**CENTRALIZED SECURITY SYSTEM BASED USING ARDUINO
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ABSTRACT

This paper put forwards the design of home automation and security system using Arduino. Home Automation system using IoT and smart devices is a system that uses computers or mobile devices to control basic home functions and features automatically through internet from anywhere around the world .The centralized security system is different from another system by allowing the user to operate the system from The main application of the centralized security system

based on IoT is to provide a centralized security to multiple blocks at the same time. The additional benefits that are getting from this project are real time monitoring of the status that will be shown at the webpage available with the security personal. This system can be used in military applications like a group of restricted area that are to be monitored at the same time to check whether there are any intruders present. In company buildings or school campuses where trespassing is restricted after certain time, this system can be activated for that period of time and those areas can be monitored by a single personal sitting at the security center of that system. In apartments and residential colony, the owners, once activated the system, can get updates regarding their home using SMS facilities or by checking the status on the secure webpage provided to them while registering for the security system. The server will keep the record of the data for certain period, so in case of any need of previous data, it can be retrieved and can be processed accordingly.

KEYWORDS: Home Automation and Security; Arduino; Embedded Systems, Arduino, Beaglebone black, Internet of Things (IoT),

INTRODUCTION

The concept of home 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. Home automation for the elderly and disabled can provide increased quality of life for persons who might otherwise require caregivers or institutional care. It can also provide a remote interface to home appliances or the automation system itself, via telephone line, wireless transmission or the internet.

Home automation not only refers to reduce human efforts but also energy efficiency and time saving. The main objective of home automation and security is to help handicapped and old aged people who will enable them to control home appliances and alert them in critical situations. This paper put forwards the design of home automation and security system using Arduino.

The centralized security system is different from another system by allowing the user to operate the system from anywhere in the world through the internet connection. In this project, we present a centralized security system using beagle bone black employing network integration, wireless communication, to provide the user with the security control of the various sensors in their home and storing data in the cloud .The device with low cost and scalable to less modification to the core is much important Internet of things is a growing network of everyday object-from industrial machine to consumer goods that can share information and complete tasks while you are busy with other activities.

Intelligent Home Automation system using IoT and smart devices is a system that uses computers or mobile devices to control basic home functions and features automatically through internet from anywhere around the world, an automated home is sometimes called a smart home. Smart device is an electronic device generally connected to other devices or networks via different protocols such as Bluetooth-NFC-WiFi-3G-etc. that can operate to some extent interactively and autonomously. Already existing buildings the implementation cost goes very high. In contrast, Wireless systems can be of great help for automation systems. With the advancement of wireless technologies such as Wi-Fi,cloud networks in the recent past, wireless systems are used every day and everywhere.

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.

N. Sriskanthan^[1] explained the model for home automation using Bluetooth via PC. But unfortunately the system lacks to support mobile technology. Basil Hamed, described the design and implement a control and monitor system for smart house. Smart house system consists of many systems that controlled by Lab VIEW software as the main controlling system in the paper. Also, the smart house system was supported by remote control system as a sub controlling system. The system also is connected to the internet to monitor and control the house equipment's from anywhere in the world using Lab VIEW.^[2] Deepali Javale, presents assist to handicapped/old aged people. It gives basic idea of how to control various home appliances and provide a security using Android phone/tab. The design consists of Android phone with home automation application, Arduino Mega ADK. User can interact with the android phone and send control signal to the Arduino ADK which in turn will control other embedded devices/sensors.^[3] Mohammad El-Basioni, proposed a new design for the smart home using the wireless sensor network and the biometric technologies. The system employs the biometric in the authentication for home entrance which enhances home security as well as easiness of home entering process. The structure of the system is described and the incorporated communications are analyzed, also estimation for the whole system cost is given which is something lacking in a lot of other smart home designs offers. WB-SH is designed to be capable of incorporating in a building automation system and it can be applied to offices, clinics, and other places. The paper ends with an imagination for the future of the smart home when employs the biometric technology in a larger and more comprehensive form. The paper ends with an imagination for the future of the smart home when employs the biometric technology in a larger and more comprehensive form.^[4] Muhammad Izhar Ramli^[5] designed a prototype electrical device control system using Web. They also set the server with auto restart if the server condition is currently down. Hasan^[6] has developed a telephone and PIC remote controlled device for controlling the devices pin check algorithm has been introduced where it was with cable network but not wireless communication. Pradeep G^[7] proposed home automation system by using Bluetooth which saves lot of power and time using mechanism to save the preloaded list by not making it to setup connection all the time when required. Al-Ali and Al-Rousan^[8] presented a design and implementation of a Java-

based automation system through World Wide Web. It had a standalone embedded system board integrated into a PC-based server at home. Amul Jadhav^[9] developed an application in a universal XML format which can be easily ported to any other mobile devices rather than targeting a single platform.

Block Diagram System

The present paper describes the development of Arduino based Intelligent home using Smart Devices. According to many of the Arcelor Mittal personnel, safety and security are two major concerns on and off the job. The current gate entrance is very outdated with little to no security. This means that anyone wanting to gain entrance has a significantly high chance of being able to do so with the current design. The goal is to modify the current entrance to ensure all personnel entering the facilities is supposed to be there. The proposed system is a centralized home security system, consists of sensors and servers. Server monitors and adjust the various sensors, and can be configured easily and can be used to handle more hardware interface module (sensors). The Beagle bone black development board, with built in Wi-Fi card port to which the card is inserted, acts as web server. Security system can be accessed from the browser of any local PC using server IP, or remotely from any PC or mobile handheld device connected to the internet with appropriate web browser through server (internet IP). Wi-Fi technology is used to be the network infrastructure that connects the sensors with the server. Wi-Fi is chosen to improve system security (by using secure WiFi connection), and to increase system mobility and scalability.

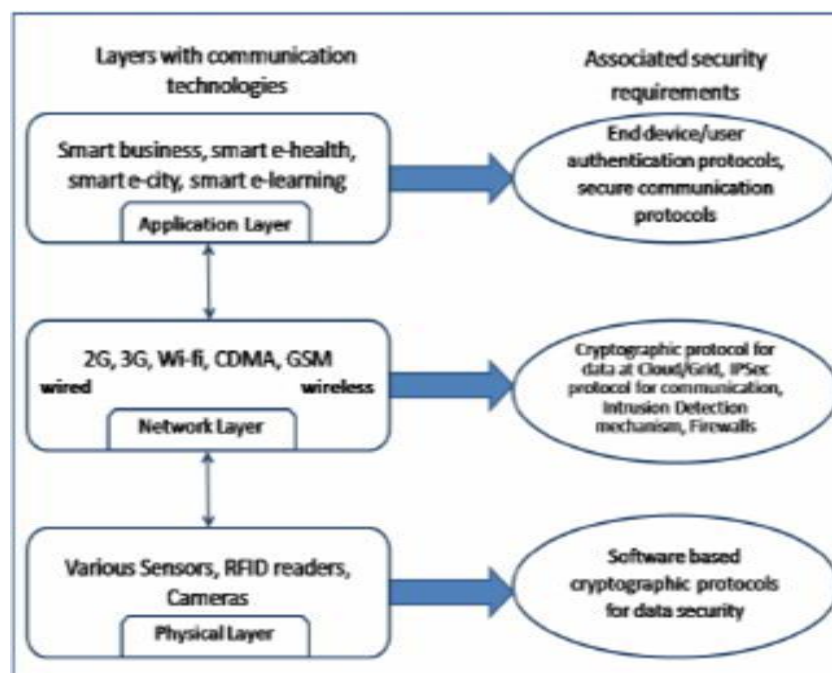


Fig 1: Architecture of IoT.

Beagle bone Black is an easy platform at low cost to work with. PIR sensors are used in this project to detect a movement which almost always used to detect whether a human is moved into or out of the range sensors. They are inexpensive, small, low power and easy to use. They are often referred to as PIR "passive infrared" or "IR motion sensor".

Initially, the beagle bone black connects to the Internet via WiFi. When the connection is established, it will start to read sensor parameters such as m1, m2, m3etc. Threshold levels for the sensors required are defined as T1, T2, etc. The sensor data is transmitted to the web server and stored in the cloud. Cloud storage is a data storage model where digital data is stored in logical pools physical storage across several servers and the physical environment is generally managed and owned by a hosting company. The data can be analyzed any time. In the proposed model the motion in the block is monitored.

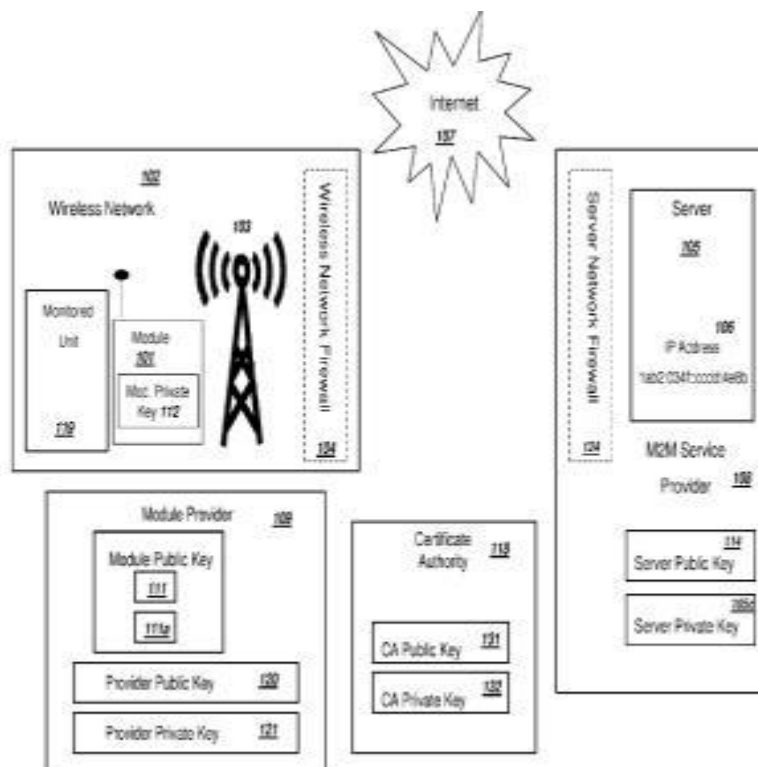


Fig 2: Block Diagram Of Arduino System.

This is very important in meeting the objectives that Arcelor Mittal has set in creating a safer and secure entrance. In order to create a solution to their problem we will need to design an entrance with the following: a Radio Frequency Identification card reader, and security cameras at the entrance The system consist of five sections; smart fridge, smart alarm, smart timer, central server and user mobile phone. The information is sent and received to and from central server through internet/cloud. for ease of remote controlling of system. As long as

there is range present for internet, the system can be controlled from anywhere in globe. The wireless connection is implemented in order to reduce set up difficulty. Figure 2 represents the flow chart for the smart fridge node.

Hardware used

The different sensors and hardware used in the system are as followed. The Raspberry Pi 3 Model B is the second generation Raspberry Pi. It replaced the original Raspberry Pi 2 Model B+ Compared to the Raspberry Pi 1 it has: A 1.2GHz quad-core ARM Cortex-A53 CPU, 1GB RAM. Like the Pi 1 Model B+, it also has: 4 USB ports, 40 GPIO pins, Full HDMI port, Ethernet port, Combined 3.5mm audio jack and composite video, Camera interface (CSI), Display interface (DSI), Micro SD card slot, Video Core IV 3D graphics core as well as In built Bluetooth and Wi-Fi.

1. The Arduino Yun: is a microcontroller board that has not only Input and Output pins but is also capable of being networked wirelessly or through an ethernet port. Initially the plan was to incorporate and use the networking capabilities to communicate with a python database hosted.



Fir: 3: Ardiuno Yun.

On a separate laptop. Unfortunately due to the circumstances stated above, an alternative solution had to be sought. The new design used the Input and Output pins, along with the micro USB port.

Each piece of the prototype would be assigned a pin which corresponded with the commands in the software. Similar to the input and output pins, the Arduino Yun has onboard ground, 3.3V and 5V connections to power the additional hardware implemented in the prototype. These pins can be seen in the image below on both sides of the board.

2. Setup RFID Reader: The RFID reader must be powered and connected to the Arduino Yun microcontroller in order to pass through a RFID tag number. This tag number is

extremely important to the success of the prototype. The Parallax RFID reader has four wires that are used for power and passing data. The card reader schematic can be seen in figure 6 below. The Vcc is connected to the 5V on board supply and GND to ground. Connecting the wires as stated will provide the reader with power to work. Next the Enable pin and Sout pin can be connected to two different pins on the microcontroller board. These will be set to input pins. Setting the enable pin will allow for the reader remain active and in standby for a card to be swiped. The Sout pin is then used to transport the received tag into the program. From here the program is responsible for manipulating this string of characters to verify whether or not it is authenticated to activate the gate motor.

3. Arduino Software: Arduino has software that works across all operating system, for developing and implementing Code, while being very simple to install. The software is open source with an integrated development environment (IDE) allowing programmers to have a vast majority of tools. The built in tools include a source code editor, automation tools, and a debugger. Having these resources available makes it easy to write a code and upload it to the microcontroller board. During the course of developing a working prototype, the team utilized the source code editor and debugger. The goal was to use the python library with the python database server, but was unsuccessful during implementation. Therefore, the libraries that were available from Arduino were not widely used. The software was very intuitive in aiding in the successful design of the working Gate Security prototype.

Expected Outcome of the Project

In this project proves to be very useful in daily home management with increased smartness with usage of smart devices. Home networking and architecture design are very important for a smart home automation system. The interfacing of sensors and microcontroller with raspberry pi is successfully simulated and tested for all smart nodes along with feature of remote controlling using Android application. With successful design and testing of hardware.

The proposed system can provide the following outcomes which will enhance the security. Flexibility and scalability of the system: If there is a requirement of adding a new block or upgrading the technology used, our system has great flexibility. Reduced cost of installation: The devices that we use here are comparatively cheap and easy to install as new technologies are becoming more approachable.

Aesthetical benefits

The centralized security system will have a small module placed in the house and the central control will be with the security personal at a centralized place. This will provide a better arrangement of things and will provide a proper managed arrangement of the whole system. Additional benefits: The proposed system is having only monitoring and securing duty but this can be extended by integrating it with the smart phones and other devices that will enhance the system. The use of microcontroller to make automating devices along with security is a future scope for this project Medical alert / teleassistance.

Precise and safe blind control. Detection of fire, gas leaks and water leaks Smoke detector can detect a fire or smoke condition, 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 a house 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.

CONCLUSION

This paper gives basic idea of how to control various home appliances and provide a security using Arduino. So the overall implementation cost is very cheap and it is affordable by a common person. Looking at the current scenario we have chosen Arduino platform so that most of the people can get benefit .The centralized security system can easily manage security issues related to housing societies or apartments. The need of automation is increasing day by day. This project will ensure that each and every block is secure in the absence of the owner and use of beaglebone black will help in providing flexibility to the project. The webpage is user friendly which will provide easy user interface to the security controller. The real time monitoring and alerting will help in keeping up to date records of the block. We acknowledge the efforts and hard work by the experts who have contributed towards development of the different home automation systems. We also acknowledge the

efforts of the reviewers of the journal for the suggestions and modifications to improve the quality of the paper.

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