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CENTRALIZED SECURITY SYSTEM BASED ON IoT

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Abstract: With the growth of technology, life becomes easier and easier in all aspects. In today's world, each system tries to move in automatic manual. With the rapidly increasing number of Internet users over the last decade, the Internet has become an integral part of life, and IoT is the latest technology and emerging Internet. Internet of Things is a growing network of objects of industrial machine consumption of common products that can share information and complete tasks while you are busy with other activities. Centralized wireless security system using IoT is a system that uses computers or mobile devices to secure the house and has access via the Internet from anywhere in the world. 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 beaglebone 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 system automatically changes based on the sensor data. real time monitoring is also provided. This system is designed to be low cost and scalable allowing a variety of devices to be controlled.

Keyword: Arduino, Beaglebone black, Internet of Things (IoT), Python.

I. INTRODUCTION

Security systems at home to three major challenges; it is the high cost of property, inflexibility and poor management. The main objectives of this project is to design and implement a centralized security system using IoT is able to provide security to multiple blocks of subject areas such as homes through an easy web interface manageable. The proposed system has great flexibility with Wi-Fi technology to interconnect its sensors distributed to centralized home security server. This will reduce the cost of deployment and increase upgrading capacity and system reconfiguration.

Warning systems are a popular way of deterring crime in modern society; as most people believe that houses criminals disregard armed with alarm systems. As the market expanded security systems, technological characteristics and resulting in the available safety systems has also exploded. Unfortunately, many customers of the security system are left with an alarm system multiple thousand dollars they are unable to function effectively. [1]

The Internet of Things, also called Internet of Things refers to a network of devices connected together, such as household appliances. The term "Internet of Things" describes a number of research disciplines and technology that allow the Internet to achieve in the real world of physical objects. [2]

In our article, we have tried to answer the solution for a centralized system will be complex or society safer and easier to manage. This paper is organized as follows; Section II deals with the implementation of the design using Arduino and beaglebone using IoT. Section III is on the expected outcome of the project and of Section IV concerns the application of

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the system at various levels. Finally section V concludes the paper.

II. IMPLEMENTATION OF DESIGN

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 Beaglebone black development board, with built in WiFi 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). WiFi technology is used to be the network infrastructure that connects the sensors with the server. WiFi is chosen to improve system security (by using secure WiFi connection), and to increase system mobility and scalability.

Beaglebone Black is an easy platform at low cost to work with. PIR sensors [3] 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". [3]

Initially, the beaglebone 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. [4] The data can be analyzed any time. In the proposed model the motion in the block is monitored.

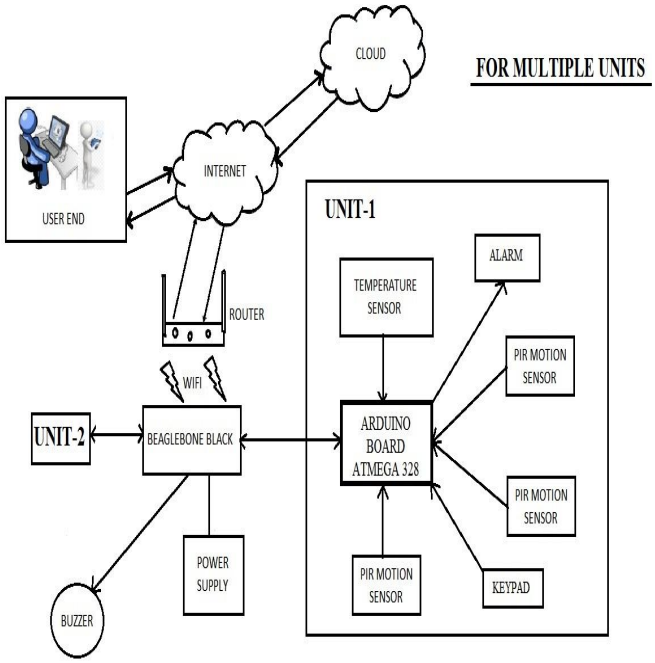

Fig. 1

From Fig. 1, the basic idea behind this project can be obtained. The unit part represents the module that will be

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placed in each block, for example, in case an apartment, each house will have this unit fixed in it.

The Arduino board will keep on sensing the status of the sensors attached to it and provides the feedback to the beaglebone black. Multiple units will be attached to the beagle bone. Due to the availability of only four serial ports in beaglebone black, four units are connected to single beaglebone. The real time monitoring of the status of the block can be observed at the browser. The webpage at the user end is easy to handle and will provide easy monitoring of the multiple blocks at the same time.

USER INTERFACE (UI)

House-id	Sensor-1	Sensor-2	System	Status
1101	Normal	Normal	Active	Secure
1102	Normal	Normal	Active	Secure
1103	Normal	Break-in	Active	UNSECURE
1104	Normal	Normal	Disabled	N.A
1105	Normal	Break-in	Active	UNSECURE

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Fig.2

Fig. 2 shows the user interface which will provide real time monitoring of the blocks. The status of the security can be easily seen on the screen which will be at the centralized area where the security personal will be present. Any changes in the status will be immediately seen in the website. As seen in Fig. 1, keypad is provided to the user and the status of the units can be changed using it. Once an individual leaves his/her home, using keypad, the system can be activated which will be updated immediately on the server.

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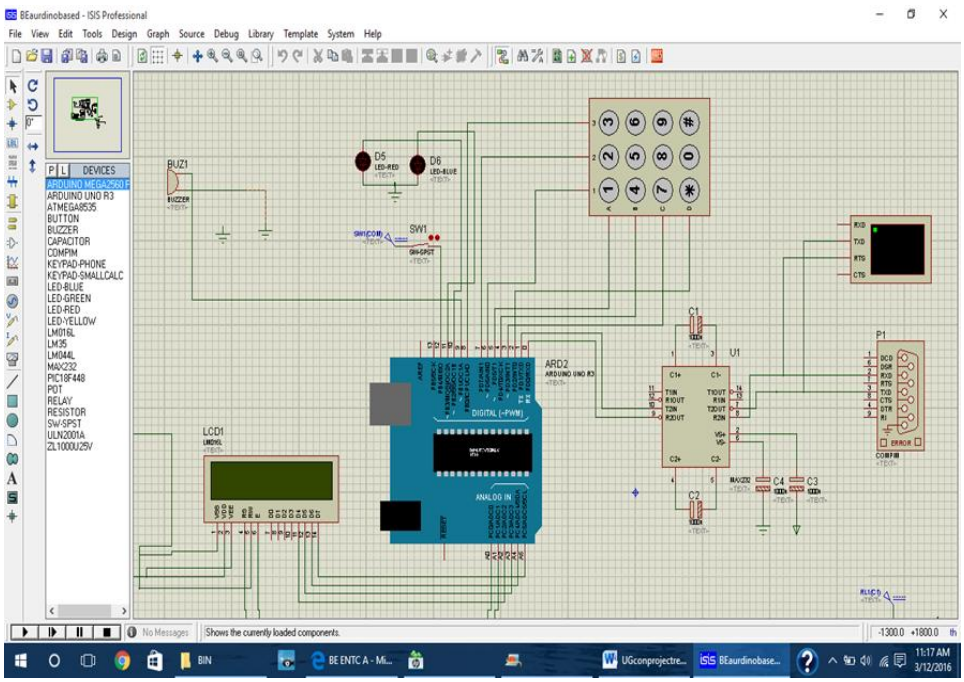

Fig. 3

Fig. 3 shows the simulation part of a unit. Proteus is used to create the simulation and Arduino environment is used to write the code for Arduino board. The serial port is then used to further transmit the value to the beaglebone. Python language is used for beaglebone black.

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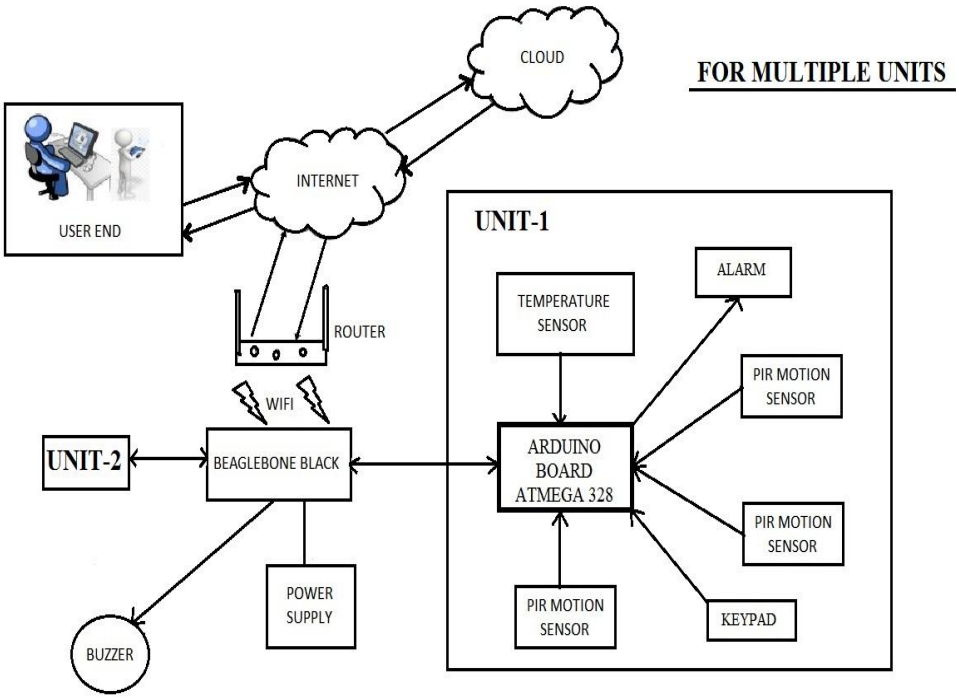

III. EXPECTED OUTCOME OF THE PROJECT

The proposed system can provide the following outcomes which will enhance the security. 1) 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. 2) Reduced cost of installation: The devices that we use here are comparatively cheap and easy to install as new technologies are becoming more approachable. 3) 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. 4) Additional benefits: The proposed system is having only monitoring and securing duty but this can be extended by integrating it with the smartphones 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 [5]-[6].

IV. APPLICATIONS OF THE SYSTEM

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 1) real time monitoring of the status that will be shown at the webpage available with the security personal. 2) 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. 3) 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. 4) 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. 5) 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.

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V. CONCLUSIONS

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.

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