SMS-based Home/ Industry Automation System

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Most existing home or industry automation systems are either remote controlled or task-scheduled. In such systems, IR and RF techniques are commonly used where the control distance is limited. The task-scheduled systems carry out actions that are predefined by the user at an earlier time, hence, the real-time controllability of the system is not utilised. Therefore, the requirement arises to analyse ways to build a system that has the capability to be controlled from any distance with real-time controllability.

This paper presents the design and implementation of a SMS-based remote monitoring and control system for home and industrial systems, focusing on the analysis of delays in the system to examine the capability of a real-time controllability. With this approach, communication is not limited in range except in a case where the user is out of mobile coverage. The SMS based system installed at user premises consists of a mobile phone, a main controlling unit and circuit modules designed for monitoring and controlling tasks. The user can monitor the current status of user system and control them by sending a predefined SMS.

The communication between the system and the user is achieved through the user's mobile phone and another mobile phone stationed in the system at user premises. Therefore, only an operating mobile connection (i.e. a valid SIM card) is needed for communication. As the design is not limited to a particular commercial mobile connection the system and the user can have different mobile connections. To protect the system from unauthorised access, several authentication processes are introduced. Once the system receives a SMS from the user, it identifies the user requirement and carries out a task accordingly. Different types of sensors are stationed at user premises to get the alarms. When a predefined event occurs, the system will inform the user via SMS and any user control actions send by the user will be implemented.

The controlling cost is further reduced by embedding multiple control commands in a single message. The design is unique in its methodology that it is not limited in the number of individual devices that can be controlled. Since the operation of the system is based on a programmable microcontroller, the type of controllability and the types of alarms the user needs to receive can be configured according to the user's choice.

The proposed methodology was tested using a commercially available mobile phone and results showed an acceptable reliability for various mobile connection vendors. The analysis on delays in receiving an alert by the user or the user system acting upon a received a control command showed some variations for different mobile connections. Modelling these errors and introducing a feedback mechanism serve the purpose of approaching a real-time controllability.