

Wireless Mesh Networks: A Vital Tool for Community Development

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Abstract—This statement will express the area in which my research interests lie. It will briefly discuss my current and past projects. Also, the goals of future research will be addressed.

I. INTRODUCTION

Information and communication technologies (ICTs) hold an enormous promise for people in both rural and urban communities around the world. This promise can be not only life changing, but world changing in nature. By simply providing information to the right people, change in a community or an entire society can be enabled. This change could mean economic development, enhanced educational opportunities, and participation in the political process. ICTs can empower people and they are becoming more and more an integral part of community development strategies around the globe.

Wireless mesh networking is a fairly new technology that is aptly suited for use in community development projects. It could provide a reliable and cost effective methods for implementing a variety of tools needed for community development. However, there are many challenges to be overcome in this emerging technology and much research will be required to unlock the potential this technology holds.

II. RESEARCH INTERESTS

Wireless mesh networks (WMNs) are dynamic in nature. They configure and organize themselves. A WMN is made up of two basic parts: the mesh router and the mesh client. The mesh router is similar to a router used in a conventional wireless network, such as a Wi-Fi (802.11a, b, and g) based network or an ad-hoc network. It acts as gateway to the wired Internet connection, much like a conventional router. These routers are usually stationary and provide the backbone of the network. Mesh clients are much simpler than mesh routers. They are able to use lightweight communications protocols to communicate with the router or with other clients. With a combination of these two components, a wireless mesh network is created. These networks are very powerful and fit a wide range of applications.

Wireless mesh networks exhibit several features that set them apart from conventional wireless networks. These features include:

- Integration with existing wired and wireless networks providing multiple types of network access
- Easy coverage in areas that are hard to reach by wired connections
- Self-healing, robust connections
- Higher bandwidth
- Low power transmissions

Some of the major challenges currently being faced by wireless mesh networking include:

- Robust security measures
- Scalability
- Network Management

For my research, I would like to focus on the issues of scalability in wireless mesh networks.

III. CURRENT AND PAST PROJECTS

A Current Project

Currently, I am working, along with 6 others, on designing and implementing an autonomous, robotic lawnmower. This project is for senior design credit and is being overseen by Dr. Mark Nelms. The lawnmower will use several sensors, including a GPS, digital compass, LIDAR, web cam, and SONAR, to gather information about its surroundings. The lawnmower will also communicate wirelessly using a RF transceiver with a base station. At the base station, data from the lawnmower will be processed and displayed and, if necessary, the lawnmower could be controlled from the base station.

My role in this project has been integrating the control software of each of the sensors into the main control software. Also, I have been developing the software to run the base station. I will be assisting in the wireless communication software as well.

A Past Project

During the Spring semester of 2007 under Dr. David Umphress, I, and my project partner, designed and implemented a campus map application for Java enabled cell phones. This application was named TigerTrails. A map of Auburn University's campus could be displayed and zoomed in or out. It also had the ability to calculate and graphically display walking routes between campus buildings. These routes could even be animated. The application was developed using Java Micro Edition.

IV. GOALS FOR FUTURE RESEARCH

The goal of future research in wireless mesh networking is to develop a technology that can be seamlessly integrated into community development programs. For this to happen, the technology must be secure, able to adapt to a growing number of users, and easily managed. Once these requirements have been met, wireless mesh networks can become a vital tool for enabling change in communities around the world.