ABSTRACT

A Novel Multi-Node Microcontroller-Cellular Based Network for GPS Navigation and Tracking Systems

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Over the years the Global Positioning System (GPS) has become an integral part of a number of individuals' and organisations' day-to-day activities. The GPS system has enabled us with the use of special equipment, to obtain our geographical location any where on the planet. This system is an integral part of many navigational and tracking systems developed by numerous companies and organisations around the world.

There are several different sources of error that are associated with the GPS system, which decrease the accuracy of the system. To this effect several organisations have developed and implemented a number of different systems to minimise/eliminate these error sources. All these error correction systems require the setting up of broadcast sites, such as, Radio Frequency (RF) transmitters' sites, which they use to transmit the correction data. These communication links are expensive to set up and maintain.

This thesis presents a novel multi-node communication network, which utilises the existing cellular network infrastructure. The system eliminates the need for private networks and thus the cost of setting up and maintaining broadcast sites, while providing additional capabilities which could be used to increase the

accuracy of the error correction system. This thesis also examines the effect of the GPS antenna orientation and placement on the accuracy of the system. This is done to determine the best orientation and placement of the antenna to reduce the error in position calculations.

Keywords: Leonardo Adalphus Clarke; Atmel; Cellular; Communication; GPRS; GPS; GSM; Microcontroller; Navigation; Network; SMS; Tracking;