

Wireless Sensor Network Controlled Vehicle Navigation System and Its Applications

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Abstract: This paper is mainly intended to describe the implementation of the Vehicle Navigation system controlled by wireless sensor network. The system is used to control all the vehicle movements by using a mote inside the vehicle connected using hardware interface. This paper studies how the mote is acting like the driver of the vehicle controlled by surrounding nodes and Base station. The navigation of the vehicle is by using Location information and Neighbour mote sensor readings. The selection of Localization algorithm is based on the application in which we are using the vehicle. This paper shows how we can use the vehicle navigation system in Military and Monitoring applications. The Implementation is by using a toy car in which five controls are there and all these are controlled by Micaz mote. The mote programming is done by using nesC language.

Keywords : Driver Mote, Hardware Implementation, Sensor Network, Vehicle Navigation.

1. INTRODUCTION

This paper is mainly intended to implement the Vehicle Navigation using wireless sensor network. Wireless sensor networks are networks consisting of numerous small computers equipped with sensors [1,2]. Varieties of sensors are used. For example, infrared sensors are used to detect events like human motion and thermistor sensor is used to determine the temperature [3]. These sensor nodes are equipped with a radio to communicate with each other and to send data to a central computer where this data can be parsed and viewed.

The vehicle will be equipped with a mote controlling the vehicle based on base station commands and surrounding nodes data. The vehicles mote is like a driver of the vehicle. The driver mote has three different inputs at each stage. First the data from the sensors are connected to the mote and the second is the data from surrounding motes and the third is the data from base station. The mote will consider the three different inputs and will take an appropriate decision at each stage.

2. VEHICLE NAVIGATION

The importance of localization [4] is to relate the vehicle location with local map or global map. Various localization techniques [5] can be used to determine the position of motes deployed. If we are using GPS, we will get the global position with these position information and we can decide the next movement of the vehicle [6]. The driver mote inside the vehicle will send the sensor information to the other motes. They will reply to the mote at the next movement.

The next part is to navigate the vehicle by using Location information and Neighbour mote communication. If we know the local map, we can give the full controls to the mote inside the vehicle *i.e.*, mote can decide the movements and load the program based on the path. The next type of control is by neighbour mote communication in which the vehicle will know the path [7]. The mote inside the vehicle will send the location information and the nearest neighbour will take the control of the vehicle. The implementation is done by using a toy car having five functions.

Table 1
Comparison between Vehicle Navigation Techniques

Parameters	Vehicle Navigation Using GPS	GPS Free Vehicle Navigation
GPS Connectivity	Not usable in absence of GPS	Can be used in all locations
Cost	Costlier	Less Costlier
Accuracy	More Accurate	Less Accurate
Sensor Reading	No Reading from Sensors	Readings used in applications
Node Density	No influence	Directly proportional to accuracy

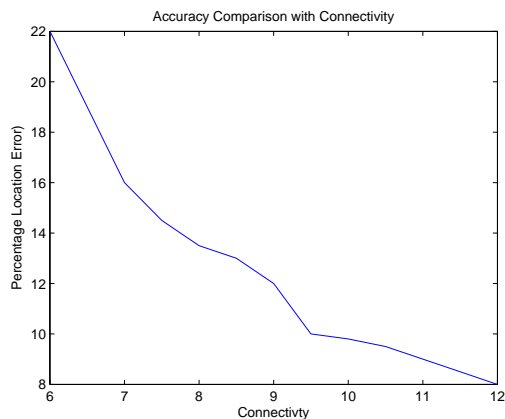


Figure 8. Accuracy Comparison with Connectivity

future scope of this work is to implement the system in any of the applications.

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