Managing Large Health Care Data

by

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Wireless Sensor Networks (WSNs) were primarily introduced for defense application, with an objective of monitoring enemy's activities without any human intervention. In recent years, addition of camera sensors has added another dimension to volume of data. In this talk, we consider two complimentary scheme of handling data for instantaneous sensing and 24x7 transmitting important physiological signals. The first step consists of transmitting biomedical data at needed rate without affecting the accuracy of results. The second step involves aggregation of data over period of time. Pulmonary Artery Pressure (PAP) and Electrocardiogram (ECG/EKG) are selected as two preliminary physiological signals for Cardio-Vascular Diseases (CVDs). We use physiological data from a user's body and transmit them to a coordinator. The second step is to aggregate sensor data by combining overtime as signals change slowly over time. Effectiveness of such an aggregation scheme is illustrated by measuring the degree of compression for EEG scalp readings, gait measurement in patients with neurodegenerative conditions, and motor movement signals in normal subjects. Final comments are added to provide glimpse of what can be done to handle volume of biomedical data in the context of cameras.

Short Biography of Dharma P. Agrawal

Dharma P. Agrawal is the Ohio Board of Regents Distinguished Professor and the founding director for the Center for Distributed and Mobile Computing in the Department of Electrical Engineering and Computing Systems. He has been a faculty member at the ECE Dept., Carnegie Mellon University (on sabbatical leave), N.C. State University, Raleigh and the Wayne State University. His current research interests include applications of sensor networks in monitoring Parkinson's disease patients and neurosis, applications of sensor networks in monitoring fitness of athletes' personnel wellness, applications of sensor networks in monitoring firefighters physical condition in action, efficient secured communication in Sensor networks, secured group communication in Vehicular Networks, use of Femto cells in LTE technology and interference issues, heterogeneous wireless networks, and resource allocation and security in mesh networks for 4G technology. His recent contribution in the form of a co-authored introductory text book on *Introduction to Wireless and Mobile Computing, 4th edition* has been widely accepted throughout the world and fourth edition is in press. The book has been has been reprinted both in China and India and translated in to Korean and Chinese languages. His co-authored book on *Ad hoc and Sensor Networks, 2nd edition,* has been published in spring of 2011. A co-edited book entitled, *Encyclopedia on Ad Hoc and Ubiquitous Computing*, has been published by the World Scientific and co-authored books entitled *Wireless Sensor Networks: Deployment Alternatives and Analytical Modeling,* and *Innovative Approaches to Spectrum Selection, Sensing, On-Demand Medium Access in Heterogeneous Multihop Networks*, and *Sharing in Cognitive Radio Networks* have being published by Lambert Academic. He is a founding Editorial Board Member, I*nternational Journal on Distributed Sensor Networks*, *International Journal of Ad Hoc and Ubiquitous Computing (IJAHUC), International Journal of Ad Hoc & Sensor Wireless Networks* and *the Journal of Information Assurance and Security (JIAS)*. He has served as an editor of the IEEE *Computer magazine*, and the *IEEE Transactions on Computers, the Journal of Parallel and Distributed Systems and* the *International Journal of High Speed Computing*. He has been the Program Chair and General Chair for numerous international conferences and meetings. He has received numerous certificates from the IEEE Computer Society. He was awarded a *Third Millennium Medal*, by the IEEE for his outstanding contributions. He has delivered keynote speech at 38 different international conferences. He has published over 666 papers, given 57 different tutorials and extensive training courses in various conferences in USA, and numerous institutions in Taiwan, Korea, China, Jordan, UAE, Malaysia, and India in the areas of Ad hoc and Sensor Networks and Mesh Networks, including security issues. He has graduated 72 **PhDs and 65 MS students**. He has been named as an **ISI Highly Cited Researcher**, is a Fellow of the **IEEE,** the **ACM**, the **AAAS** and the **World Innovation Foundation,** and a recent recipient of **2008 IEEE CS Harry Goode Award**. Recently, in June 2011, he was selected as the **best Mentor for Doctoral Students** at the University of Cincinnati. Recently, he has been inducted as a **charter fellow of the National Academy of Inventers.** He has also been elected a **Fellow of the IACSIT (**International Association of Computer Science and Information Technology), 2013.