Digital Chip Design for futuristic Cardio-vascular health Monitoring

Overview

Among the several non-communicable diseases world is scourged with Cardiovascular Diseases (CVD) resulting in millions of deaths every year throughout the globe. There is an exponential increment in human mortality rate, caused due to the delayed diagnosis, lack of proper distribution of health care facilities and prognosis centers in the vicinity. There is a need of a robust automated device for the early detection of the vital abnormal ECG signals in chronic CVD patients. To address the aforementioned problems, there is a tremendous necessity of developing a personalized CVD monitoring device powered by battery backup and with a very low form factor to achieve unobtrusiveness that works under the emerging Internet of Things (IOT) setup. These medical science and technological needs impose many challenges on such device development viz., low power consuming system design tradeoff between the on board processing and RF communication, low complexity analog front end circuit design and energy harvesting or self-power mechanism to prolong battery life. Here the objectives are two folds: (1) Enhance clinical diagnosis using the infinite amount of virtual resources in terms of computation and processing exploiting clouds. (2) Improving the state of the art technology focusing on building the entire system architecture for both home and hospital based healthcare monitoring, diagnosis and prognosis.

Course participants will learn these topics through lectures and hands-on experiments. Also case studies and assignments will be shared to stimulate research motivation of participants.

Important Information: Dates and Module Details	• **Date: 5 – 10 December, 2017** • **Number of participants for the course will be limited to fifty.** • **Modules**: CVD overview, current status, challenges and future directions including 2 European funded long-term research Projects: CHIRON and HEARTMAN and how these can be viewed from a Medico-engineering perspective, Next generation Technology requirement in remote CVD monitoring, Low power hardware design for CVD monitoring, Diagnostic Features and their effects on human health, Importance of ICT for patients with Hypertrophy, Heart Failure and other major heart related diseases. Areas of interest to improve patient reported outcomes in CHF patients: physical activity, medication and nutrition; Hardware and softwares needed for up-to-date telemedicine in CHF, IOT based technology platform design for remote healthcare, Importance of real time fragmentations detection from the ECG and On-chip Signal processing for detection of fragmentation, Bridging the gap between medical science and technology with Demo and hands on.
This course will beneficial to the..	▪ Engineers, Healthcare Practitioners, Scientists, Executives and researchers from private and government organizations including R&D laboratories. ▪ Student students at all levels (BTech/MSc/MTech/PhD) or Faculty from academic/ research Institutions and technical and medical science establishments.
Fees	The participation fees for taking the course is as follows: **Participants from abroad : US $300** **Industry/ Research Organizations: INR 20000** **Academic Institutions: INR 10000 (faculty), INR 7500 (student)** The above fee include all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, free internet facility. The participants will be provided with accommodation and conveyance on payment basis.

Objectives

- Exposing participants to the fundamentals of CVD and related healthcare technologies.
- Building in confidence and capability amongst the participants in the application of remote CVD monitoring tools and techniques.
- Providing exposure to practical problems and their solutions, through case studies and live projects/ demonstration,
- Enhancing the capability of the participants to contribute in this highly interdisciplinary field of research.

The Faculty

Prof. Paolo Emilio Puddu (MD, PhD, FESC, FACC) is Faculty Member of the Sapienza University of Rome (Italy) and Caen University (France). His research interests include Electrocardiography and signal detection, measurement, transmission and predictivity of outcome and events in general. He is an expert electrophysiologist in vitro and loves mathematical modeling applied to CVD prediction.

Dr. Amit Acharyya is an Assistant Professor of Indian Institute of Technology, Hyderabad. His research interests are Healthcare Technology, Pervasive computing, digital VLSI and VLSI for Digital Signal Processing.

Course Co-ordinator

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