

Cloud Based Intruder Detection System

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Abstract— A normal burglar alarm system typically comprises only a local system and an on-site burglar alarm. In this implemented model, system consists of a remote system present in a cloud and a local system interacting with it for authentication and alarm purposes. Both on site alarm and an off-site alert system using SMTP email protocol has been implemented and also a provision for the administrator provided for monitoring the login history of the users. The administrator can also add new users from a remote system. An industrial system interacts with the microcontroller for door control and other tasks.

Keywords— Cloud, Burglar alarm, Open shift, remote system, SMTP.

I. INTRODUCTION

The door is controlled by a stepper motor interfaced via 8051 based microcontroller. An industrial metal sensor fitted in system to monitor the door position. FSM based sequential program running inside the microcontroller controls the opening and closing of the door and sending information to a front end application running on a industrial system communicating through a serial port.

II. FSM BASED EMBEDDED SYSTEM

An FSM based Embedded system consists of a set of states and the system is present in any one of the states at any given point of time of the operation. An FSM model can be realised by using a sequential program using a switch structure.

A. FSM in this system

A character variable is used to represent the current state. State '0' is the unlocked state and '1' is the locked state. State '2' is the wrong password state gives off onsite alarm. The FSM is illustrated in Fig 1

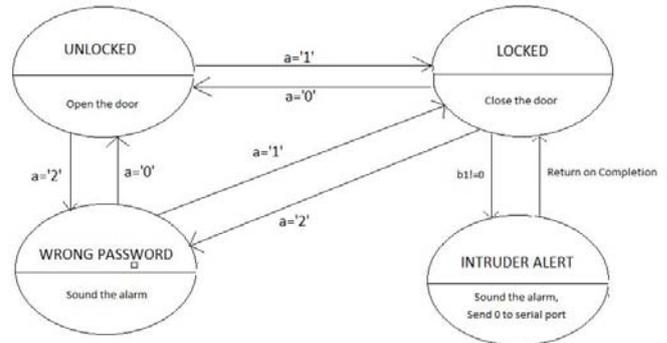


Fig 1- The FSM for our machine

B. Sequential model

A sequential model is a procedure oriented program model with instruction being executed in a sequential manner. It makes use of selection and iteration constructs to achieve a functionality.

III. WORKING OF THE EMBEDDED SYSTEM

When the system starts it assumes that the door is unlocked. A user logged in through the interacting system locks the door by button clicks and the system sends lock command to microcontroller through serial port. The MC makes stepper motor rotate which closes the door. In the same way unlock also works. System validates that two unlock commands are not sent consecutively and two lock commands are not sent consecutively. The door is designed such that when door closes completely, sensor can detect the presence the door. Even a slight misplacing of the door is considered as intrusion presence.

When the door is locked, FSM checks for the sensor input. If the sensor can detect the presence of the door then system is in protected mode. If the sensor does not presence the door then system assumes that intruder has force opened the door. System them makes an alarm go off, simultaneously a data byte is sent to the interacting system indicating that burglary is occurring.

IV. INTERACTION BETWEEN EMBEDDED SYSTEM AND CLOUD

In our project we have used OPENSIFT by redhat as the cloud provider. OPENSIFT is a PAAS(Platform as a Service)

Using a cloud along with the embedded system gives the administrator the chance of maintaining the system remotely as well to collect log details from the system

The architecture of the OPENSIFT is as shown in Figure2. Fig 3- System Flowchart

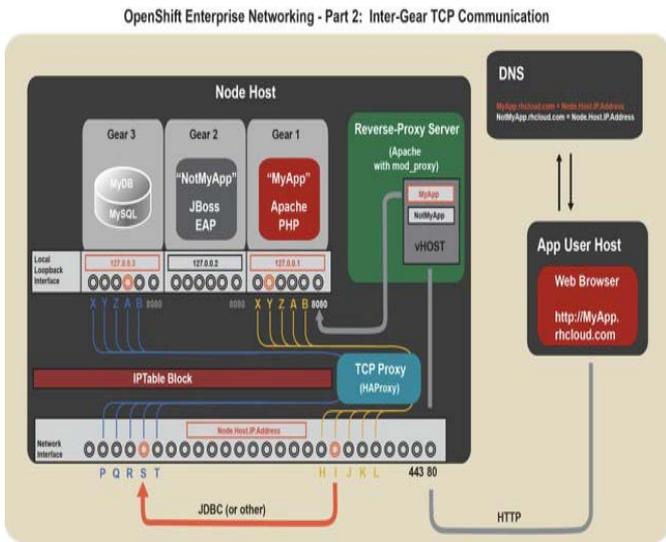


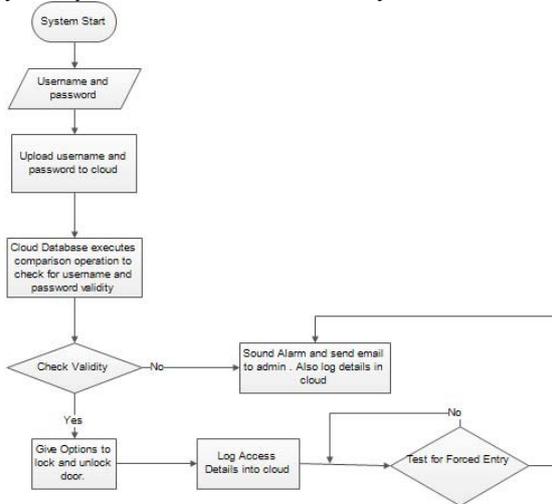
Fig 2- OPENSIFT Architecture

When a user wants to open or lock the door, he uses the industrial embedded PC to key in his username and password. The embedded system then performs a link up to the mysql database present on OPENSIFT using port forwarding. Port forwarding places a virtual NAT device on the computer which transforms all requests to the local database onto the cloud database. So the computer thinks that the cloud database is running on the local system.

If the user is not validated then an image is captured and the image along with a warning is sent to the system administrator.

If the user is validated, then he is provided with options to lock or unlock the door. His actions are logged and uploaded the cloud.

On the cloud system appropriate PHP scripts generate the log data to the user in the form of a website. Also there is a provision to add another user and a default password for a new user by the system administrator remotely.



V. EXPERIMENTAL SETUP

In our circuit we have used an 89v51RD2 microcontroller from NXP semiconductors. The Microcontroller is interfaced with stepper motor and industrial sensor.

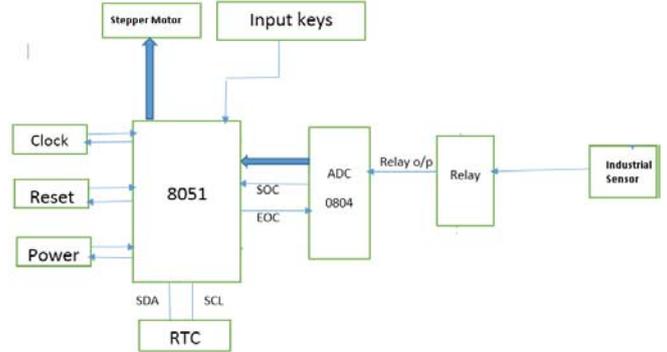


Fig 4- Circuit Diagram of our setup

The stepper motor is used to open or close the door whereas the industrial sensor is used to detect if the door is open or closed.

The microcontroller is integrated with C# by sending data out of serial port. The C# provides for user interface as well as for uploading data to the cloud.

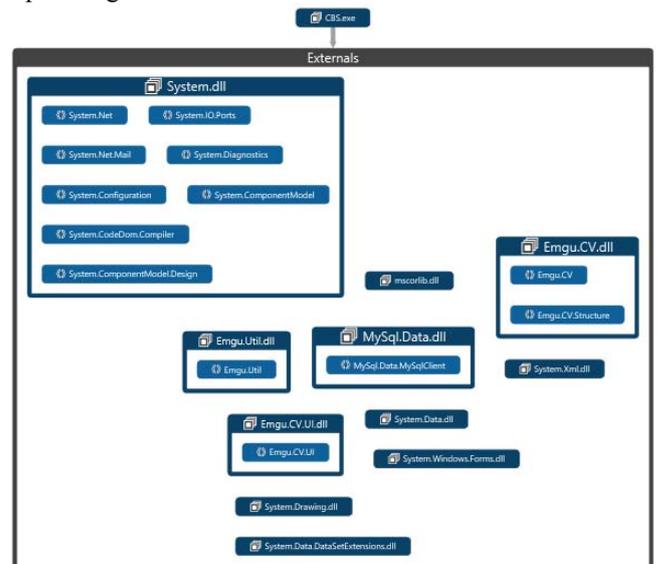


Fig 5 Dependency graph for C# cloud and user interface.

VI. CONCLUSION

The cloud based intruder system is a low cost option for corporate offices, datacentres, high security areas. The Cloud based intruder system's major advantage is that the system can be monitored remotely and also new users can be added remotely. Placing the code and data in different locations

ensures the availability of data even when the system is destroyed

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