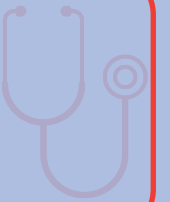# Webinar on Healthcare IoT
The Fourth Edition

IEEE Communication Society
eHealth Technical Committee: Special Interest Group on "IoT for eHealth"
and
Technical Committee Green Computing and Communications: Special Interest Group on "Pandemics

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Title: Integrating Cyber Security and Machine Learning with Applications in Internet of Transportation Systems

Abstract: The collection, storage, manipulation, analysis and retention of massive amounts of data have resulted in new technologies including big data analytics and data science. It is now possible to analyze massive amounts of data and extract useful nuggets and make predictions with machine learning techniques. However, the collection and manipulation of this data has also resulted in serious security and privacy considerations. Various regulations are being proposed to handle big data so that the privacy of the individuals is not violated. Furthermore, the data being stored may also be vulnerable to cyber-attacks.
Machine Learning and Security are being integrated to solve security and privacy challenges. For example, machine learning techniques are being applied to solve security problems such as malware analysis and insider threat detection. However, there is also a concern that the machine learning techniques themselves could be attacked. Therefore, the machine learning techniques are being adapted to handle adversarial attacks. Furthermore, due to privacy violations caused by machine learning, privacy enhanced machine learning techniques are being developed.

Title: Auracle: Detecting Eating Episodes with an Ear-Mounted Sensor

Abstract: We propose Auracle, a wearable earpiece that can automatically recognize eating behavior. More specifically, in free-living conditions, we can recognize when and for how long a person is eating. Using an off-the-shelf contact microphone placed behind the ear, Auracle captures the sound of a person chewing as it passes through the bone and tissue of the head. This audio data is then processed by a custom analog/digital circuit board. To ensure reliable (yet comfortable) contact between microphone and skin, all hardware components are incorporated into a 3D-printed behind-the-head framework. We collected field data with 14 participants for 32 hours in free-living conditions and additional eating data with 10 participants for 2 hours in a laboratory setting. We achieved accuracy exceeding 92.8% and F1 score exceeding 77.5% for eating detection. Moreover, Auracle successfully detected 20-24 eating episodes (depending on the metrics) out of 26 in free-living conditions. We demonstrate that our custom device could sense, process, and classify audio data in real time. Additionally, we estimate Auracle can last 28.1 hours with a 110 mAh battery while communicating its observations of eating behavior to a smartphone over Bluetooth.

Title: Sounding out wearable and audio data for health diagnostics

Abstract: Sensing and data analysis has made strides to improve how we understand human behaviour and health. I will reflect on the challenges that mobile and wearable health systems are introducing for the developers as well as the users. I will use examples from my group's research on exploring machine learning and data analysis for health application in collaboration with clinicians. I will discuss our project on using audio signals for disease diagnostics and our work in the context of COVID-19: a crowdsourced collected through mobile apps (covid-19-sounds.org) of respiratory sounds to pre-screen and diagnose COVID-19.

Principal Host: **Prof. Sudip Misra, IIT Kharagpur, India**
Co-Host: **Dr. Arijit Roy, University of Luxembourg, Luxembourg**
Co-Host: **Dr. Ayan Mondal, IIT Indore, India**

More details can be found **here**
Date: **January 14, 2022**
Time: **8:30 PM – 10:00 PM, Indian Time (IST)**

All participants need to pre-register by January 13, 2022 by filling-up the following form: **Registration Link**
Zoom sign-in details will be shared with the registered participants using the email address provided in the registration form.