IOT BASED SMART VOICE AND APP CONTROLLED OFFICE AUTOMATION

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Abstract - This paper presents a low cost and flexible office control and environmental monitoring system. It employs an embedded micro –web server in NODE MCU microcontroller, with IP connectivity for accessing and controlling devices and appliances remotely. These devices can be controlled through a web application or via Bluetooth Android based Smart phone app. The proposed system does not require a dedicated server PC with respect to similar systems and offers a novel communication protocol to monitor and control the home environment with more than just the switching functionality. To demonstrate the feasibility and effectiveness of this system, devices such as light switches, power plug, temperature sensor, gas sensor and motion sensors have been integrated with the proposed home control system. Therefore this systemhas been successfully designed and implemented in real time.

***Key Words*: Node MCU, Blink Android app, WiFi, Relay.**

1. INTRODUCTION

A load controlled by computer systems has many advantages compared with manual controlled loads. Nowadays there are many programs and applications help to control things better using codes or python algorithms in artificial intelligence projects. In order to save energy and make loads monitored easily, this research suggests smart home project based on IoT technology. This smart home is an Internet of Things (IoT) project that controls loads with internet connection via Wireless Fidelity WIFI connection. A smart phone connected to internet with Blynk application as a control panel, and Node MCU microcontroller kit in other side as a controller that receives control commands via WIFI signal. Node MCU kit is built with ESP8266 WIFI receiver that able to process and analyze WIFI signal to input the microcontroller. The WIFI receiver and microcontroller are built in one kit to be used as IoT project. It's called Node MCU. To connect the system to the Internet needs a WiFi receiver. In my case I used ESP8266 that is connected as built-in in the Node MCU board that contains a firmware runs with the ESP8266. The firmware is low-level control computer software. The Node MCU is coded via Arduino Integrated Development Environment (IDE) with the Universal Serial Bus port (USB) to tell the Node MCU what to do, I want to make the Node MCU controls four-channel relay kit by Blynk hand phone application and shows the temperature that measured by LM35 sensor.

1.1. LITERATURE REVIEW

Emerging technologies these days are playing a vital role in making human life automated. In this busy world human beings are absorbed with internet and automated devices. As a consequence automated homes or smart homes have become a buzz word and their implementation is increasing rapidly. Smart office doesn't simply mean communication with hardware devices using internet, it should also include secured linking. We did a good research on the papers on Home/office automation and various designs implemented in the past. Some of the existing designs are briefed here.

1] Kumar Mandula in his paper implemented home automation in two ways using Bluetooth and using Ethernet. Arduino is used for programming and controlling various devices. Bluetooth is for short range communication. So, in smart home implemented using Bluetooth, one can operate the devices from home only within the vicinity of 10-20m.This limitation has been overcome in the next design using Ethernet. This paper discussed only the control of different electronic devices in home using mobile app but it did not include any security features.

2] Mitul Sheth in his project discussed various possible devices that can be connected to Internet using Android App and different modes of using them; manual and automated mode. The Smart Santander Project deployed around 20 thousand sensors for measuring various parameters like temperature, moisture content, to detect levels of CO and NO2 gases for monitoring environment in gardens and parks.

3] In their paper, Tan, Lee and Soh (2002) proposed the development of an Internet-based system to allow monitoring of important process variables from a distributed control system (DCS). This paper proposes hardware and software design considerations which enable the user to access the process variables on the DCS, remotely and effectively.

4] Potamitis, Georgila, Fakotakis, and Kokkinakis, G. (2003) 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 through speech. Voice separation strategy is selected to take appropriate decision by speech recognition.

5] In the year 2006, S. M. Anamul Haque, S. M. Kamruzzaman and Md. Ashraful Islam proposed a system entitled "A System for Smart-Home Control of Appliances Based on Time and Speech Interaction" that controls the home appliances using the personal computer. This system is developed by using the Visual Basic 6.0 as programming language and Microsoft voice engine tools for speech

recognition purpose. Appliances can be either controlled by timer or by voice command.

6] Ciubotaru-Petrescu, Chiciudean, Cioarga, and Stanescu (2006) present a design and implementation of SMS based control for monitoring systems. The paper has three modules involving sensing unit for monitoring the complex applications. A processing unit, that is microcontroller and a communication module that uses GPRS modem or cell phone via serial port RS-232. The SMS is used for status reporting such as power failure.

2. PROPOSED SYSTEM

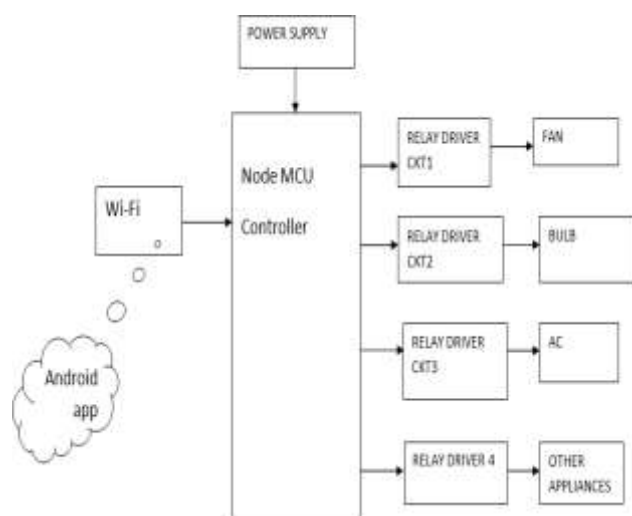Day by day, the field of automation is blooming and these systems are having great impact on human beings.

Fig 1: **Block Diagram of System**

The project which is to be implemented is a home/office automation using Easy IOT Webserver and WIFI and has very good future development. In the current system webserver is installed on a windows PC so the home appliances can be controlled using only by using the device on which webserver is installed. This can be further developed installing webserver on cloud.

Real Time clock based office automation in an advance project to control the devices in timely and systematic manner. The devices can be controlled wirelessly from other places using wireless technology. RTC with EEPROM can record all the working parameters in the devices or appliances. Basically the project is a concept to bring automation in the industry or home. All the home appliances will be controlled by mobile app. The appliances in the office or home will be interfaced with centralized micro controller NODE MCU for the systematic working. The inbuilt RTC and EEPROM present in the controller will be activated for the operation. The controller also interfaced with WIFI to receive the control commands from Wi-Fi shield (Wi-Fi

hotspot). The operator will be provided with Mobile app having Wi-Fi in that. If operator wants to switch the Light to turn on or off he needs to switch control button provided in app. Once he switched the Wi-Fi will send the data to Wi-Fi present at microcontroller. As and when the request is received the microcontroller activates the RTC and EEPROM and as per request received the operation will be done. In the same way all other appliances can be controlled.

A. NODE MCU (esp8266):

NODEMCU (esp8266) has been selected as the controller for this system due to its compact size, compatibility, easy interfacing over several other type of controller including Programmable Integrated Circuit (PIC), Programmable Logic Controller (PLC) and others. ESP8266 is an open source firmware that is built on top of the chip manufacturer's proprietary SDK. The firmware provides a simple programming environment, which is a very simple and fast scripting language TheESP8266 chip incorporates on a standard circuit board. The board has a built-in USB port that is already wired up with the chip, a hardware reset button, Wi-Fi antenna, LED lights, and standard-sized GPIO (General Purpose Input Output) pins that can plug into a bread board.Figure-3shows the diagram of NODEMCU (ESP8266).It has Processor called L106 32bitRISCmicroprocessor core based on the Tensilica Xtensa Diamond Standard 106Micro running at 80MHz and has a memory of 32 Kbit instruction RAM ,32 Kbit instruction cache RAM, 80 Kbit user data RAM&16 Kbit ETS system data RAM. It has inbuilt Wi-Fi module of IEEE 802.11b/g/n Wi-Fi

Fig -2: **Node MCU (esp8266)**

B. RELAY:

Relay is nothing but it is the electromagnetic switch. Relay allows one circuit to switch another circuit while they are separated. Relay is used when we want to use a low voltage circuit to turn ON and OFF the device which required high voltage for its operation. For example, 5V supply connected to the relay is sufficient to drive the bulb operated on 230V AC mains. Relays are available in various configurations of operating voltages like 6V, 9V, 12V, 24V and so on. Relay is divided into two parts, one is input and other is output. Input side is nothing but a coil which generate magnetic field when small input voltage is given to it. Relay having three contactors: Normally closed (NC), normally opened (NO) and

common (COM). By using the proper combinations of the contactors electrical appliances may turn ON or OFF.

Fig -3: **Relay**

C. WiFi MODULE:

WIFI MODULE Expressive Systems Smart Connectivity Platform (ESCP) of high performance wireless SOCs, for mobile platform designers, provides unsurpassed ability to embed Wi-Fi capabilities within other systems, at the lowest cost with the greatest functionality.

D. SOFTWARE DEVELOPMENT:

Arduino software has been used as the interface between software and hardware of this project. Microcontroller needs a program to operate and execute the process associated with proposed design. It is easy to verify and compile after writing the code. The complete flowchart which gives the whole operation of system is shown in figure-6. The focus of this project is to bring automation in home or industries Firstly, the Wi-Fi shield (Wi-Fi hotspot) connect to the existing network infrastructure& it initializing blynk server which is of open source server ,The Wi-Fi module send single to app that provide for the client(operator) indicating system is in online or offline then it check the input-output pins i.e.switch-1,2,3,4,5,6,7,&8.If the client (operator) switches any of the switch the data will be received by blynk server and give status return to the user by display it on LCD provided in app. Lastly, this process is in continues operation the system will loop to the initial condition.

3. CONCLUSIONS:

It is evident from this project work that an individual control office automation system can be cheaply made from low-cost locally available components and can be used to control multifarious office appliances ranging from the security lamps, the fans to the air conditioning system and even the entire office lighting system. And better still, the components required are so small and few that they can be packaged into a small inconspicuous container. The designed office automation system was tested a number of times and certified to control different office appliances used in the lighting system, air conditioning system, office entertainment system and many more . Hence, this system is scalable and flexible.

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