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H-Box (Connecting Homes)

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Abstract: *Home automation systems have gained popularity in recent years, paralleling the advances in the concept of the Internet of Things. The current project presents the implementation of an inexpensive home automation system, within the framework of assistive technology. The system implementation is based on the [2]Arduino microcontroller, with IOT[1], mobile communications capability, and it is designed for use by the elderly and people with disabilities. The system is user-friendly, with an intuitive interface implemented on a [3]android based smart phone. Demonstrations show that the system facilitates control of home appliances, lights, heating, cooling systems and security devices by the intended users, i.e., the elderly and the disabled.*

Keywords- [1]IOT (Internet of things), [2]Arduino microcontroller development board, [3] Android (operating system).

1. INTRODUCTION

As we know that it is era of Internet, Internet is one of the popular thing which is easily available and less costly thing. This advantage makes internet very important thing and hence many system trying to use this advantage. IOT (Internet of things) is one of the popular and growing technology. It will defiantly make impact in future. Already many companies' starts using of IOT technology for making their different products and start implementation of this. IOT is useful for decreasing the physical controlling of different systems in order to make connectivity.it helps to decrees manual work and increase the efficiency of any system. Hence in order to use this advantage this system (H-Box) uses this technology.

Homes are important place for human being, it is one of the need of human being. Hence in order to make life easy IOT can help. In this System H-Box interconnection and controlling of two different home possible. This paper introduce a box which performs automation that means without using of physical or manual controlling possible. The two different homes or home-office interconnected with each other and so one who has this system can control the appliances of this two different homes or office. Box is the advanced version of home automation. With the help of internet (cellular data, Wi-Fi, Hotspot, router) long distance controlling is possible.

In previously designed home automation system with help of Bluetooth, RFID etc. are restricted for the distance that means for controlling distance is always short. Also it can control only one homes appliances. A key concept in our system architecture is the use of a mobile phone app to control the services and their use. We use the phone's internet and make app for controlling the Home appliances. Hence in order to overcome all this problems and also to improve the automation in the homes this H-Box will defiantly starts new revolution.

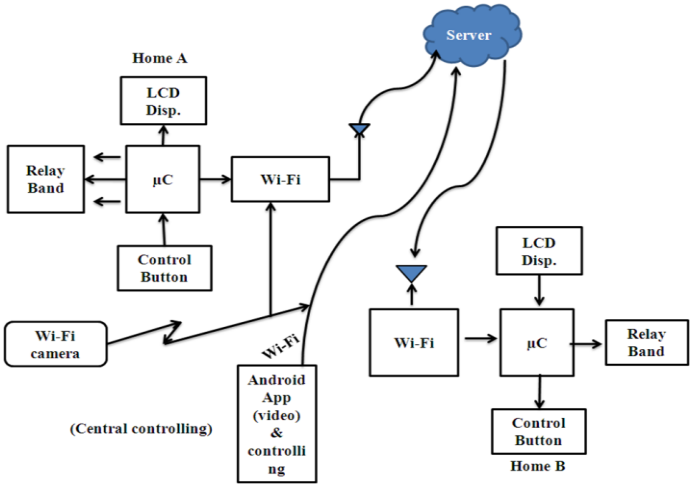

Figure1: Overall block diagram of H-Box (Connecting Homes)

NodeMCU

NodeMCU is an open source IOT platform. It includes firmware which runs on the ESP8266 Wi-Fi SOC(System on Chip) from Espressif Systems, and hardware which is based on the ESP-12 module. The term "NodeMCU" by default refers to the firmware rather than the development kits. The firmware uses the Lua scripting language. It is based on the eLua project, and built on the Espressif Non-OS SDK for ESP8266. It uses many open source projects, such as lua-cjson and spiffs.

Significance of NODMCU: - As NodeMCU is an open source platform which can be used by anybody freely. As it consists of on board Microntroller as well as Wi-Fi Module it is really becomes useful board for connecting with internet tools as well as controlling(microcontroller's work).Due to this for

decreasing or to make a compact system this board make possible.

In H-Box this NodeMcu plays significant role. This board is use for connecting with server. SSid and password of internet source (Hot-spot, router) and also Server's link is provide to this board by programming using arduino compiler. As it connect with the internet it automatically established its connection with server and starts uploading and receiving data. It basically consists of 8 GPIO (General Purpose Input Output) which are useful of interfacing input/output devices.

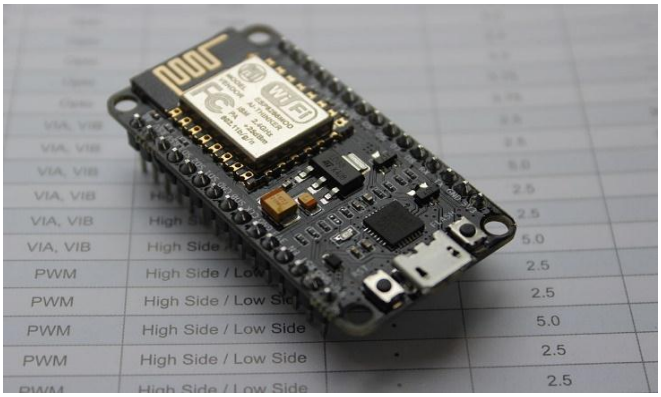

Figure 2: NodeMCU

Arduino

Arduino is a single board microcontroller kit for the creating and building the various digital devices and interactive objects. It can also sense and control objects in the physical and digital world. It comes with different CPU versions such as Atmel AVR(8 bit),ARM Cortex-M0+ and ARM Cortex-M3(32 bits).Arduino boards come with equipped sets of digital and analog input and output pins which can be interfaced to various expansion boards and breadboards. It also has the feature of serial communication (universal serial bus) for loading programs which are typically use the dialect features from the programming languages of C and C++. Arduino provides an integrated development environment (IDE).

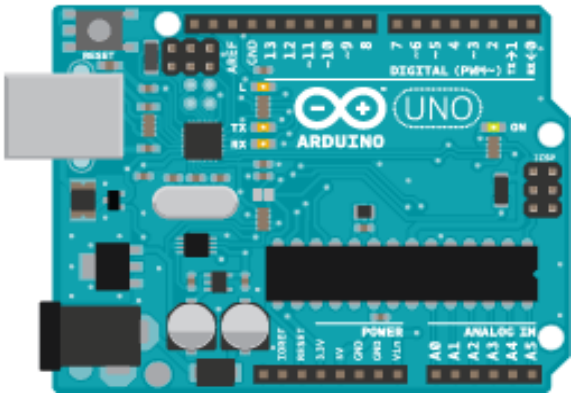

Fig 4: Arduino uno

Android Mobile App

In this H-Box there is one android app which has controlling butrtons for on/off the different applinces which are present in home. As due to use of IOT that means internet hence this app is also connected with server by using mobile's internet connectivity. Hence user can controll his/her homes applinces from anywhere in the world.

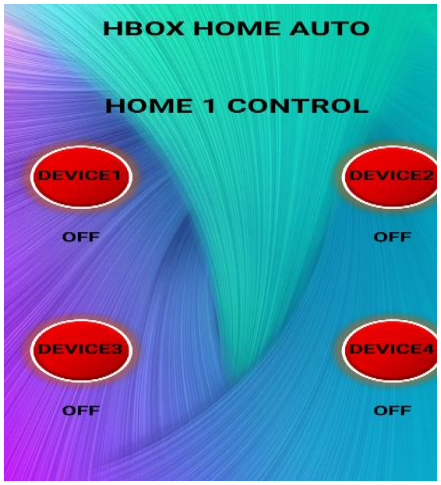

Fig 4: Android app design

Web-Cam

Fig 5: Web cam

A webcam is a video camera that feeds or streams its image in real time to or through a computer to a computer network. When "captured" by the computer, the video stream may be saved, viewed or sent on to other networks via systems such as the internet, and emailed as an attachment. When sent to a remote location, the video stream may be saved, viewed or on sent there. Unlike an IP camera (which connects using Ethernet or Wi-Fi), a webcam is generally connected by a USB cable, or similar cable, or built into computer hardware, such as laptops.

The term "webcam" (a clipped compound) may also be used in its original sense of a video camera connected to the Web continuously for an indefinite time, rather than for a particular session, generally supplying a view for anyone who visits its web page over the Internet. Some of them, for example, those used as online traffic cameras, are expensive, rugged professional video cameras.

2. SYSTEM WORKING

In this H-Box (connecting Homes) basically there is two homes or we can consider it as an office-home. It is one kind of home automation system but we does some modification and also trying to decrease the size of the automation system by using NodeMCU as it looks like a real small box (H-Box). In normal home automation system (GSM based or RF/IR based/Bluetooth based) short distance controlling is possible. In normal home automation system we can only ON/OFF the home appliances or other devices. But in this H-box not only we can control the applinces of one home but also we can control the devices of more than one home. Due to this controlling of more than one home can be possible.

Basically this system has one Android app which has different buttons which use for on/off the applinces.as we consider two homes hence each home consists of Node MCU which has Wi-Fi module so it has ssid and password of internet provider sources so as soon as it connect with the internet then it also connected with server. NodeMCU has on board Microcontroller and also has 8 GPIO pins.so this GPIO pins interface with different devices. As soon as app give signal on server by pressing buttons this signal received by NodeMCU and controller gives signals to appropriate GPIO pin and ON/Off the applinces connected with it.

As both homes has NodeMCU and both has same ssid, password and Server 'links hence these both are gets automatically connected with android mobile app, so user can control both hones and home-office.

One can also connect Web cam in his/her home/office and interface with the NodeMcu and can monitor his/her home/office on directly android app.

3. Result

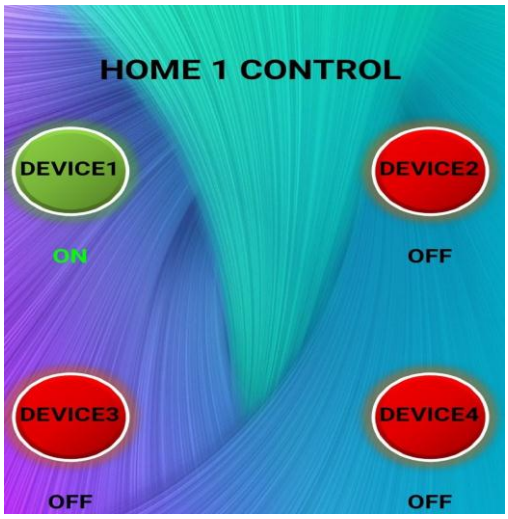

Fig 6 As Android app device 1's button press

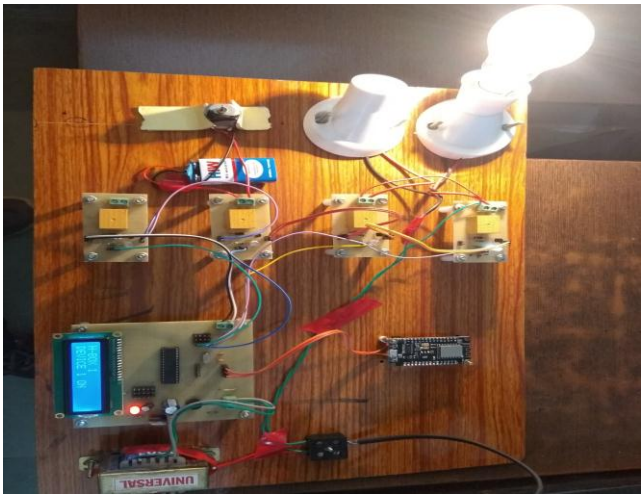

Fig 7 Home 1's Device 1's is ON

4. Conclusion

The home automation using Internet of Things has been experimentally proven to work satisfactorily by connecting simple appliances to it and the appliances were successfully controlled remotely through internet.

5. Future work

Using this system as framework, the system can be expanded to include various other options which could include home security feature like capturing the photo of a person moving around the house and storing it onto the cloud. This will reduce the data storage than using the CCTV camera which will record all the time and stores it. The designed system can be monitors the sensor data, like temperature, gas, light, motion sensors, and the system can be expanded for energy monitoring, or weather stations. This kind of a system with respective changes can be implemented in the hospitals for disable people or in industries where human invasion is impossible or dangerous, and it can also be implemented for environmental monitoring.

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