



## **EWG IoT & SEWG: Internet- of- Things & Internet- of- Things for Health Meeting in Graz**

**September 12 – 14, Graz, Austria**

On September 12 the EWG-IoT had the first Workshop on “Dependable Communication for IoT”.

On September 13-14, the EWG-IoT had four sessions: two were on the EWG on IoT, two were dedicated to the SEWG-IoT: Internet-of-Things for Health (IoT-Health). One of the latter sessions was a joint session with EWG-LT: Localisation and Tracking (LT). Details are given in the following.

### **EWG-IoT**

#### **I. September 12<sup>th</sup> (9:00-12.40)**

During the Workshop a keynote speech was given from Jean-Marie Gorce (University of Lion, France) and then 6 papers have been presented. The topics addressed were related to NB-IoT, 6TiSCH, sparse code multiple access and vehicular communication.

#### **II. September 13<sup>th</sup> (15:30-17:00)**

Two TDs (n. 21 and 28) were presented. TD n. 21 was related to the proposal of a control-aware scheduling policy for energy harvesting sensors, while TD n. 28 was dealing with the analysis of capabilities of low cost HF RFID cars.

At the end of the presentation of IoT-Health TDs, there was a group discussion. The discussion topics included the following:

##### 1. Training School proposals/topics for 2018 and beyond

- The possibility to have a joint WG2 - EWG-IoT school in Lyon in October 2017 has been discussed. The training school will include a theoretical part, dealing with bursty multi-user communication and standard for the IoT, and lab activities, where students will have the possibility to use the FIT/CorteXlab facilities and the NB-IoT implementation on the OpenAirInterface.

##### 2. Joint activities with H2020 projects

- Possible links with CLEAR5G H2020 project have been discussed.

##### 3. Tutorial offers for upcoming meetings (starting from January 2018)

- No tutorial offers at the moment.

##### 4. Joint activities (experiments, papers, etc.)

- Collaboration between UNIBO and UNIBL: A joint paper has been approved and presented at the Workshop on Dependable IoT, on Sept. 12.
- Collaboration between UNIBO and UoM: A joint TD has been presented during the meeting (see below), and a joint paper has been submitted to the Conference IEEE WPMC 2017. A journal contribution will be submitted soon to the IEEE Journal on Internet of Things.



- Collaboration between University College Dublin and European University Cyprus: a joint paper has been presented during the meeting (see below).
5. Short Term Scientific Missions among participant institutions
- No plan at the moment
6. Any other business?
- Members of the EWG were asked to send information about joined publications in which IRACON has been acknowledged.

### **III. September 14<sup>th</sup> (11:00-12:30)**

Three TDs (n. 9, 41 and 47) were presented.

TD n. 9 presented aims and scenarios of the CLEAR5G H2020 project just started and a discussion about the testbeds planned within the project took place after the presentation.

TD n. 41 presented the result of the joint research activity between University College Dublin and European University Cyprus dealing with novel airborne self-organising architecture for 5G+ networks, while TD n. 47 presented the joint research activity between UNIBO and UoM on Software Defined Networking for the IoT.

### **SEWG-IoT for Health**

### **IV. September 13<sup>th</sup> (15:30-17:00)**

This was a joint session with LT in which two TDs (no. 23 and 27) were related to IoT for Health. The first document discussed localisation of capsule endoscopy at Ultra-Wideband (UWB) frequencies. The authors investigated the performance of RSS-based technique for two-dimensional localisation of the capsule by employing a two-layer experimental phantom model. The second TD described a heterogeneous IoT-based architecture for remote monitoring of physiological and environmental parameters by employing Bluetooth and IEEE 802.15.4 wireless connectivity.

### **V. September 14<sup>th</sup> (11:00-12:30)**

During this session three TDs (no. 8, 13 and 54) were presented. The first TD described the effect of human morphology on the measurement uncertainty of a multi-band body-worn distributed exposimeter (BWDM). The exposimeter consists of 22 wearable antennas integrated in a garment. It is shown that proposed BWDM can lead to lower measurement uncertainty. The topic of the second TD was off-body radio channel measurements in a ferry passenger cabin at 2.45 GHz. Several static sleeping scenarios with different body orientation and on-body antenna placements were considered to obtain comprehensive measurement results. The last TD presented a dynamic channel model for off-body communications. The dynamic model is based on previously developed propagation model for a static user and wearable antenna mobility models during walking and running motions. Results



show the significant influence of user's motion on the channel (i.e. a received power variations of up to 35 dB) in both free-space and multipath scenarios.

After the above presentations, there was a sub-group discussion. The summary of the discussion topics has been captured in the following:

7. Workshop proposals for 2018 and beyond

- A proposal for "IoT-Health 2018: IRACON Workshop on IoT Enabling Technologies in Healthcare" has been accepted and will be held in Barcelona on April 15<sup>th</sup>, 2018, as part of the IEEE WCNC.

8. Short Term Scientific Missions among participant institutions

- A STSM proposal (GUT to IST) titled "Simulations of the radio channel in off-body communications in a passenger ferry environment" has been accepted. It will take place on September 18 through 29, 2017.
- There are also two planned STSMs: IST to GUT (for February 2018), and BME to UPV.

9. Joint activities (experiments, papers, etc.)

- A proposal for Convened Session at EuCAP 2018 has been accepted. The title of the proposed Session is: "COST Action CA15104 (IRACON): Measurements and Simulations in Channel Modelling in Wireless Body Area Networks".
- Two joint conference papers (GUT and IST) (with acknowledgements to IRACON) were published and presented at the 32<sup>nd</sup> *International Union of Radio Science General Assembly and Scientific Symposium (URSI GASS)* on Aug. 19-26, 2017 in Montreal, Canada:
  - K.K. Cwalina, S.J. Ambroziak, P. Rajchowski, L.M. Correia, "Radio channel measurements in 868 MHz off-body communications in a ferry environment";
  - P.T. Kosz, S.J. Ambroziak, L.M. Correia, "Radio channel measurements in off-body communications in a ferry passenger cabin".

VI. One joint journal papers (GUT and IST) (with acknowledgements to IRACON) in *Telecommunication Review and Telecommunication News*, No. 6/2017 was published (in Polish):

- S.J. Ambroziak, K. Turbić, L.M. Correia, "Polarisation and path loss analysis for off-body wireless body area networks".

VII. Discussions were held for collaboration or possible STSM between UGENT and UPV in regards to using the measurement facility at UPV for near field communication study by UGENT.

VIII. There is ongoing collaboration between GUT and IST on off-body and body-to-body channel modeling.

IX. Discussions were held for collaboration between NIST and UPV on matching the body phantom experiment and computational model results.

10. Training School proposals/topics for 2018 and beyond

- No Training School offers at the moment.

11. Joint activities with H2020 projects

- A joint proposal for Marie Skłodowska-Curie Research and Innovation Staff Program (H2020-MSCA-RISE-2017) has been submitted in April 2017. Participating organizations:



NIST, University of Oulu, University of Florence, London South Bank University, Oslo University Hospital, Yokohama National University, University of Technology Sydney, Asian Institute of Technology, Worcester Polytechnic Institute and Purdue University.

12. Tutorial offers for upcoming meetings

X. No tutorial offers at the moment.

13. Any other business?

- Members of IoT-Health Sub-Working Group were asked to send information about joined publications in which IRACON has been acknowledged.