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Home Automation and Security System

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Abstract: Home security systems combines a constantly, year after year, developing research field. Very few of these systems are limited to support basic operations, while some others satisfy a range of additional primitives. In this paper, a security system for smart home automation is proposed. The introduced system operation is supported by a GSM embedded mobile module, which enables the alert messages transmission to both mobile devices of end users, and central security offices. The proposed system is implemented on a microcontroller module, through an embedded platform. System's operation is also based on cameras and sensors inputs. The developed system operates on different levels of user's access control, based on passwords policies. Each time, the involved end users and the security offices, can be informed for attacks, operation modes changes etc., through SMS communication, via the available GSM network.
Keywords: smart home automation, Home security systems, cameras, GSM network.

I.   INTRODUCTION

The home automation is control of home devices from a central control point, automation is today's fact, where more things are being completed every day automatically, usually the basic tasks of turning on or off certain devices and beyond, either remotely or in close proximity .The concept of the RF-based systems is to use the underlying wireless data network such as IEEE 802.11 (Wi-Fi). In today's world automation plays a major role and the automated way of working the home appliances through the wireless connection is an efficient and effective method to utilize them. By including the voice recognition to the appliances it makes it even useful for the people suffering from paraplegia (people who cannot move their limbs but can speak and listen).   The popularity of wireless networks in home has increased in recent years, and the advanced computer technology has made the personal digital device to commonly have the capability to communicate through the wireless network. It can be as basic as dimming lights with a remote control or as complex as setting up a network of items in your home (such as a thermostat, security system, lighting and appliances) that can be programmed using a main controller. The basic idea of home automation is to employ sensors and control systems to monitor a dwelling, and accordingly adjust the various mechanisms that provide heat, ventilation, lighting, and other services. The automated "intelligent" home can provide a safer, more comfortable, and more economical dwelling. A software architecture that makes home automation (HA) system based on multi-agent concept. The architecture is composed of five main components respectively named space agents, function agents, personal preference agents, environment variables server, and resource access right control kernel. The approach is inclined for people with disability to perform real-life operations at home by directing appliances through speech. It contains free software but even non-free software are compatible and so it is one of the most popular choice for the web servers. The ESP8266 WIFI module is a self-contained SOC with the integrated TCP/IP protocols stack that give any microcontroller to access the WIFI network. It is capable of hosting an application or offloading the WIFI networking functions from different processors.

II.   LITERATURE SURVEY

A software architecture that makes home automation (HA) system based on multi-agent concept. The architecture is composed of five main components respectively named space agents, function agents, personal preference agents, environment variables server, and resource access right control kernel. There is need to construct a more powerful home automation both in the hardware and software aspects. Due to the advent of the advanced computer and wideband network, the personal computer based environment seems to be the suitable platform for the system integration. Researches had been carried out to propose the development of an Internet-based system to allow the monitoring of important process variables from a distributed control system (DCS). This paper proposes hardware and software design considerations which enables the user to access the process variables on the DCS, remotely and effectively, using only a commonly available web browser.
These Researchers suggested the use of speech to interact remotely with the home appliances to perform a particular action on behalf of the user. The approach is inclined for people with disability to perform real-life operations at home by directing appliances

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through speech. Voice separation strategy is selected to take appropriate decision by speech recognition.
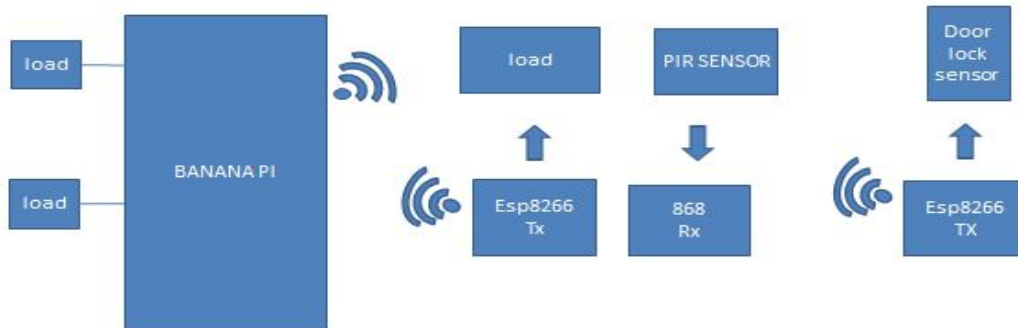
III.   METHODOLOGY

Fig 1 Block Diagram

The block diagram consists of the Banana Pi board, ESP 8266 chip (low cost WIFI chip with TCP/IP stack), RFM65W-868 Receiver (120dBm at 1.2kbps at a range of 862-890MHz), PIR sensor (measures IR light radiated from an object in its field of view) and door lock sensor for the security purposes.

A. Transformer

The efficient transformer will step down the power supply voltage (0-230V) to (0-9Vand 15-0-15) level. If the secondary has less turns in the coil then the primary, the secondary coil's voltage will decrease and the current or AMPS will increase or decreased depend upon the wire gauge. This is called a STEP-DOWN transformer. Then the secondary of the potential transformer will be connected to the rectifier.
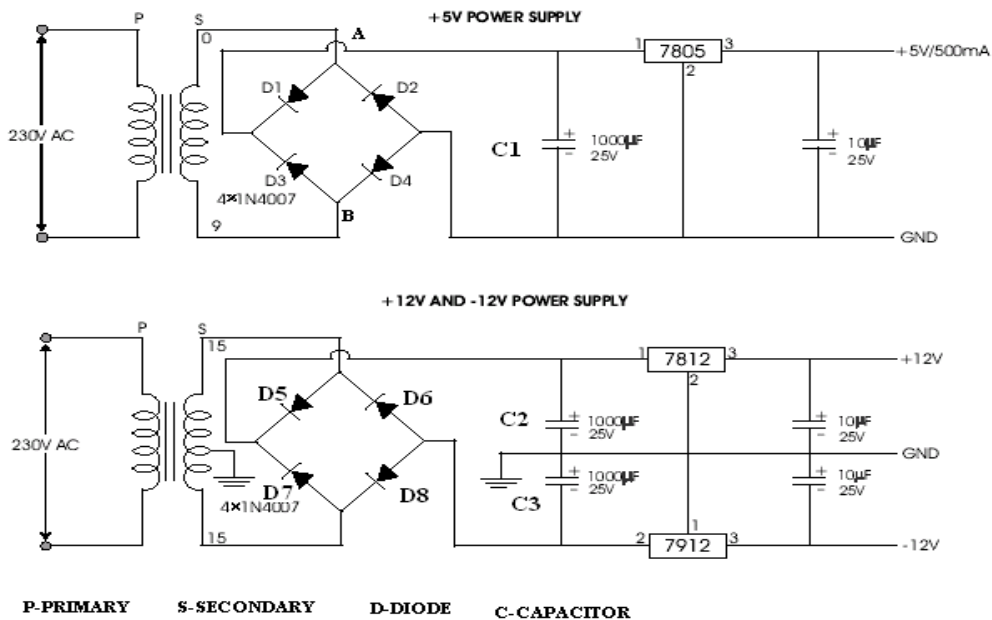

Fig 2 Circuit diagram of power supply

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IV.   BANANA PI

The Banana Pi R1 board is the low powered single board computer. This has an All winner A20 system on chip that includes the ARM Cortex A7 Dual core 1GHz,Mali-400 M2 GPU and 1GB DDR3 SDRAM. It has SATA 2.0 for external storage. It has inbuilt WIFI 802.11 and 40 extension header.
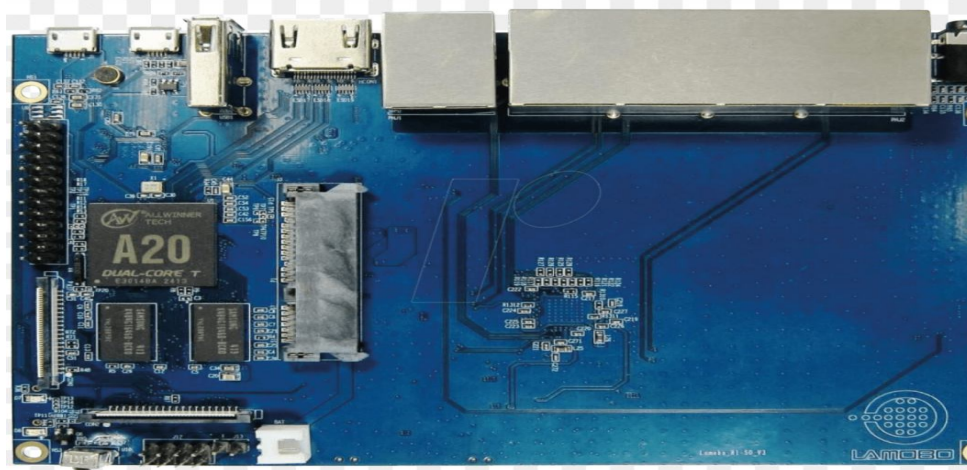

Fig 3 Banana Pi

The Banana Pi board can be programmed by using Andriod(Android 4.2.,4.4), Linux (Bananaian, Ubuntu, raspbian, debian, GNU/Linux, Fedora, Arch Linux ARM,Gentoo). The software that is used in this is Debian. It is a UNIX-like software that is open source that is composed of the free software in which most of the GNU General Public License is handling. It contains free software but even non-free software are compatible and so it is one of the most popular choice for the web servers.The Homegenie is an open source, programmable, home automation server for the smart connected devices and also applications. It is designed on the multi-standard basis such that the Homegenie can interface to various devices such as X10,KNX,Z-wave etc., to communicate with the external web services and integrate all of this into a common automation environment.This software helps in creating the scenarios with our fingers and shape the home intelligence with no limits by creating the advanced control/interaction logic using the program editor. It also helps in keeping the voice control ovr the appliances and also IR/RF remote control for controlling the devices.

V.   ESP8266

The ESP8266 WIFI module is a self-contained SOC with the integrated TCP/IP protocols stack that give any microcontroller to access the WIFI network. It is capable of hosting an application or offloading the WIFI networking functions from different processors. It has the storage capability that allows it to be integrated with sensors. It contains a self-calibrated RF allowing it to work in all operating conditions and needs no external RF parts. Its features are 802.11 b/g/n, WIFI Direct, Integrated TCP/IP protocol stack, TR Switch, 1MB flash memory, integrated low power 32-bit CPU, standby power consumption of <1mW. The wireless connection can be stabilized using this type of transceiver that is efficient in power consumption and also in standby mode.
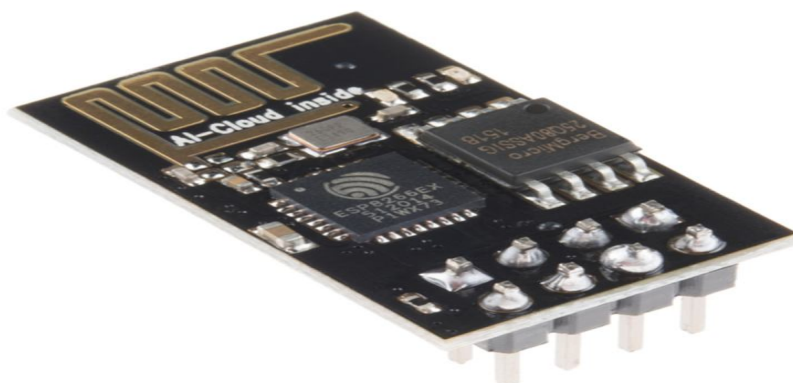

Fig 4 Schematic representation of ESP8266

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A. Relay

A relay is an electrically operated switch. The initial relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations. Solid-state relays control power circuits with no moving parts, instead using a semiconductor device to perform switching. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults; in modern electric power systems these functions are performed by digital instruments still called "protective relays". Repeated pulses from the same input have no effect. Magnetic latching relays are useful in applications where interrupted power should not be able to transition the contacts. This is a 5V 4-channel relay interface board, and each channel needs a 15-20mA driver current. It can be used to control various appliances and equipment with large current. It is equipped with high-current relays that work under AC250V 10A or DC30V 10A. It has a standard interface that can be controlled directly by microcontroller.
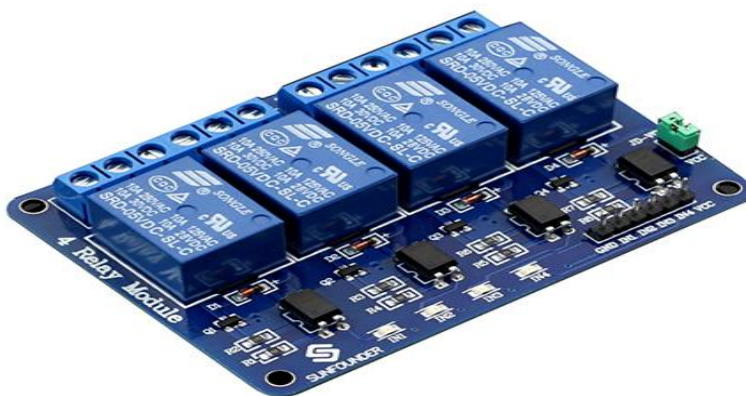

Fig 5 Relay
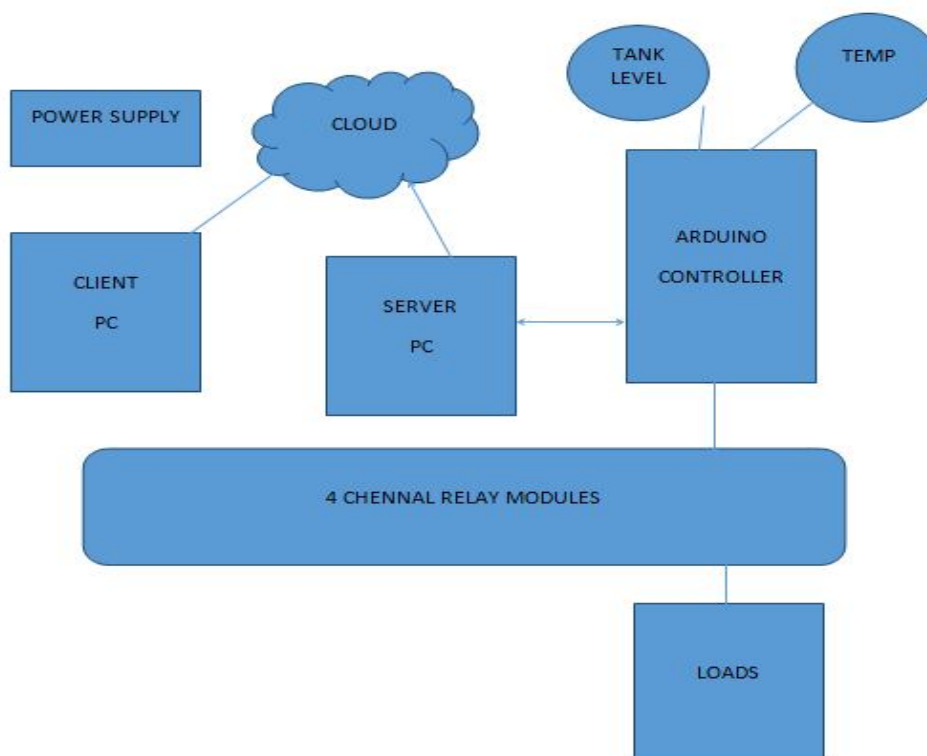
VI. RESULTS AND DISCUSSIONS

Fig 6 Proposed system block diagram

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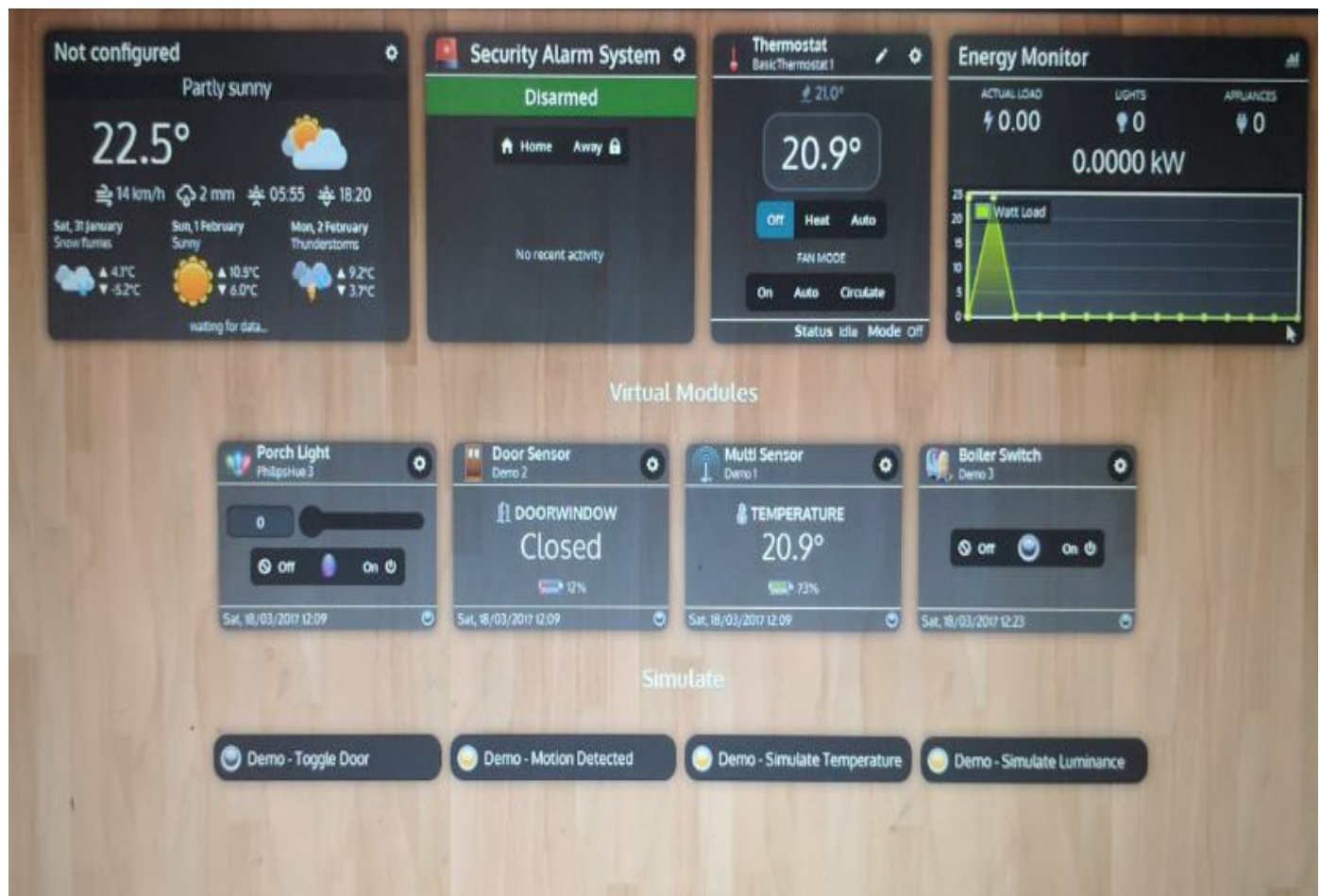

Figure 7 SNAPSHOT OF BANANA PI

Figure 8 Proposed system output

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VII. CONCLUSION

These Researchers suggested the use of speech to interact remotely with the home appliances to perform a particular action on behalf of the user. The approach is inclined for people with disability to perform real-time operations at home by directing appliances through speech. Voice separation strategy is selected to take appropriate decision by speech recognition. From the above done experiments we can thus conclude from forming the Home Automation by using the Banana Pi board and thus we can make the voice recognition along the accessing of the data with the user making it a very effective and efficient manner to maintain the automation remotely. This involves in the accessibility of the applications being much more efficient and easy to use. A large number of people are very timid the first time they have to replace a component in their PC and, in the same way, there is a learning curve to HA. It is evident that the project work that an individual control home automation system can be cheaply made from the low cost locally available components and used to control multifarious home appliances ranging from security lamps to the entire lighting system. The term may be used for isolated programmable devices. Automation is, unsurprisingly, one of the two main characteristics of home automation. Automation refers to the ability to program and schedule events for the devices on the network.

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