Research Interest of

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Broadly speaking, networking, and distributed and parallel computing are main areas of my research. My special research interests in networking includes (*i*) Wireless communication, (*ii*) Multimedia transport over the Internet, (*iii*) Wireless Sensor Networks, and (*iv*) Smart devices for the Internet of Things (IoT). I believe billions of (embedded and/or stand alone) smart devices will be end nodes for IoTs.

Now Wi-Fi is the most commonly used method for accessing networks, including the Internet. However, all clients connected to an access-point (AP) share limited bandwidth of the AP. We have and are developing protocols for associating each client with multiple APs for increasing bandwidth utilization and reducing response time for all clients. A US patent (Patent No. US 8792349 B2) has been awarded on July 29 2014 for part of our work in this area.

Wi-Fi, Wi-Max, 3G, and 4G services are available form almost anywhere anytime. While traveling on vehicle we connect to the Internet using one or more of theses services. A map of 3G and 4G signal strengths is available online from the website of *OpenSignal*. We have and are developing algorithms for selecting driving routes from a source to a destination that provide the best connection speed while do not increase driving time (or distance) more than a predetermined amount. Some of these algorithms were presented at 2014 Vehicular Technology Conference in Vancouver, Canada.

Since multimedia streams require high bandwidth and available bandwidth on a path from a multimedia source to a destination could be insufficient, transporting packets of a stream over a number of different paths is a good solution to the problem. We have developed concurrent multi-path transport protocols and working to improve them. We are also investigating potential methods for compression of multimedia data at the sensors — *compressed sensing*.

I believe wireless smart-devices with microcontrollers, embedded sensors, and actuators will be part of the future IoT. I have started a Lab for developing wireless smart-devices. My immediate goal is to establish a network of wireless sensors for monitoring, reporting, and controlling variety of activities in the networked area. The sensor network will be connected to the Internet for remote access. My next goal is to develop a group of autonomous mobile agents each with its own set of wireless sensors. These mobile agents will be trained to perform cooperative and competitive tasks.

Parallel and distributed computing, main area of my past research, is an area of my current interest. Multi-core CPUs and Center for Computational Science at UM have fueled my interest. My goal is to develop parallel algorithms for bioinformatics problems, including next-generation sequence assembly and mapping problems. Last year we have implemented scalable self-tuning parallel version of Smith-Waterman Algorithm, which is used for searching patterns in genomic databases. A paper reporting the algorithm was presented at PDPTA conference in Las Vegas.