

1.0 Introduction

1.1 Introduction to Wireless Sensor Networks

Wireless sensor networks are an emerging area of interest among embedded and wireless research groups around the globe. Such networks are envisioned to be composed of low power computers that communicate with each other using short range radio frequency (RF) or infra red (IR) links.

Due to the low power requirements of such devices, it is envisioned that such a sensor node – or mote as it is popularly referred to – will become the enabling technology for pervasive computing. Tiny computers will be ever-present in our environment and will collect and process information unbeknownst to us.

Applications of such systems may include areas such as environmental monitoring and health, wildlife, defence and security and transport.

Wireless sensors networks (WSN) of tomorrow, as the enabling tool for pervasive and ubiquitous computing will be called upon to operate in diverse scenarios. The classical example of WSN deployment is the building monitoring application. Here the motes may be deployed in high densities to monitor and adjust temperature, humidity, light level, etc. Due to its inherently versatile nature, motes may find their way into diverse and never before imagined application scenarios.

Mobile sensor networks are another interesting research area that has much promise. Such networks may constitute ad-hoc networks among vehicles to monitor and control road traffic, swarms of robot armies, data mules [26] or fleets of mobile motes mounted on animals [35].

1.2 Objectives of the research

This research is aimed at developing enabling technologies for a particular type of mobile sensor network. In this type of network the mobile motes will sense the environment, and buffer the measured data for later communication and analysis. Possible applications could range from analysing migrations patterns of animals (eg. elephants) to offline monitoring of vehicle fleets. In either case the motes should be mounted on the target or object of interest (eg. vehicle or animal under study)

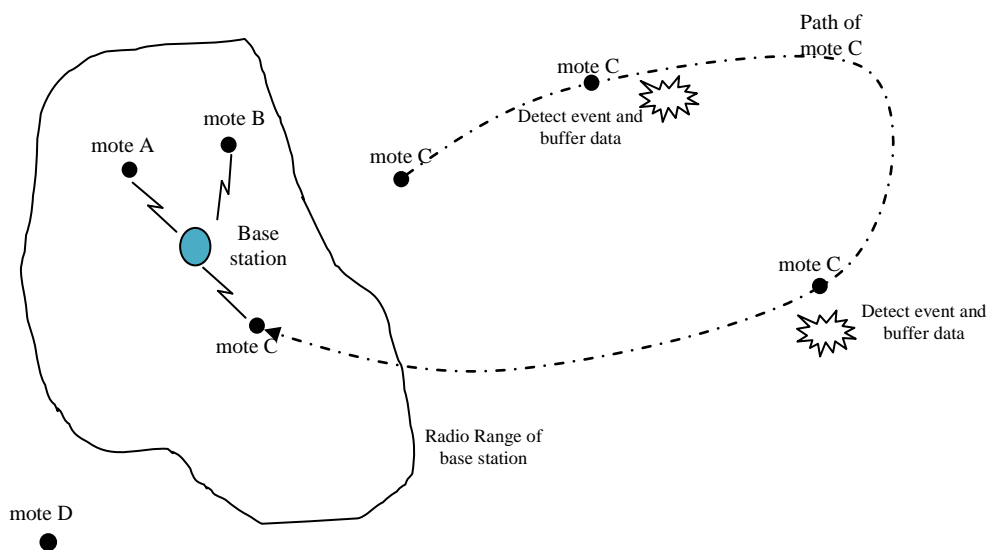


Figure 1.1 – Illustration of scenario under study

As illustrated in Figure 1.1, it is envisaged that the mobile mote will sense environmental phenomena and buffer the captured data. The mote will then travel to a base station, where it will upload this information. The base station will relay the captured information to a central server, possibly via a long range communication link (ex. via GPRS)

Once within range of the base station, the mobile mote will have a considerable amount of data to upload to the base station. It is also possible that a number of mobile motes will be required to upload data to the same base station simultaneously. This research focuses on developing a MAC protocol that will maximize the throughput of the network, and thereby ensure that the maximum amount of data can be uploaded by a community of mobile motes to the base station in a given time.

Additionally, the above mentioned MAC protocol will be implemented on real world hardware, in order to demonstrate it's viability.

The primary objectives of the research will be;

1. Study and build sensor node hardware locally for the purpose of research
2. Design and implement a network protocol that maximizes throughput, thereby enabling mobile motes to transfer the maximum amount of data to base station when it comes into range
3. Study and make recommendations on algorithms for data storage on sensor nodes, optimized for fast retrieval



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