN
Rana Ghani and Wafaa Salih

Abstract:
Unconsciousness is a state which takes place when the person is unable to maintain his/her awareness of the surroundings. It is a fully or nearly loss of responsiveness to environmental stimuli. As a consequence of that state, physical injuries, and or mental problems might take place. Hence, this paper proposes a simple faint detection technique using Faster Region-based Convolutional Neural Network (Faster RCNN) with thermal imaging camera to observe the unconscious person or a fainted one, and consequently an instant and convenient treatment will be carried out to that person. Experimental results reveal that the proposed architecture achieved a precise accuracy during the dim lightening condition, and a fairly excellent result indoor in ascertaining where the case is.

Depth Based Routing Protocol Using Clustered Sensor Nodes in Underwater WSN
Syed Bilal Hussain Shah, Chen Zhe, Lina Xu, Yin Fuliang, Muhammad Faheem, Seema Begum

Abstract:
The underwater wireless sensor networks have been receiving a great attention towards the ocean monitoring systems in the past couple of years. They have different types of characteristics based on the relation with the terrestrial wireless sensor networks, in terms of the bandwidth of the limited capacity, battery power with default capacity. Though, more work has been completed with developing the protocols and the models based on the terrestrial networks, these applications will be rarely the application on the products of the underwater wireless sensor networks. Major works have placed on the designing of the standard protocol with respect to the underwater communication characteristics. With the use of the sensor nodes, more energy can be saved. The proposed system is based on the process of depth based routing protocol and it will be the base production of the proposed paper. The depth routing protocol is into the process of checking the depth of sensor nodes. The cluster based routing protocol, is used in this paper for minimizing the consumption ratio of the energy and distributing the nodes equally to all the functions. Though, the existing system will be resulting in damage of the nodes, when the load is more. The main issue will be faced is, constructing a standard clustering algorithm. In this paper, the underwater wireless sensor networks context term will be clustering and it will contribute as the purpose of efficient use of the energy resources. The energy that is consumed by each
node will be processed with equal probability for the selection of cluster head. Based on this type of processing, the stable time period of the network will be improved in the DBR. The cluster depth routing protocol will be used for will be maximizing the overall process of the network. The comparison is done on the various types of protocols used in it.

This paper will be reviewing the most important terms in the cluster based routing protocols that are adopted in UWSN. The protocol's major issues on the performances are identified based on the conditions of the network, like delivery ratio of packet, consumption of energy, and common packet lag. The simulation will be done for the comparison between DBR and EEDBR, the results of it will be validating the stability period achieved in the cluster depth routing protocol also the high throughput along with the comparison of the EEDBR and DBR. Then the advantages and disadvantages for each protocol will be described in it.

DDoS Attacks on the Internet of Things and their Prevention Methods

Hanan Mustapha and Ahmed Alghamdi

Abstract:
The Internet of Things (IoT) vulnerabilities provides an ideal target for botnets, making them a major contributor in the increased number of Distributed Denial of Service (DDoS) attacks. The increase in DDoS attacks has made it important to address the consequences it implies on the IoT industry being one of the major causes. The aim of this paper is to provide an analysis of the attempts to prevent DDoS attacks, mainly at a network level. The sensibility of these solutions is extracted from their impact in resolving IoT vulnerabilities. It is evident from this review that there is no perfect solution yet for IoT security, this field still has many opportunities for research and development.
IoT system to control Greenhouse Agriculture based on the needs of Palestinian farmers

Waleed Abdallah, Mohamad Khdair, Mos-Ab Ayyash and Issa Asad

Abstract:
Technology can play an important role in greenhouse agriculture. In this paper we look at the role of IoT (Internet of Things) in greenhouse agriculture in Palestine, questionnaires and interviews were used to collect data from agricultural engineers to find out the extent to which they use technology in greenhouse agriculture, also to identify the current greenhouse usage and to outline the main problems. Our data shows that the role of technology was highly valued by the agricultural engineers despite the fact that it is not utilized efficiently mainly because regular farmers and not convinced of its value. Study results also show that the use of technology contributes in providing larger quantities of high quality products compared to traditional methods. The study shows that the main obstacles for using technology in greenhouse agriculture are: the cost, lacking the appropriate training and education among farmers, and the limited governmental resources. Based on the study findings, we proposed a system that is designed bearing in mind simplicity and efficiency. This system can be used in different areas and for different products, this is done by choosing values for system parameters as needed (temperature, humidity, irrigation...) for the specific greenhouse in consideration, the Palestinian case is considered here as a case study for the system’s application.

An IoT Based Monitoring and Controlling System for Water Chlorination Treatment

Nael Zidan, Mohammed Maree and Subhi Samhan

Abstract:
With the recent development of the Internet, the availability of a variety of low cost sensors and the evolution of the Internet of Things (IoT), the development of remote real-time monitoring and controlling systems – without the need of direct human intervention – has expanded significantly in various application domains. The Water sector is one of the most important industrial application domains that demands developing efficient and effective water quality monitoring and control; considering the scarcity of natural water resources worldwide, an in Palestine region in particular. In this research work, we propose developing an IoT based system prototype that remotely monitors and controls direct water treatment (Chlorination Treatment as a pilot phase) in Water Pumping Stations (WPS). The proposed system monitors the concentration of chlorine and controls the dosing pump to
keep chlorine concentration as desired. In addition, it monitors the chlorine level in tanks, and alerts the human operator for immediate actions in abnormal cases. A prototype of the proposed system has been set up to experimental test and validate our proposal.

**Session: General Track**
15:10 – 16:30 | Wednesday, June 27th 2018 | Room: B027 | Chair: Wail Mardini

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**Paper I**

**Full Paper**

**Feature Selection Using Binary Particle Swarm Optimization with Time Varying Inertia Weight Strategies**

Majdi Mafarja, Radi Jarrar, Sobhi Ahmed and Ahmed Abusnaina

**Abstract:**

In this paper, a feature selection approach that based on Binary Particle Swarm Optimization (PSO) with time varying inertia weight strategies is proposed. Feature Selection is an important preprocessing technique that aims to enhance the learning algorithm (e.g., classification) by improving its performance or reducing the processing time or both of them. Searching for the best feature set is a challenging problem in feature selection process, metaheuristics algorithms have proved a good performance in finding the (near) optimal solution for this problem. PSO algorithm is considered a primary Swarm Intelligence technique that showed a good performance in solving different optimization problems. A key component that highly affect the performance of PSO is the updating strategy of the inertia weight that controls the balance between exploration and exploitation. This paper studies the effect of different time varying inertia weight updating strategies on the performance of BPSO in tackling feature selection problem. To assess the performance of the proposed approach, 18 standard UCI datasets were used. The proposed approach is compared with well regarded metaheuristics based feature selection approaches, and the results proved the superiority of the proposed approach.

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**Paper II**

**Full Paper**

**Training Neural Networks Using Salp Swarm Algorithm for Pattern Classification**

Ahmed A. Abusnaina, Sobhi Ahmad, Radi Jarrar and Majdi Mafarja

**Abstract:**

Pattern classification is one of the popular applications of neural networks. However, training the neural networks is the most essential phase. Traditional training algorithms
Rank Based Binary Particle Swarm Optimisation for Feature Selection in Classification

Majdi Mafarja and Nasser Sabar

Abstract:

Feature selection (FS) is an important and challenging task in machine learning. FS can be defined as the process of finding the best informative subset of features in order to avoid the curse of dimensionality and maximise the classification accuracy. In this work, we propose a FS algorithm based on binary particle swarm optimisation (PSO) and k-NN classifier. PSO is a well-known swarm intelligent algorithm that has shown to be very effective in dealing with various difficult problems. Nevertheless, the performance of PSO is highly effected by the inertia weight parameter which controls the balance between exploration and exploitation. To address this issue, we use an adaptive mechanism to adaptively change the value of the inertia weight parameter based on the search status. The proposed PSO has been tested on 12 well-known datasets from UCI repository. The results show that the proposed PSO outperformed the other methods in terms of the number of features and classification accuracy.
MEU is a national, educational, research, consultancy, and non-profit institution managed by a body of directors in Jordan. The University has a deep interest in knowledge as a driving force for spreading culture. It builds on the high scientific skills of students and prepares and provides them with such skills to fulfill the requirements of human development needed for keeping pace with international scientific development and its varied applications.

As universities are the lighthouses of science and knowledge, and as institutions manufacture future leaders, MEU contributes to fulfilling the motto “Knowledge is Strength”. Its founder built the foundations of this academic institution, taking this slogan as a guiding principle of realizing goals, against all potential adverse conditions. The University embodies this slogan by providing a unique scientific environment where students can discover means of acquiring knowledge. This is assured by its policies of recruiting teaching and administrative staff, of student admission selection processes, and in providing modern and advanced library, laboratories, and other facilities. This way, students find themselves immersed in a motivating scientific environment that is conducive for excellence and distinctiveness.
Information for Delegates

At the Conference

Conference Registration

Registration will open at 09:00am on Tuesday, 26th June 2018, at the Middle East University, Building B. The staff at the ICFNDS’18 registration desk will sign you in, hand out conference packs, and answer any questions you may have. Throughout the conference the registration desk will be open to answer any general enquires.

Coffee Breaks

Hot beverages will be served.

Lunch

Lunch will be served in the Skylight.

Wireless Internet

Wireless Internet will be available for the conference participants. Information about how to connect your computer will be available at the conference venue.

Smoking Policy
Smoking is not allowed inside the conference venue.

**Mobile Phone Policy**

As a courtesy to speakers and attendees please refrain from using mobile phones during the keynote speeches and presentations. Turn your mobile phone to vibrate before entering a session and leave the session if you receive a call.

**Information for Presenters**

In the main conference, presentations of full papers are allocated 20 minutes, including a few minutes for questions and answers after the presentation. A Session Chair introduces the speakers and moderates the questions-and-answer period.

A laptop with Microsoft office installed will be available in each conference room. Upon request, help will be available to the presenters for the installation of their presentations. Projection screen and data projector will be available in the room.

**ICFNDS Awards**

This year, the presentation Awards of the ICFNDS 2018 will be held during the closing session.
Trip to Madaba

A trip will be arranged at heavily discounted prices to Madaba Sacred & Religious Sites, Historic Sites, Sights & Landmarks, Nature & Parks, including the Jordan River Baptismal Site (Dead Sea Region)

The amiable market town of Madaba is best known for a collection of Byzantine-era mosaics. The most famous of these is the map on the floor of St George’s Church, but there are many others in different parts of the town, several of them even more complete and vibrantly colourful.

Date: Thursday, 28 June 2018

Programme

09:00: Departure from the hotel (only hotels recommended by the conference organisers)
10:00: Visit the Church of the Apostles
12:00: Visit Mount Nebo and Madaba Archaeological Park
14:00: Visit Madaba Mosaic Map and the La Storia Tourism Complex
15:00: Lunch at the La Storia restaurant
17:00: Return to hotel
Conference Address

Middle East University
Queen Alia Airport Road, Cross Madaba Bridge
Amman, Jordan

By Air

Jordan’s strategic location in the Middle East, with direct flights to many of the world’s premier business and travel destinations, makes Queen Alia International Airport (QAIA) the perfect hub to build your next itinerary. Located 35 kilometers from the heart of the capital of Amman, Queen Alia International Airport (QAIA) was first inaugurated in 1983 to become Jordan’s key gateway to the world. The airport provides passenger, air cargo and aviation support services.

A gateway to the world, the hub at QAIA gives you direct access to the major destinations of Europe, Asia, North America and the Middle East. This level of access gives travelers coming to, from or through QAIA a wide range of options when choosing flights and routes. The airport has a mobile website for visitors wanting to access information via their smartphones. The site provides live flight and timetable information, airport maps, car park booking options, and car rental services. The airport can provide you with personalised information about your onward journey.

Airport Bus:

A Sariyah shuttle bus, which plies back and forth between Amman and the airport is a convenient and cost effective way to reach Amman, for more details please visit: http://www.qaiairport.com/en/content/transportation

Bus Route

North Bus Station - Housing Bank Complex - Fourth Circle - Fifth Circle - Sixth Circle - Seventh Circle - QAIA.

Airport Taxi

Offering speedy, secure, comfortable and reasonably-priced transport services to any location in Amman, the service is ideal for passengers who have not made any prior transportation arrangements upon their arrival. Taxi fares are fixed by law through the Jordan Transport Organization Council and the prices are displayed near the designated taxi park at the airport’s terminal exits.

Car Rental

Please visit http://www.qaiairport.com/en/car-rentals to see available car rental companies at QAIA.
Recommended Hotels

**W Amman Hotel**
Nestled in the heart of new modern Amman, Abdali, the past meets the future where local tradition and history of Jordan are instilled with an unmistakably bold design. To book, contact Mr Yazan Abu Al Ragheb on yazan.abualragheb@whotels.com, by telephone on: +962 6 510 8888 or mobile on: +962 77 540 4443

**The Olive Tree Hotel**
Located in the commercial Hub of Amman, the hotel is less than 3 km away from Queen Alia International airport and a short drive from any Mall around the city or shopping areas & commercial locations such as Abdoun, Sweifeyeh, 7th Circle...etc. as well as Touristic spots like Central Amman city.
To book, contact Mrs Lama Youssef by email on: Lama.youssef@olivetreeamman.com or by telephone on: +962 (0) 796061925

Please see the map below for locations of Hotels in Amman and the Conference Venue.
Amman | The history in the hills

Amman is a relative youth, being mostly a creation of the 20th century. There’s plenty here to encourage you to linger awhile before making for Petra, the Dead Sea or Wadi Rum. In fact, Amman is one of the easiest cities in which to enjoy the Middle East experience.

Downtown Amman is a must-see. At the bottom of the city’s many hills and overlooked by the magisterial Citadel, it features spectacular Roman ruins, an international-standard museum and the hubbub of mosques, souqs and coffeehouses that are central to Jordanian life. Elsewhere, urbane western Amman has leafy residential districts, cafes, bars, modern malls and art galleries; and in earthy eastern Amman, it’s easy to sense the more traditional and conservative pulse of the capital.
The General Chairs and the Steering committee would like to express their special thanks and gratitude to the Middle East University senior management who gave us the opportunity and support to organise ICFNDS 2018 in Amman. The success and final outcome of this conference required a lot of guidance and assistance from many people and we are extremely privileged to have got this all along the preparation of the conference. We owe our deep gratitude to Dr Ahmed Nasereddin (member of MEU board of trustees) who took keen interest on the conference, encouragement and suggestions during this project life. Finally, we would like to extend our sincere esteems to all admin staff in the Middle East University for their timely support.
Conference Program

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