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CONFERENCE REPORT

NETSOFT 2018: 4th IEEE International Conference on Network Softwarization, Montreal, Canada

By Prosper Chemouil and Noura Limam, General Co-Chairs, Chadi Assi, Lisandro Zambenedetti Granville and Imen Grida Ben Yahia, TPC Co-Chairs

The telecommunications landscape has been changing and will continue to change in the next few years. Pervasive ultra-broadband, programmable networks, and cost reduction of IT systems, are paving the way to new services and commoditization of telecommunication infrastructures, while lowering entrance barriers for new players and giving rise to new value chains. While this results in considerable challenges for service providers, this transformation also brings unprecedented opportunities for the Digital Society and the Digital Economy. 5G networks and beyond are expected to both exploit and accelerate this transformation.

NetSoft was created in 2015 by the IEEE SDN Initiative as a flagship conference aiming to address "Softwarization" of networks and systemic trends concerning the convergence of Cloud Computing, Software-Defined Networks (SDN), and Network Function Virtualization (NFV). Network softwarization and programmability promise to reduce operational costs, provide better flexibility, and bring new service paradigms. They are enabling the deployment of 5G infrastructures, from high data rate fixed-mobile services to the Internet of Things, accelerating the current digital transformation witnessed by the industry. This evolution was reflected in the theme of NetSoft 2018: "Achieving smart network softwarization".

NetSoft 2018 was organized into five days, including tutorials and workshops, as follows. The core of the conference ran on Tuesday, June 26 through Thursday, June 28 and featured four visionary keynote talks delivered by world-class researchers and practitioners, a distinguished expert panel discussion, 10 technical sessions covering recent advances and emerging challenges in network sofwarization, and three demo sessions showcasing nine prototypes and proof-of-concept implementations of ongoing research. On Monday, June 25 and Friday, June 29, four focused workshops and four practical tutorials complemented the program.

The conference attracted 164 participants representing 25 countries, a significant increase compared to NetSoft 2017. The vast majority of participants attended the main track of NetSoft.

From left to right: Mohamed-Faten Zhani, Workshop Co-Chair, Israat Tanzeena Haque, Participant, Jérôme François, Workshop Co-Chair, Noura Limam, General Co-Chair, Abdelkader Lahmadi, Workshop Co-Chair, Alberto Leon-Garcia, Keynote Co-Chair, S?awomir Kukli?ski, Panel Member, Flavio Esposito, TPC Co-Chair, Giovanni Schembra, Workshop Co-Chair.

From left to right: Chadi Assi, TPC Co-Chair, Lisandro Zambenedetti, TPC Co-Chair, Noura Limam, General Co-Chair, Imen Grida Ben Yahia, TPC Co-Chair, Prosper Chemouil, General Co-Chair.

From left to right: Raouf Boutaba, Award Co-Chair, Imen Grida Ben Yahia, TPC Co-Chair, Manuel Peuster, Recipient of Best Paper Award.

A significant share of participants (24%) were from industry, showing that NetSoft provides great opportunities to address industry concerns and developments. Industry participants were evenly distributed among traditional telcos, vendors, third-parties and end-service providers. Canada, the USA and France were the most represented countries with some good participation from Asia and the rest of Europe.

NetSoft 2018 successfully attracted papers falling in the areas of software-defined and virtualized infrastructures, with a focus on network slicing and management, network functions virtualization (NFV), programmable software-defined networks (SDNs), service chaining, and edge clouds. Overall, a total of 103 submissions were received, of which 20 regular papers as well as 29 short papers were accepted., an acceptance rate of 19.2% (resp. 28%) for regular papers (resp. for short papers). Authors of accepted papers originated mostly from six countries: Canada, France, Germany, Italy, UK and USA, representing 65% of authorship.

All keynotes were aligned with the theme of the conference. Raj Jain, Washington University in Saint Louis, USA, first discussed "Trends and Issues in Softwarization of Networks," emphasizing that the trend of DevOps and the slowness of standardization activities has led the networking industry toward open source software and hardware. According to Raj, open

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WORKSHOP REPORT

WICE Workshop at ICC 2018

Promoting the Visibility and Roles of Women Communications Engineers

By Ana Garcia Armada, Chair of the WICE Committee, Universidad Carlos III de Madrid, Spain ,Baek-Young Choi, University of Missouri-Kansas City, USA, Michele Nogueira, Federal University of Parana, Brazil and Dola Saha, University at Albany, Suny, USA

WICE represents the IEEE ComSoc Women in Communications Engineering Standing Committee, whose mission is promoting the visibility and roles of women communications engineers, as well as providing a venue for their professional growth. N2Women (Networking Networking Women) is a discipline-specific community of researchers in the fields of networking and communications. WICE and N2Women jointly organized a workshop at the 2018 IEEE International Conference on Communications (ICC), which was held in Kansas City, MO, USA on Sunday, 20 May, 2018.

The workshop aimed to foster connections among women and researchers from under represented groups and minorities in communications, computer networking and related research fields.

The program featured keynotes, a panel, mentoring activities and student presentations and posters in a very friendly and welcoming atmosphere where professional and technical discussions were mixed with personal experience details and advice to the young engineers.

Innovation and Research in Wireless

The keynote speakers were Vanitha Kumar, Vice President-Software Engineering, Qualcomm Technologies Incorporated, and Monisha Ghosh, Program Director, NSF.

Ms. Kumar, with her talk about the "Road to the Innovation Super Highway," showed that the mobile platform has transformed the world and changed our lives far beyond what anyone could have imagined in the past decade. With the advent of 5G, we are about to see another new wave of possibilities to an even more connected world. This promises to not only make our lives more efficient, but will also open doors for technological innovations from a new pool of creators, thinkers, makers and doers who may not be in a traditional technology domain. She discussed with the audience how the new wave of mobile revolution will achieve this and how the engineers of today can be better prepared to travel on this innovation super highway.

Ms. Gosh addressed "What's Next for Wireless Networking Research," highlighting that wireless networking has made unprecedented advances in the past decade, with fundamental contributions from both academia and industry. The National Science Foundation has played a pivotal role from the very beginning in nurturing research ideas from conception to reality. She shared her point of view about new initiatives that will fuel the next generation of advances in wireless networking.

Both speakers agreed that "there is no better time to be in technology than now."

Speakers and organizers.

Some of the Mentors introducing themselves.

Hard Working and Excellent Engineers and Researchers

A lively panel was held discussing "In the crowd of hard-working and excellent researchers: what can we do to stand out." The topic was developed by the following panelists: Elisa Bertino (Purdue University), My Thai (University of Florida), Vanitha Kumar (Qualcomm), Victor Frost (University of Kansas), and Teresa Kellett (Google), who shared their experience in a very interactive session.

The importance of impactful research, to select where you publish, build a community, and follow trends, was emphasized, as well as having a good mentor and building confidence in yourself. The attendees were encouraged to have passion for what they are doing.

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Group picture of WICE meeting at ICC 2018.

Mentoring and Student Presentations

We held multiple parallel mentoring sessions organized by Angela Sara Cacciapuoti and led by the following experienced personnel from industry and academia:

- Vladimir Barash (Graphika, Inc)
- Michelle Zhu (Montclair State University)
- Anu Mercian (Hewlett Packard Enterprise)
- Ali Imran (University of Oklahoma)
- Teresa Kellett (Google)
- Amardeep Kaur (Missouri University of Science & Technology)
- Fengjun Li (University of Kansas)
- Kira Theuer (National Instruments)

The students had the chance to briefly introduce their research topics and then in an interactive poster session discuss the details. They covered a very wide spectrum of topics on video caching, security, vehicular networks, HetNets, content distribution, network slicing, WSNs, image retrieval, data routing, mmWave, VLC, mu-MIMO, channel modeling, and bacterial communications, to name a few, with all being very timely and relevant.

Students presenting their research.

Interactive poster session.

Concluding Remarks

The presenters reported that it was a satisfying experience for them and they enjoyed being able to connect with the next generation of researchers, especially women and minorities, and share some of their experience with them. Some presenters also highlighted that they liked this workshop with a very high attendance rate where people shared their experience of career development and also their personal life.

Some comments from the students were, "The workshop is amazing, and the organization was great. I could not have a better experience," and "The moments in which we interact with other people at the workshop are the best, so activities like this should continue and maybe have more. For us students, it provided a professional vision that we did not have."

We would like to acknowledge the support from IEEE Comsoc, WICE, N2Women, CRA-W and NSF. This was a wonderful event and the experience will allow us to improve in the future. Get ready for more at future major ComSoc conferences!

CHAPTER REPORT

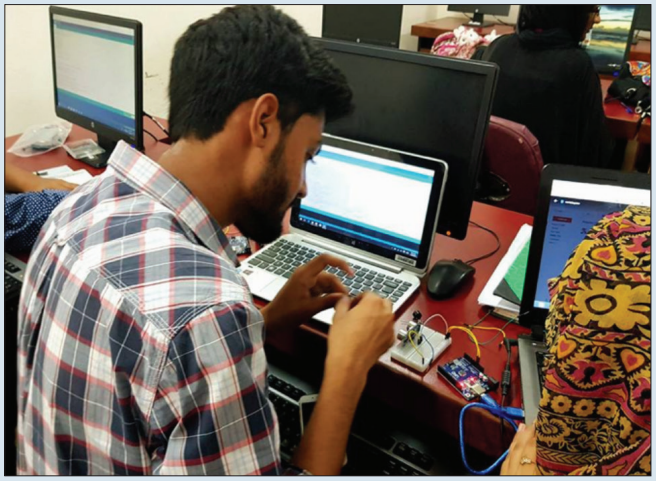
Arduino Day 2018: Sensing and Controlling Real World Using Arduino

Celebration by IEEE ComSoc Karachi

By Anum Talpur, Mehran UET, Pakistan

The Department of Telecommunication (TL) Engineering, Mehran UET, Jamshoro, organized this two-day workshop to celebrate Arduino Day 2018 with the partnership of the IoT Research Labortory (TL, Dept.) and IEEE ComSoc Karachi. The title of the workshop was "Sensing and Controlling Real World using Arduino." The celebration and workshop were conducted on 10–11 May, 2018. It was initiated by Dr. Faisal Karim Shaikh (Chairman, TL Dept.), Engr. Nafeesa Bohra (Assistant Professor). and Engr. Anum Talpur (Lecturer), to make the students of Telecommunication, Electrical, Electronics and Computer System department aware of the Arduino platform and its use in the field of IoT. The welcome speech was delivered by Dr. Faisal Karim Shaikh, who spoke about Arduino Day and how Arduino is playing a key role in making the world smart. He spoke about the current role of Arduino and its growing future. This initiated the Arduino Day celebration.

The first day included two sessions. The Day-1 workshop was conducted by Dr. Yasir Arfat Malkani, Ph.D. from the University of Sussex, Brighton, UK. During this first session, he introduced the concept, underlying technologies, and applications of IoT, an overview of Wireless Sensor Networks, and current market trends of IoT. After a break, he conducted the second session of the workshop in which Arduino and its specifications were introduced. He conducted a hands on practice session on basic applications such as a blinking LED, LDR sensing and ultrasonic sensor integration with Arduino.



Participants performing hands-on demo over the Arduino board during the event..

On the second day of the workshop, the session was conducted by Engr. Safiullah Shah (Researcher at IoT Lab, TL dept.) and Engr. Gulam Fiza (Researcher at IoT Lab, TL dept.). They presented a lecture on Arduino data collection mechanisms. The methods of data collection were introduced to students, including data collection through an SD card and through a global server/cloud (ThingSpeak). This also included a hands-on demo of WiFi module integration with Arduino. Finally, Engr. Nafeesa Bohra offered a word of thanks to the participants and trainers.

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sourcing has now become the fastest way to introduce new research, ideas, concepts, and technologies.

The second keynote, by Jeff Tantsura, Nuage Networks, USA, was on "Software-Defined Everything (SDX 2.0)," encompassing SD-WAN, SD-Cloud and SD-Security. As we are witnessing a proliferation of hybrid clouds and a massive increase in the number of end-points, from IoT devices to containers, a majority of data is moving within data centers. The need for a coherent, end-to-end programmatic approach has become necessary: SDX 2.0 is a cooperative, policy-driven approach, with end-to-end security as the foundation.

Nicholas Payant, Bell Canada, Canada, delivered the third keynote addressing "Network transformation at Bell." He stated that many telcos are experiencing a massive digital transformation, and he described Bell Canada's strategies on how to leverage software, automation and process transformation to tackle the complexity challenge while delivering the best network for its customers. He also emphasized the involvement of Bell Canada in the ONAP (Open Networking Automation Platform).

Finally, Richard Li, Huawei, USA, presented his keynote on "A New Way to Evolve the Internet." He argued that rethinking current Internet principles is needed to meet tomorrow's challenges of novel applications that pose unprecedented requirements in terms of high precision, seamless mobility, and intrinsic security. New networking principles and large-packet protocols are thus needed, with features including a novel network programming model that promises to unleash innovation.

The last day of the conference featured a panel of distinguished experts (DEP), moderated by Prof. Olivier Festor, Telecom Nancy, France, with representatives from both academia and industry. The session was interactive; each member briefly presented their statement and later addressed questions from the audience. Alexis Galis, University College London (UCL), UK, discussed the role of SDN and network slicing as enablers for future networks. Sawomir Kukliski, Orange Poland and Warsaw University of Technology, Poland, elaborated on the application and role of cognitive techniques in the control, management and orchestration of SDN and 5G networks. Richard Li, Huawei, USA, stressed the need and requirements for evolving the Internet by rethinking the design principles. Makan Pourzandi, Ericsson Research, Canada, discussed the rising threats for 5G and safeguards against these threats. The interaction with the audience was lively, addressing the impact of location and virtualization on ultra-low latency services. The need to fundamentally rethink basic principles of the Internet to meet the new requirements raised by 5G was shared. Artificial intelligence was debated in the context of softwarized networks that require ever growing automation and increased intelligence.

The conference also included demo sessions organized during coffee breaks. Nine demos were selected, addressing key aspects of network softwarization: routing and control, orchestration, service function chaining and network slicing. They were all well attended and generated a lot of debate and discussions.

Four collocated workshops featured very timely topics: Emerging Trends in Softwarized Networks (ETSN 2018); Advances in Slicing for Softwarized Infrastructures (S4SI 2018); Smart Network Technologies and Edge computing for the Tactile Internet (STET 2018); and Performance Issues in Virtualized Environments and Software Defined- Networking (PVE-SDN 2018). Workshops were held in parallel sessions, with morning and afternoon sessions, and attendance was beyond expectation. All workshops discussed ideas and presented papers of very high interests to the theme of the conference. The ETSN workshop focused on SDN/NFV and data analytics, and their role in Cyber-Physical Systems. The S4SI workshop addressed network slicing and the role it plays in 5G networks, providing services to emerging 5G applications such as smart grids, V2X, etc. The STET workshop featured research papers on the design, management and orchestration of Edge Computing and Tactile Internet. The last PVE-SDN workshop on Friday focused on performance in virtualized and software-defined environments, including resilience as well as deployment challenges.

On June 29, a set of timely tutorials delivered by experts from both academia and industry was delivered. They focused on: "Network Slicing Landscape: A holistic architectural approach, orchestration and management with applicability in mobile and fixed networks," by Alex Galis, UCL, UK, and Kiran Makhijani, Huawei, USA; "Security Issues in SDN and IoT Applications," by Baek Young Choi, UMKC, USA, Sejun Song, UMKC, USA, and Alex Sprintson, Texas A&M University, USA; "Advanced Topics in Architectural and Robust Operational Research for Virtual Networks," by Kohei Shiomoto, Tokyo City University, Japan, and Dimitri Papadimitriou, Nokia Bell Lab, Belgium; and "A Language and Framework for Prototyping and Experimenting with Edge-Oriented IoT," by Muthucumaru Maheswaran, McGill University, Canada. Tutorials were informative, engaging, and dynamic, given the state-of-the-art topics covered in the corresponding domains.

During the Closing Session, the TPC Co-Chairs provided the audience with some highlights of NetSoft 2018 and some takeaways for participants to address in the future. The main outcomes are:

•Softwarization paradigms are driving the re-design of network architecture and services running on top of softwarized infrastructure. Security, resiliency, rapid deployment and service chaining still remain challenges when designing future software networks.

•Softwarized networks require rethinking network operations with Artificial Intelligence. In this regard, the conference covered several approaches with respect to fault and fraud detection, network parameters optimization paradigms, etc.

•5G networks and the slicing concepts are a hot topic linked with softwarized networks. Key challenges are on metrics, new protocols and the overall system communication.

Next the conference presented the Best Paper, Best Student Paper and Best Demo awards, as follows:

•Best Paper Award: "DARN: Dynamic Baselines for Real-time Network Monitoring," presented by Rashid Mijumbi, Nokia Bell Labs, Ireland.

•Best Student Paper Award: "Let the State Follow its Flows: An SDN-based Flow Handover Protocol to Support State Migration,' presented by Manuel Peuster, University of Paderborn, Germany.

•Best Demo Award: "5G Edge Resource Federation Dynamic and Cross-Domain Network Slice Deployment," presented by Amina Boubendir, Orange Labs, France, and Frédéric Faucheux, Nokia Bell Labs, France.

The conference was closed with the announcement of IEEE NetSoft 2019, June 24-28, 2019 in Paris, France. The Organization of this event is now under way and information is available at http://ieee-netsoft.org/.

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