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Modelling and Development of Wireless Inertial Measurement Units

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CERTIFICATE OF AUTHORSHIP/ORIGINALITY

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

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_____

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ABSTRACT

This thesis presents the design and test of a wireless sensor mounted inertial navigation system. The innovative, low-cost and effective inertial measurement unit is based on three- axis accelerometer with USB and the serial direct interface. The accelerometer has connectors on both side of the module for control and communication. Wireless sensor, Bluetooth, has been mounted on the inertial navigation system to facilitate communications. By using this solution, it is possible to monitor and update the data of the accelerometers wirelessly and synchronously. The collected wireless data are analysed and compared with the data from other sources, such as USB cable, to determine errors in the system. The work discusses issues related to the accelerometer system technology, demonstrate application and process experiment. Particular consideration is given to the development of wireless technology and to a new micro-electro-mechanical accelerometer system test facility.

The main contributions of this thesis are as follows:

• Development of a wireless inertial measurement unit
• Development of an error model
• Implementation of this inertial measurement unit into a gyro-free inertial navigation system