NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF INDUSTRIAL TECHNOLOGY

DEPARTMENT OF ELECTRONIC ENGINEERING

ACCESS CONTROL SYSTEM BASED ON DALLAS CHIPS

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ABSTRACT

The aim of the research and design work was to produce a system that can electronically identify a driver, open a boom gate for his vehicle and close it after the vehicle has passed provided the driver is authorized. Overall, the system is desired to control access to premises. The thrust was to use the available resources, and produce the system using the modular design approach.

Electronic identification of drivers is based on Dallas chips contained inside iButtons. As such, the research work centered mainly on the theory of Dallas chips. The associated practical work centered mainly on the design of a method to communicate with Dallas chips and production of structured software routines to achieve the communication.

Since a boom gate is used to regulate the access by vehicles, a model mechanical boom gate and the required drive system powered by an electric motor were designed and constructed. The necessary software to automatically operate the boom gate was also developed.

The overall control of the system is carried out by a computer, which hosts a database to hold the necessary information and into which access events are logged. Hence, a computer package was developed to provide interfaces between the physical access control part, the database and the user. The necessary physical link between the computer and the gate-based part was also designed and produced.

The above mentioned main components were each, as relevant and applicable, designed to be made up of several modules so that the overall Access Control System was produced from a stage by stage and hierarchal build up of the component modules. Each module was added to already existing modules only after it met required test specifications following its design, testing and implementation of the necessary corrective modifications. The test methods involved simulating the environments in which the components would work.

The overall Access Control System was tested by simulating entry and exit requests by probing authorized and unauthorized iButtons as well as operating user switches on the entrance and exit boom gates. When a request (entry or exit) was made from an authorized iButton or by a gate operator, the boom gate swung from the closed rest position to the fully open position. It remained open for 2 seconds, a period when a vehicle is expected to have passed, after which it swung back to the closed rest position. A record of the access event that featured the access request type as entry or exit, the initiator of the request as a particular driver identified from the iButton or the operator, date and time of the event were logged into the database. The recorded location of the driver as inside or outside the premises was toggled to indicate the resulting new location. When a request was made from an unauthorized iButton, the boom gate remained in the closed rest position and an alarm was raised. The logged access events could be viewed on a computer based on various criteria. An administrator could change the state of a driver (iButton) as authorized or unauthorized.

In conclusion, the research goals were generally achieved. The model Access Control System is now proposed to be improved and installed at NUST.

This piece of literature presents the amassed theory, the designs, test procedures, results and recommendations for the research and design work.