

# Advanced Electronic Switching System Using Web-server and Android

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**Abstract** - In today's world, automation is playing an important role in our day-to-day life. Electronic switching systems are used in industries to control various industrial appliances on a very large scale. This type of switching not only reduces the human effort but also is energy and time efficient. The main objective of our project is to control the industrial appliances and to create alertness in critical situations.

This paper puts forward the design and security system using an Android application. Android is an open source operating system for mobile devices. Today it is primarily used in mobilephones. During the last year many projects have been created, targeted to bring Android to other platforms such as sub-notebooks or embedded systems. Our target is to evaluate if Android is a suitable platform for Industrial Automation. The appliances are connected to the input/output ports of the embedded system board and their status is passed to the server. We are developing an authentication system for authorized individuals to access the appliances. The device with low cost and scalable to less modification to the core is much important. It presents the design and implementation of switching system that can monitor and control appliances via android phone or tablet.

## Keywords

Switching System and Security; Atmega32; Embedded Systems; Android phone; Tablet; Server; PHP database

## I. INTRODUCTION

Advanced electronics switching system is controlling of industrial activity. It may include centralized controlling of lights, motors or any other industrial appliances or detection of temperature, humidity and also be used as a counter in packaging industry to provide improved convenience, comfort, energy efficiency and security. The concept of industrial automation has been around for a long time and products have been on the market for decades, though no one solution has broken through to the mainstream yet. It can also provide a remote interface to appliances itself, via wireless transmission or the internet, to provide control and monitoring via a smart phone or web browser. This paper will describe the approach which we are implementing to control various industrial appliances with Android smart phone.

## II. LITERATURE SURVEY

As per our survey currently there exists no system at cheaper rates. Various systems are hard to install, difficult to use and maintain. Current systems are generally proprietary and closed, not very customizable by the end user.

Also we found that more manpower and space is required to control the appliances and various systems are hard to reach via humans.

Google and Microsoft have recently entered the automation domain. At 2011, Google announced first standard for Android devices to communicate with external hardware. Android powers hundreds of millions of mobile devices in more than 190 countries around the world. It is one of the largest installed bases of any mobile platform and growing rapidly. Microsoft is similarly working on a project called HomeOS, an operating system designed specifically for home automation.

## III. IMPLEMENTATION

### A. Android OS

For industrial automation and security system we are making use of the Android platform since it is an open source OS and has a huge market presence. Android is a software stack for mobile devices that includes an operating system, middleware and key applications. With Android being open source project, one might initially think that Android is not an adequate environment for commercial purposes due to licensing restrictions. However, Android ships with its own compiler that uses a stripped down version of the standard C library called Bionic. When building and distributing applications with that particular compiler you are therefore not obligated to lay open your source code to your customers. Android provides many Application Programming Interfaces (API) for developing your own projects.

The real beauty of Android is that these APIs are available using the Java programming language. Furthermore, Android features a Plugin for the Integrated Development Environment (IDE) Eclipse, making it easy to develop and debug your applications on a virtual emulator as well as on real hardware. It is also possible to create your own native C/C++ applications and accessing them from within the Java context.

## B. Software Design

The software design is divided into three sections:

### Android implementation

We are using the Android OS to create events in java language to generate the required notifications and commands. Also it is used for displaying the status of the appliances to the user. The main screen has a list of all functions among which user can select any one function which he want to control. After selecting a function he would be able to see a current status of a particular appliance. If user wishes, he can enable or disable intended appliance.

### Server (Server side language PHP &MySQL)

The basic purpose of the web server in the project is to ensure communication between the devices and the users. The web server programming is done using the server side languages PHP and MySQL for authentication and creating programmable logic control (PLC) for automation. PLCs can also be used to reduce the on chip load as well.

### Embedded C (On chip language)

The on chip programming is worked out in the language C. The Ethernet module is used as an interface between the switch and the micro controller in which http protocols are used. The communication between the I/O pins and the Ethernet module is controlled by the micro controller which is programmed using embedded C language (Arduino IDE).

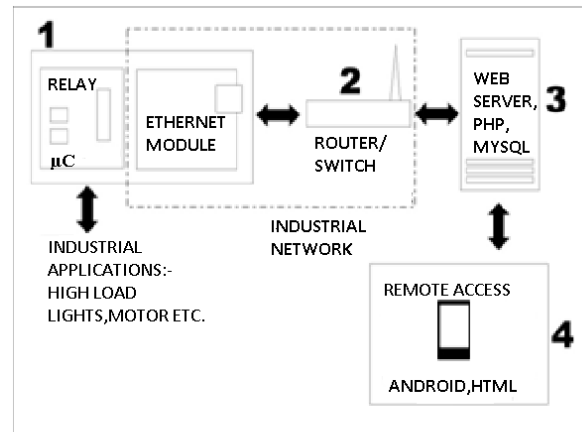
## C. Hardware

For this project we are making use of an android based mobile phone which will display the actual data from the applications and send commands to the various applications as well. The information and commands sent from the appliance and the phone will be recorded by the server.

## D. Hardware Design

The control board consists of two sections viz. micro controller and Ethernet module. The micro controller is used to control the relay. Ethernet module is used to interface with web required for sending and receiving commands through and from the server.

## IV. BLOCK DIAGRAM



1: Control Board

2: Router Switch

3: Web Server

4: Remote Access (Android phone)

## V. WORKING

The system will be initiated when commands will be sent as per user's requirement from an android smart phone. These commands will be further sent to the web server having a php & MySQL based data base. Here php is used as a Server site programming language which will send it to a router or a switch.

The http request with parameter will contain the IP address and the data command given by the user. Further the Ethernet module acts as an interface between the switch and the microcontroller.

- The micro controller receives the command and acts physically on the device.
- In this way any command sent by the user from his android phone gets converted in an appropriate physical change from the corresponding appliance and also sends the user confirmation of the same.
- The confirmation of the data command sent by the user is sent back to the switch again by the Ethernet module. The switch sends this data to the data base server which in turn conveys it to the android device which is remotely located.
- The android phone, the server and the industrial network are all connected via the internet.

## VI. APPLICATIONS

Following are the applications of Industrial Automation and Security System:

- Medical alert /teleassistance.
- Precise and safe blind control.
- Detection of fire, gas leaks and water leaks.
- Smoke detectors can detect fire or smoke, causing all lights in the house to blink to alert any person of the house to the possible emergency.
- The system can call the home owner on their mobile phone to alert them, or call the fire department or alarm monitoring company.
- In terms of lighting control, it is possible to save energy when hours of wasted energy in both residential and commercial

applications by auto on/off light at night time in all major city office buildings, say after 10pm.

- Control and integration of security systems and also the potential for central locking of all perimeter doors and windows.
- Security cameras can be controlled, allowing the user to observe activity around the industry or business right from a Monitor or touch panel.
- Security systems can include motion sensors that will detect any kind of unauthorized movement and notify the user through the security system or via cell phone.
- An intercom system allows communication via a microphone and loud speaker between multiple rooms.

### VII.FUTURE WORK

Looking at the current situation we can build cross platform system that can be deployed on various platforms like iOS, Windows.

Security cameras can be controlled, allowing the user to observe activity around a house or business.

Security systems can include motion sensors that will detect any kind of unauthorized movement and notify the user.

Scope of this project can be expanded to many areas by not restricting to only industries.

It will be flexible to support various wired as well as wireless technologies like Bluetooth, Zigbee, Wi-Fi, World Wide Web, MQTT

### VIII.CONCLUSION

This is an ongoing project. This paper gives basic idea of how to control various industrial appliances and provide a secure environment using Android phone/tab. This project is based on Android which is a FOSS(Free Open Source Software). So the overall implementation cost is very cheap and is affordable to smaller industries. Looking at the current scenario we have chosen Android platform so that both small as well as large industries can be benefitted. The basic design is made as easy and user friendly as possible keeping the Android phone, good internet connectivity and the dedicated application being the only requirement for the end user. Users can interact with the android phone and send control signal to the control board which in turn will control other embedded devices/sensors. We have discussed a simple prototype in this paper but in future it can be expanded to many other areas.

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