**MOTES**

Embedded Systems are an integral part of our everyday lives and define our modern day society. The evolution of technology has brought about the mass production of these systems, saturating practically every industry known to man as well as being incorporated in devices people use daily in their homes, schools, and organizations. One interesting and developing device in collecting data from environmental phenomenon are the use of motes.

A mote is a sensor node in a wireless micro-sensor network that collects data from a phenomenon then transmits that data to an end user, the Task Manager. This communication is performed using specific network protocols, dependent on the application requirements, to allow for efficient communication through an available path in the network. Motes are intended to be used as a collective whole, creating a densely populated sensor field that satisfies the requirements of low energy consumption, low latency, high accuracy, and fault tolerance. There are a number of different applications for this system used in the past as well as presently that include monitoring environmental phenomena like earthquakes and tornados, as well as military and industrial uses. A derivative of this concept is even being seen today in the smartphone industry with near field communication where data exchange can take place wirelessly and is based on radio-frequency identification standards similar to the form used in a wireless micro-sensor network.

Although the individual mote has a simplistic design, it has a variety of classification and communication models. Each sensor node is comprised of five basic components – sensing hardware, flash memory, embedded processor, battery, and a transceiver, with its performance measured by energy efficiency, scalability, system lifetime, latency, accuracy, and fault tolerance. The two communication areas used in this system either deal with the application, where the motes can communicate cooperatively or independently, or infrastructure, which establish, maintains, and optimize system operation. Classification of a sensor network is done using data delivery and network dynamic models. Data delivery requirements can be continuous, event driven, request/response, or a hybrid of each with the network dynamics being either static or mobile. If any node in the network is mobile, the sensors, the phenomena, or end user, there is a high potential that the path maybe broken and rebuild strategies must be performed.

Dependent on these application requirements, there are a number of different potential protocols available for use that must address the challenges of limited energy and memory availability as well as error prone communication channels. Careful selection of an appropriate protocol at each level of the communication stack must be made in order to maintain a well functioning system. Some popular network protocols used today in a wireless-sensor network include Ad Hoc routing, LEACH, and Direct Diffusion.

The architecture of a wireless micro-sensor network is based on its infrastructure, network protocol, and end user requirements. Important elements of infrastructure include sensing accuracy, memory size, battery life, transmission ranges, and deployment strategies. Deployment strategies are based on mote density, location, and mobility. The network protocol’s role is to create paths for communication between sensors as well as between sensors and end user that address latency as well as fault tolerance. Finally, end user requirements are based on the type of query being made about the phenomena as well as where data translation occurs – either at the application software level, at the sensor node, or interpreted by the end user.

A mote, although small and compact, is a very powerful device when used collectively in wireless micro-sensor network. Its flexible architecture allows for a wide range of functional uses. Continued research and development is being made to make it even more efficient and we will probably see this type of system incorporated into our everyday lives in the future.