Home Automation Using Node MCU-32S and Blynk App

1Prof. Sandeep Mishra, 2Miss. Jagruti J. Mishra

1Assistant Professor, 2Student
Department of Electronics Engineering, Kalinga University, Raipur, India

Abstract: The overall design of Home Automation System (HAS) implements low cost wireless communication between a Node MCU-32S and an android based application to the Smart Doorbell present at home. It introduces a smart home concept that improves the standard of living at home. The paper is intended to control electrical appliances in a home or office using an android application with relatively low cost design, user-friendly interface and ease of installation. The main control system implements wireless technology to provide remote access from Node MCU-32S. The paper mainly focuses on the monitoring and control of smart home remotely and providing security, when the user is away from home. This paper differentiates itself from others as it has its own software level application to control the home appliances. In this paper android phone is used to control the various parameters using Blynk app.

Keywords: Blynk app, Home Automation System, Node MCU-32S, Smart Security Door Bell

I. INTRODUCTION

An automated home is sometimes called a smart home. Home automation can include the scheduling and automatic operation security systems, lighting, reminder systems and entertainment appliances. The fundamental components of a well-designed home automation system include a computer with the appropriate programming, the various devices and systems to be controlled, interconnecting cables or wireless links, a high-speed Internet connection and essential home systems. The Home Automation project is based on a Node MCU-32S processor, which is supported by 520KB SRAM, 8-bit DAC. This paper comprises of the following functionalities: controlling the lighting, setting alarms and reminders, smart security system and an entertainment system.

The lighting functionality, alarms, reminders and entertainment system can be remotely controlled via Blynk application present on an android device. The android application controls the Node MCU-32S wirelessly to perform the necessary function.

II. METHODOLOGY

Detailed steps with reference to the block diagram

1. Smart Door Bell - The doorbell button is connected to the Node MCU-32S. On pressing the doorbell, resulting a command is initiated at the Node MCU-32S to run, the webcam clicks a picture and send it to the Node MCU-32S. Through message and e-mail both via LAN port connected to the Node MCU-32S.

2. Regulating Appliances - The appliances such as Doorbell lights and fans are connected to the Node MCU-32S Board via GPIO Pins. The Blynk Application present on the mobile phone wirelessly communicates to the Node MCU-32S through the internet. The Node MCU-32S connected to the LAN port receives these commands and runs the scripts which control the appliances to take action accordingly.

3. Wireless Speakers - The Node MCU-32S is connected to the speakers via auxiliary port. The speakers are responsible for the sound output wirelessly. The music is selected from the existing audio clips present within the phone. Upon connecting the phone to the Node MCU-32S via bluetooth, these audio clips can be played wirelessly.
III. HARDWARE REQUIREMENT

(1) Node MCU-32S

![Node MCU-32S](image1)

Node MCU is an open source IOT platform. ESP32 is a series of low cost, low power system-on-chip (SOC) microcontrollers with integrated Wi-Fi & dual-mode Bluetooth. The ESP32 series employs a Ten silica Xtensa LX6 microprocessor in both dual-core and single-core variations, with a clock rate of up to 240 Mhz. The Node MCU is a microcontroller with integrated Wi-Fi, which means that there is no need for an additional Wi-Fi chipset. Today, many retailers offer ESP8266 Breakout boards to facilitate our work. The Node MCU is an easily usable board and it has a variety of pins. It has a USB connection port to connect to the computer.

(2) Webcam

![Webcam with microphone](image2)

We have used a webcam to be set up in front of the main door of the user. The webcam is used to provide the user with a picture to be sent via email when the doorbell is rung. The webcam used by us for this project is a basic webcam with a microphone. The microphone helps the user to talk to the visitor when a call is initiated.

(3) Android Mobile Device

![Android Device](image3)

The android application is downloaded on the android device to provide the user with an interface to interact with the Node MCU-32S. This application allows the user to control the lighting, connect to the speakers via Bluetooth, set alarms and reminders.

(4) Ultra Link 2.0 Multimedia Speakers ULP-SP2W01

![Wired Speakers (Ultra Link 2.0 Multimedia Speakers ULP-SP2W01)](image4)
IV. SOFTWARE REQUIREMENT
IDE: It is an IDE (Integrated Development Environment) that takes codes to be written, compiled and uploaded. Embedded C language, which is used with commodities by any user is wont for the Arduino software. Even for a being new to embedded C, it is elementary to grasp the details, since it is facile to understand. Library files should be installed for sensor deeds and also integration with Blynk app can be made possible.

IOT

The Internet of things (IOT) is the extension of Internet connectivity into physical devices and everyday objects. Embedded with electronics, Internet connectivity, and other forms of hardware (such as sensors), these devices can communicate and interact with others over the Internet, and they can be remotely monitored and controlled. A growing portion of IOT devices are created for consumer use, including connected vehicles, home automation, wearable technology (as part of Internet of Wearable Things (Io WT), connected health, and appliances with remote monitoring capabilities.

BLYNK APP
Blynk is a mobile Platform with IOS and Android apps to control Arduino, Node MCU-32S, Raspberry Pi and the likes over the Internet. It's a digital dashboard where one can build a graphic interface for the project by simply dragging and dropping widgets.

V. HARDWARE IMPLEMENTATION

We connect the Node MCU-32S to the wired speakers. This enables the reminder, alarm and audio speaker functionality.

The project aims at implementing the following:
(1) Smart Door Bell: When the bell is rung, a text message is sent to the owner of the house along with an email containing the picture of the visitor. The system ensures the user is informed about the entrant.
(2) Regulating Appliances: The appliances that fall under this category include fans and lights. The appliances mentioned above can be switched on and off by using the android application.
(3) Wireless Speakers: The system also can act as wireless speakers which can be put to use for multiple purposes.

Here We proposes office appliance automation by using Node MCU-32S microcontroller. A Wi-Fi modem ESP8266 inbuilt on it is used for receiving commands over the internet. The Wi-Fi module receives user commands over the internet. The microprocessor now processes this data and switches the loads through relays. Also it switches the fan, light, Doorbell as per users commands. It also controls the smart doorbell system, webcam system, speakers. When the bell is rung, a text message is sent to the owner of the
house along with an email containing the picture of the visitor. The system ensures the user is informed about the entrant. then it displays the status of the system on mobile screen.

VI. ADVANTAGE
- Security using smart doorbell.
- Music streaming mode via Bluetooth.
- Appliance regulation mode.

CONCLUSION
The proposed system permits the owner or the controller, all the rights to take decisions and to regulate the home appliances with the help of Blynk application. It provides various ways to control the devices in the house, thus making one’s life comfortable and at the same time remotely accessible through portable devices like android phones.

In the future extensions to the project, the smart Door Bell can be made by implementing voice and video calls with the person standing right outside the door and the owner remotely. There by increasing the safety quotient of the system.

REFERENCES
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