

Library Book Management Robot

Submitted in partial fulfilment of the requirements for the award of
Bachelor of Engineering degree in Electronics and Communication Engineering

by

Gokula Krishnan S - 39130162

Harish J K - 39130162



**DEPARTMENT OF ELECTRONICS AND COMMUNICATION
ENGINEERING**

SCHOOL OF ELECTRICAL AND ELECTRONICS

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

Accredited with Grade "A" by NAAC

JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI - 600 119

NOVEMBER - 2022



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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of Gokula Krishnan S (39130144) and Harish J K (39130162) who carried out the project entitled "Library Book Management Robot" under our supervision from July 2022 to November 2022.

Internal Guide


Dr. E. ANNA DEVI, M.E., Ph.D.,

Head of the Department


Dr. T. RAVI, M.E., Ph.D.,

Submitted for Viva voce Examination held on 24/04/2023



Internal Examiner



External Examiner

DECLARATION

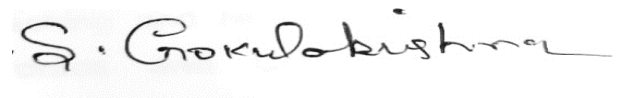
We, GOKULA KRISHNAN S (39130144) and HARISH J.K(39130162) hereby declare that the Project Report entitled “LIBRARY BOOK MANAGEMENT ROBOT” done by us under the guidance of Dr.E.ANNA DEVI M.E.,Ph.D,. Associate professor, Dept. of Electronics and Communication Engineering, SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY, CHENNAI, is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Electronics and Communication Engineering.

DATE : 24/04/2023

PLACE : Chennai

SIGNATURE OF THE CANDIDATE(S)

1.

Handwritten signature of S. Gokulakrishnan in black ink.

2. J. K. HARISH

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CHAPTER - 1

INTRODUCTION

1.1 General:

A library is a collection of materials, books, or media that are accessible for use and not just for display purposes. A library provides physical (hard copies) or digital access (soft copies) materials and maybe a physical location or a virtual space, or both. A library's collection can include printed materials and other physical resources in many formats such as DVD, CD, and cassette as well as access to information, music or other content held on bibliographic databases. A library, which may vary widely in size, may be organized for use, and maintained by a public body such as a government; an institution such as a school or museum; a corporation; or a private individual. In addition to providing materials, libraries also provide the services of librarians who are trained and experts at finding, selecting, circulating, and organizing information and at interpreting information needs, navigating, and analyzing very large amounts of information with a variety of resources.



Figure 1.1 – Pictorial View of Book Stack

Library buildings often provide quiet areas for studying, as well as common areas for group study and collaboration, and may provide public facilities for access to their electronic resources; for instance: computers and access to the Internet. The library's clientele and services offered vary depending on its type: users of a public library have different needs from those of a special library or academic library, for example. Libraries may also be community hubs, where programs are delivered and people engage in lifelong learning. Modern libraries extend their services beyond the

physical walls of a building by providing material accessible by electronic means, including from home via the Internet. The services the library offers are variously described as library services, information services, or the combination of "library and information services", although different institutions and sources define such terminology differently.

1.2 Role of Librarian in Book Stacking:

A librarian is a person who looks after the storage and retrieval of information. In a workplace, the librarian is usually a professional who is trained and educated to deal with information in a wide variety of formats and settings” Librarian helps users to navigate the voyage of the internet and evaluate information efficiently. Librarian offers a helping hand for users to find out the required piece of information and to use it for personal and professional purposes (BLS, 2011).

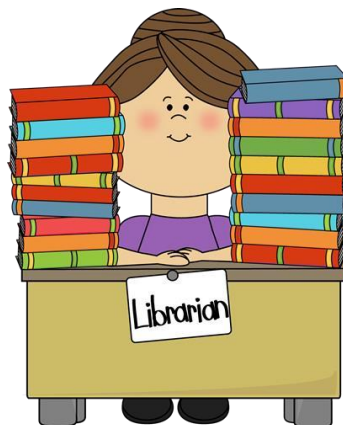


Figure 1.2 – Role of Librarian

Due to the advent of the Internet, the World Wide Web, and the proliferation of online catalogs, the role of the librarian has changed. Now he is more efficient and has new roles as an intermediary, facilitator, end-user trainer/educator, web organizer & designer, researcher, interface designer, knowledge manager/professional, and sifter of information resources (Rao & Babu, 2001). Librarians should be knowledgeable in a variety of information sources and follow the new trends and advancements in computers, media, and publishing

1.3 Abstract

Robots are used for various purposes in day-to-day life. With ever growing technology and competition there is a desire for doing work in less time, also considering economy in the equation. Keeping this into consideration this project aims at minimizing the efforts required to arrange books in a library. A library generally consists of thousands of books and there are two or three employees to arrange them. The Library Management Robot (LMR) will mitigate the problems by collecting the books from library counter and then arranging the books, one by one, into shelves. The LMR works on general principle of RFID, Line following and kinematics of robotic arm. The LMR will initially scan the RFID tag of a book and then find its shelf according to the data previously fed into it. Then it will travel to the shelf according to the path following the lines made on the floor of library. After reaching the shelf, LMR will pick the book and place it in the respective rack in the shelf. The same procedure will be repeated for every book. The robot consists of a microprocessor (ATmega328), two motors for locomotion, four different motors for arm, RFID reader and proximity sensors for gathering surrounding information. This project will definitely prove helpful for library enabling them to work efficiently and eliminating problem like misplacing of books.

1.4 Problems Faced by Librarians:

One of our consistently popular posts over the years has been **10 Challenges Librarians Are Facing**,

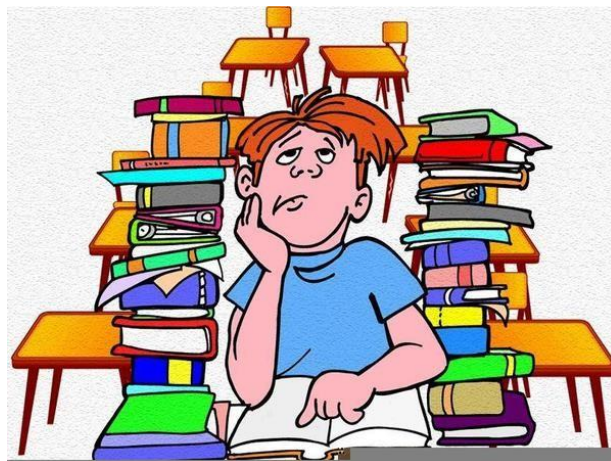


Figure 1.3 - Problems Faced by Librarians

1. Budget

Budget issues remained the top challenge for librarians at the *Academic Library* conference and across the globe. This includes: competing for funding, growing the library's resources within allocated means, and defending the number of library resources.

2. Communicating about changes in the library

Changes are inevitable in this digital age but communicating these changes and getting the necessary support for communications is challenging as there are typically many stakeholders involved in the process.

3. Declining patron requests for content

The need to validate library purchases and tight budgets often force librarians to decline patrons' requests for content.

4. Career advancement

Equipping librarians with the skills they now need is imperative. Job training and career advancement opportunities are vital in helping librarians overcome the challenges they face at work. New and emerging competencies which were not required five to ten years ago, such as data visualization and communication skills, are now required for librarians to become effective at what they do.

5. Keeping up with changing technical requirements

Technology and the internet have had a huge impact on the library and the way it delivers services. The rapid digitization of information has impacted operations and systems in libraries within a very short span of time, resulting in gaps in the skills needed to operate a digital library.

6. Understanding research trends & the librarian's role in the research cycle

The role a librarian plays in the process of connecting users to information goes beyond making content discoverable. New skill sets such as data management are necessary for librarians to stay ahead of research trends and provide users with the most relevant content in this era of information overload.

7. Staying current on policy changes

The complicated nature of the industry means librarians have to constantly keep abreast of new developments and policies in the scholarly publishing space. It is

not easy to decipher the regulations and understand how the changes will affect the library landscape.

8. Managing library operations and tracking staff performance

The complex scholarly publishing network, coupled with increasing pressure to demonstrate the library's value, makes the management of library operations and staff performance tracking an ongoing challenge for librarians.

9. Conveying the value of librarians to researchers

Changes in the scholarly publishing space have redefined the roles of librarians, extending far beyond content curation. While this is happening, librarians are finding it a challenge to communicate the value of their work to their constituencies.

10. Managing the continuous transition from a print to a digital-based collection

The transition from 'print to digital has been one of the longest-standing conversations in the library. On top of managing this transition, librarians are also participating in the dialogue around transforming the physical space in the library to foster better collaboration and accommodate other activities.

1.5 Motivation Behind Our Project

After a brief analysis of the problems and role of libraries and librarians, we decided to use the latest technology to find a solution for one of the major problems faced by librarians in the book stacking process. As discussed in our thesis one of the most common and major problems is rearranging the stack with the books and finding the correct book match according to the department

1.6 PROJECT Scope and OBJECTIVES:

1. Primary objective of our project is to support the role of librarians
2. To implement a stacking process based on QR codes or with RFID tags
3. Fully automated book stacking process based on the information retrieved from book codes

4. Reduce the work pressure and increase the system preference and precision of work
5. To save time with a minimal energy source



Figure 1.4 – Project Scope and Objective

CHAPTER - 2

LITERATURE REVIEW

2.1 INTRODUCTION

The following shows a survey done for analyzing the role of self-operated robots used in machinery in industries to reduce manpower. Data encryption and decryption will be safe and reliable since we have planned to use QR codes and or RFID tags to sort the process. This system is reliable to integrate on multiple platforms with the help of ESP32 master which serves as standard firmware. Further, the study was extended to multiple operation platforms like Linux, Windows, and IOS are discussed as follows. In this detailed survey, we have learned a lot in stabilizing our concepts from the existing feedback mechanisms that were designed in the previous study.

2.2 LITERATURE SURVEY

2.2.1 Satyendra K. et al

This paper presents a step-by-step procedure for a smart warehouse automation controller. It uses IoT to convert home appliances to smart and intelligent devices, with the help of design control. An energy-efficient system is designed that accesses the smart home remotely using IoT connectivity. The proposed system mainly requires, Node MCU as the microcontroller unit, IFTTT to interpret voice commands, Adafruit a library that supports MQTT acts as an MQTT broker, and Arduino IDE to code the microcontroller. This multimodal system uses Google Assistant along with a web-based application to control the smart home. The smart warehouse is implemented with the main control unit that is connected to the 24-hour available Wi-Fi network. To ensure, that the Wi-Fi connection does not turn off, the main controller is programmed to establish an automatic connection with the available network and connected to the auto power backup.

2.2.2 Shardha Somani et al

This paper focuses on a system that provides features of automated book sorting. Automation relies on IoT to operate easily, in addition, it includes a camera module to gather QR codes for sorting the books. The android application basically converts smartphones into a remote for all home appliances. Security is achieved with motion sensors if movement is sensed at the entrance of the house; a notification is sent that contains a photo of the house entrance in real-time. This notification will be received by the owner of the house via the internet such that the app can trigger a notification. So, the owner can raise an alarm in case of any intrusion or he/she can toggle the appliances like opening the door if the person is a guest. The system uses Raspberry Pi, a small-sized computer that acts as a server for the system. The smart home consists of two modules. Home automation consists; of a fanlight and door controller, and a security module that consists; of a smoke sensor motion sensor, and camera module.

2.2.3 Tui-Yi Yang, et al

This paper proposes an optimization of sorting power consumption based on PLC (Power Line Communication) for easy-to-access energy consumption. This also proposes a Zigbee and PLC-based renewable energy gateway to monitor the energy generation of renewable energies. ACS and DDEM algorithms are proposed for the design of intelligent distribution of power management systems to make sure ongoing power supply of home networks. To provide efficient power management the power supply models of home sensor networks are classified into groups viz. main supply only, main supply and backup battery, rechargeable battery power, and non-rechargeable battery power. Devices with particular features are assigned to these groups. It targets establishing a real-time processing scheme to address variable sensor network topologies.

2.2.4 Tushar Chaurasia, etal

This paper proposes a system that develops a model to reduce the computation overhead in existing smart home solutions that use various encryption technologies like AES, ECHD, hybrid, etc. these solutions use an intermediate gateway for connecting various sensor devices. The proposed model provides a method for automation with sensor-based learning. The system uses a temperature sensor for development but other sensors can also be used as per requirement.

These smart home devices with sensors can configure themselves autonomously and can operate without human intervention. This work minimizes encryption decryption and focuses on authentication and automation of smart home devices with learning. The system bypasses the local gateway mentioned in the existing system to provide better security for smart home devices and sensor data and save computation overhead. The real-time broker cloud is directly connected to the smart home and manages all incoming and outgoing requests between users and devices. The main purpose to use a real-time broker cloud saves time for cryptographic operations.

2.2.5 Suraj, Ish Kool, etal

The paper presents a vision-based machine intelligence system to sense the on/off state of common homeappliances. The proposed method of sensing the state of appliances results in a novel home automation system. The accessibility of the suite of devices in the home over a remote network is facilitated by the IP Addressing methods in the IoT. This project uses two boards viz. Raspberry Pi and Intel Galileo Gen 2. The communication between the User devices, Raspberry Pi, and the Intel Galileo boards happens over a wireless network. The UDP protocol is deployed to facilitate the wireless communication of the nodes present in the home automation network. A Pi Cam and a USBLogitech camera are attached to the rotating shaft of two different servo motor capture snapshots that are passed as inputs to the Machine Learning based models trained using dlib-C++ to detect the stateof the operation of

the appliances. The proposed method uses visual modality to automate the appliances, as privacy concerns may emerge while using the images from some specific places, as a counter to this issue, an SPDT switch is added to the Raspberry Pi which when turned off ensures that even if the images are taken from the webcams, they are just passed as inputs to the machine learning models and are not displayed on the website when the users access the website on the server address obtained from Raspberry Pi.

2.2.6 Vikram N, etal

This paper illustrates a methodology to provide a low-cost Home Automation System (HAS) using Wireless Fidelity (Wi-Fi). This crystallizes the concept of internetworking of smart devices. A Wi-Fi-based Wireless Sensor Network (WSN) is designed for the purpose of monitoring and controlling the environmental, safety, and electrical parameters of a smart interconnected home. The different sections of the HAS are; the temperature and humidity sensor, gas leakage warning system, fire alarm system, burglar alarm system, rain-sensing, switching and regulation of load & voltage, and current sensing. The primary requirement of HAS to monitor and control devices is accomplished using a Smartphone application. The application is developed using Android Studio based on the JAVA platform and the User Interface is exemplified. The primary focus of the paper is to develop a solution cost-effective and flexible in the control of devices and implements a wide range of sensors to capture various parameters.

CHAPTER - 3

SYSTEM ANALYSIS

3.1 ESP32 MASTER

NodeMCU ESP32 (Node Microcontroller Unit) is a low-cost open-source IoT platform. It initially included firmware that runs on the ESP8266 Wi-Fi SoC from Espressif Systems and hardware that was based on the ESP-12 module. Later, support for the ESP32 32-bit MCU was added. NodeMCU-based ESP32 is an open-source firmware for which open-source prototyping board designs are available. The name “NodeMCU” combines “node” and “MCU” (micro-controller unit). The term “NodeMCU” strictly speaking refers to the firmware rather than the associated development kits. Both the firmware and prototyping board designs are open source. The firmware uses the Lua scripting language. The firmware is based on the project and built on the Espressif Non-OS SDK for ESP8266. It uses many projects, such as a- JSON and SPIFFS. Due to resource constraints, users need to select the modules relevant to their project and build firmware tailored to their needs. Support for the 32-bit ESP32 has also been implemented. The prototyping hardware typically used is a circuit board functioning as a dual in-line package (DIP) which integrates a USB controller with a smaller surface-mounted board containing the MCU and antenna. The choice of the DIP format allows for easy prototyping on breadboards. The design was initially based on the ESP-12 module of the ESP8266, which is a Wi-Fi SoC integrated with a Tensilica Xtensa LX106 core, widely used in IoT applications.



Figure 3.1 ESP32 Master Development Board

3.1.1 Pin Configuration of ESP32 Development Board

This module provides an access to the GPIO subsystem. All the access is based on the I/O index number of Node MCU kits, not the internal GPIO pins. For example, the D0 pin on the development kit is mapped to GPIO pin 16. Node MCU provides access to the GPIO pins and the following pin mapping table is a part of the API documentation.

Specifications	ESP8266	ESP32
MCU	Xtensa® Single-Core 32-bit L106	Xtensa® Dual-Core 32-bit LX6 600 DMIPS
802.11 b/g/n Wi-Fi	Yes, HT20	Yes, HT40
Bluetooth	None	Bluetooth 4.2 and below
Typical Frequency	80 MHz	160 MHz
SRAM	160 kBytes	512 kBytes
Flash	SPI Flash , up to 16 MBytes	SPI Flash , up to 16 MBytes
GPIO	17	36
Hardware / Software PWM	None / 8 Channels	1 / 16 Channels
SPI / I2C / I2S / UART	2/1/2/2	4/2/2/2
ADC	10-bit	12-bit
CAN	None	1
Ethernet MAC Interface	None	1
Touch Sensor	None	Yes
Temperature Sensor	None	Yes
Working Temperature	- 40°C ~ 125°C	- 40°C ~ 125°C

Figure 3.2 ESP8266 (vs) ESP32 Master Development Board Chart

D0 (GPIO16) can only be used for GPIO read/write. It does not support open-drain/interrupt/PWM/I²C or 1-Wire. The ESP32 Node MCU has a total of 30 pins that interface it to the outside world. The pins are grouped by their functionality as:

1. Power pins:

There are four power pins viz. one VIN pin & three 3.3V pins. The VIN pin can be used to directly supply the ESP8266 and its peripherals if you have a regulated 5V voltage source. The 3.3V pins are the output of an onboard voltage regulator. These pins can be used to supply power to external components.

2. GND:

Is it a ground pin of the ESP8266 Node MCU development board?

3. I2C Pins:

Are used to hook up all sorts of I2C sensors and peripherals in your project. Both I2C Master and I2C Slave are supported. I2C interface functionality can be realized

programmatically, and the clock frequency is 100 kHz at a maximum. It should be noted that the I2C clock frequency should be higher than the slowest clock frequency of the slave device.

4. GPIO Pins:

ESP8266 Node MCU has 17 GPIO pins that can be assigned to various functions such as I2C, I2S, UART, PWM, IR Remote Control, LED Light, and Button programmatically. Each digital-enabled GPIO can be configured to internal pull-up or pull-down, or set to high impedance. When configured as an input, it can also be set to edge-trigger or level-trigger to generate CPU interrupts.

5. ADC Channel:

The Node MCU is embedded with a 10-bit precision SAR ADC. The two functions can be implemented using ADC viz. Testing power supply voltage of VDD3P3 pin and testing input voltage of TOUT pin. However, they cannot be implemented at the same time.

6. UART Pins:

ESP8266 Node MCU has 2 UART interfaces, i.e., UART0 and UART1, which provide asynchronous communication (RS232 and RS485) and can communicate at up to 4.5 Mbps. UART0 (TXD0, RXD0, RST0 & CTS0 pins) can be used for communication. It supports flow control. However, UART1 (TXD1 pin) features only data transmit signal so, it is usually used for printing logs.

7. SPI Pins:

ESP8266 features two SPIs (SPI and HSPI) in slave and master modes. These SPIs also support the following general-purpose SPI features:

- 1) 4 timing modes of the SPI format transfer
- 2) Up to 80 MHz and the divided clocks of 80 MHz
- 3) Up to 64-Byte FIFO

8. SDIO Pins:

ESP8266 features a Secure Digital Input/Output Interface (SDIO) which is used to directly interface SD cards. 4-bit 25 MHz SDIO v1.1 and 4-bit 50 MHz SDIO v2.0 are supported.

9. PWM Pins:

The board has 4 channels of Pulse Width Modulation (PWM). The PWM output can be implemented programmatically and used for driving digital motors and LEDs. PWM frequency range is adjustable from 1000 μ s to 10000 μ s, i.e., between 100 Hz and 1 kHz.

10. Control Pins:

Are used to control ESP8266. These pins include the Chip Enable pin (EN), Reset pin (RST), and WAKE pin.

- 1) EN pin - The ESP8266 chip is enabled when the EN pin is pulled HIGH. When pulled LOW the chip works at minimum power.
- 2) RST pin - RST pin is used to reset the ESP8266 chip.
- 3) WAKE pin - A wake pin is used to wake the chip from a deep sleep.

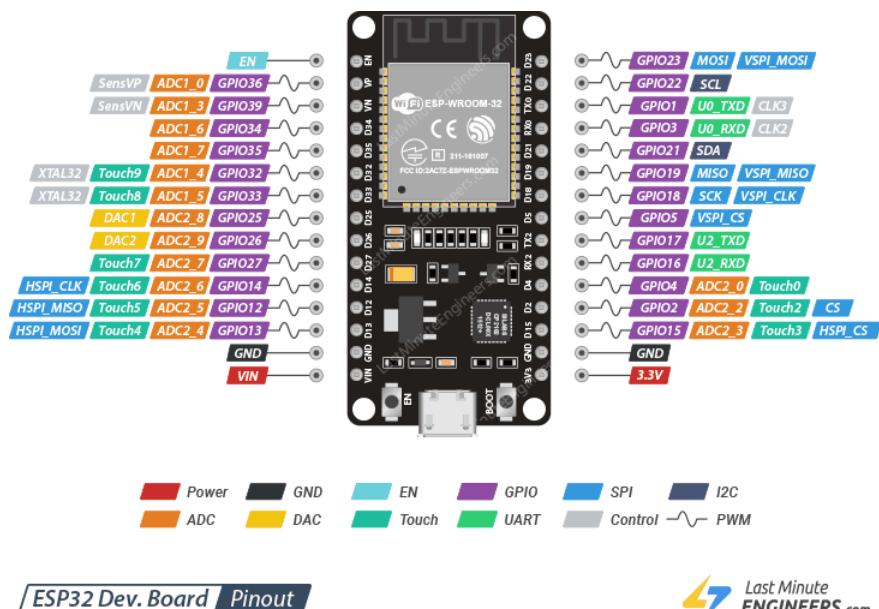


Figure 3.3 ESP32 Dev. Board Master Pinout

3.1.2 ESP 32-E Module

The development board equips the ESP-12E module containing an ESP8266

chip having Tensilica Xtensa® 32-bit LX106 RISC microprocessor which operates at 80 to 160 MHz adjustable clock frequency and supports RTOS. There's also 128 KB RAM and 4MB of Flash memory (for program and data storage) just enough to cope with the large strings that make up web pages, JSON/XML data, and everything we throw at IoT devices nowadays.

The ESP8266 Integrates an 802.11b/g/n HT40 Wi-Fi transceiver, so it can not only connect to a Wi-Fi network and interact with the Internet, but it can also set up a network of its own, allowing other devices to connect directly to it. This makes the ESP8266 Node MCU even more versatile.

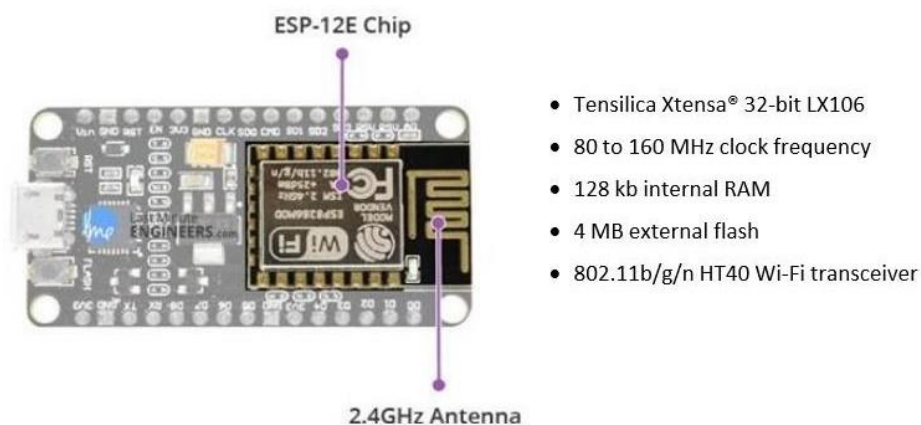


Figure 3.4 ESP 32E Module in ESP32 Master Development Board

3.1.3 Power Requirements

As the operating voltage range of ESP8266 is 3V to 3.6V, the board comes with a LDO voltage regulator to keep the voltage steady at 3.3V. It can reliably supply up to 600mA, which should be more than enough when ESP8266 pulls as much as 80mA during RF transmissions. The output of the regulator is also broken out to one of the sides of the board and labeled as 3V3. This pin can be used to supply power to external components. Power to the ESP8266 Node MCU is supplied via the onboard Micro B USB connector. Alternatively, if you have a regulated 5V voltage source, the VIN pin can be used to directly supply the ESP8266 and its peripherals.

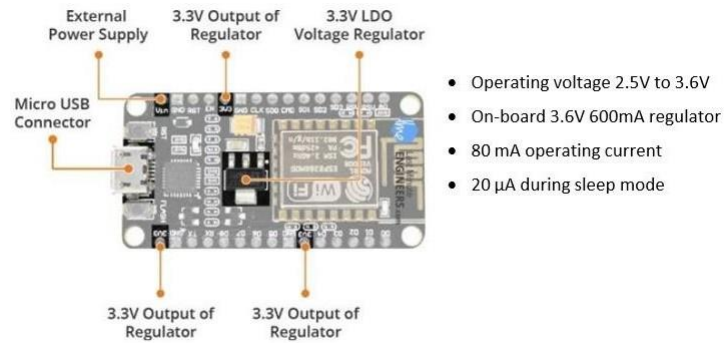


Figure 3.5 Power Module on an ESP32 Master Development Board

3.1.4 Peripheral I/O

The ESP8266 Node MCU has total 17 GPIO pins broken out to the pin headers on both sides of the development board. These pins can be assigned to all sorts of peripheral duties, including:

- 1) ADC channel - A 10-bit ADC channel.
- 2) UART interface - UART interface is used to load code serially.
- 3) PWM outputs - PWM pins for dimming LEDs or controlling motors.
- 4) SPI, I2C & I2S interface - SPI and I2C interface to hook up all sorts of sensors and peripherals.
- 5) I2S interface - I2S interface if you want to add sound to your project.

As a result of the pin multiplexing feature (Multiple peripherals multiplexed on a single GPIO pin), a single GPIO pin can act as PWM/UART/SPI.

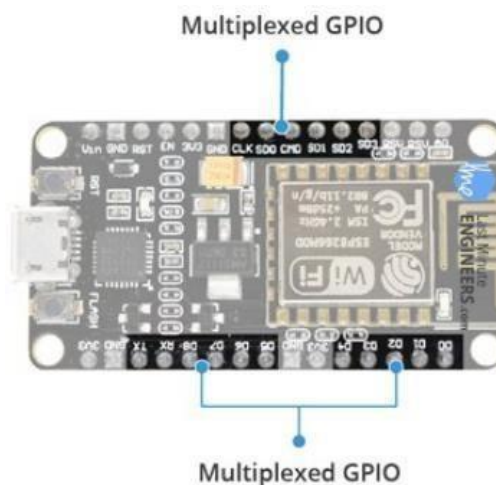


Figure 3.6 GPIO Pins on ESP32 Master Development Board

3.1.5 On-Board Switches and LED Indicators

The ESP8266 Node MCU features two buttons. One marked as RST located on the top left corner is the Reset button, used of course to reset the ESP8266 chip. The other FLASH button on the bottom left corner is the download button used while upgrading firmware. The board also has a LED indicator that is user programmable and is connected to the D0 pin of the board.

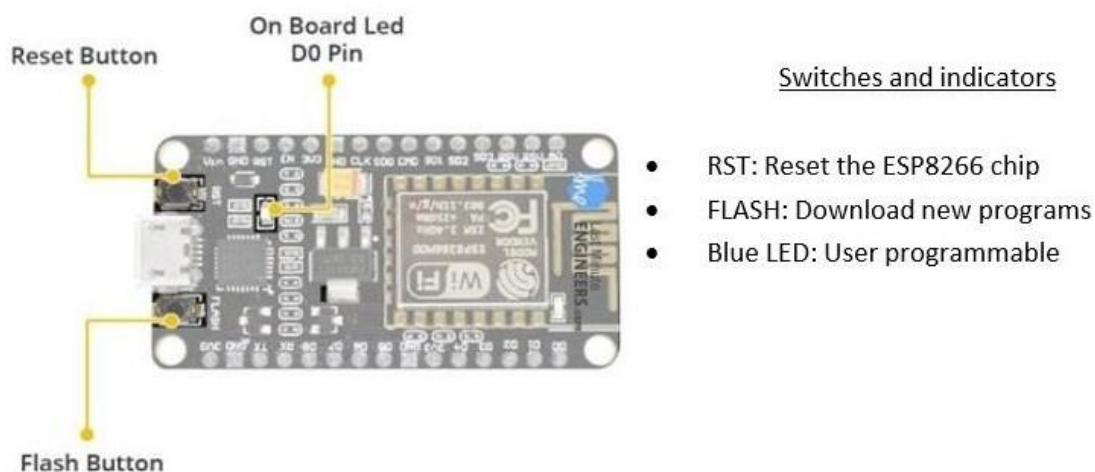


Figure 3.7 On-Board Switches and LED Indicators

3.1.6 Serial Communication

The board includes a CP2102 USB-to-UART Bridge Controller from Silicon Labs, which converts USB signal to serial and allows your computer to program and communicate with the ESP8266 chip.

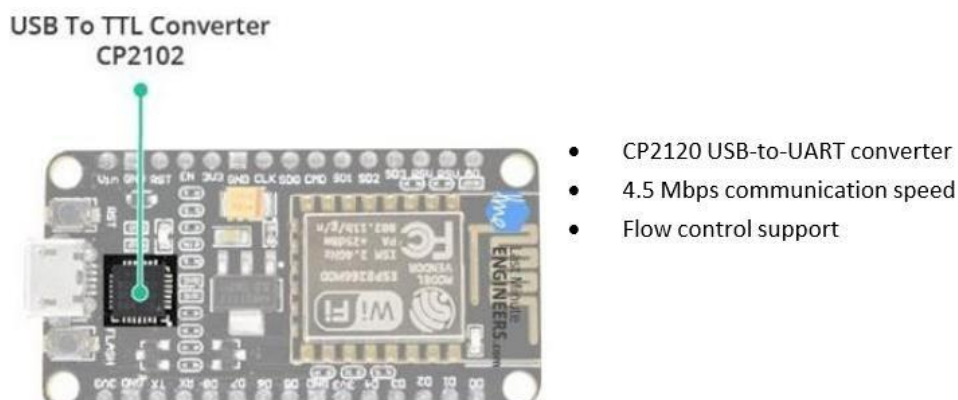


Figure 3.8 CP2102 on Board ESP32 Master Development Board

3.1.7 Installation of ESP32 Master

Mostly these days devices download and install drivers on their own, automatically. Windows don't know how to talk to the USB driver on the Node MCU so it can't figure out that the board is a Node MCU and proceed normally. Node MCU Amica is an ESP8266 Wi-Fi module-based development board. It has got a Micro USB slot that can directly be connected to the computer or other USB host devices. It has got 15X2 header pins and a Micro USB slot, the headers can be mounted on a breadboard and the Micro USB slot is to establish a connection to the USB host device. It has CP2120 USB to serial converter. In order to install CP2120 (USB to serial converter), the user is needed to download the driver for the same. Once a user downloads drivers as per its respective operating system, the system establishes a connection to Node MCU. The user needs to note down the COM port allotted to the newlyconnected USB device (Node MCU) from the device manager of the system. This com port number will be required while using Node MCU Amica. As the CP2120 driver is been installed, the Node MCU can be programmed using Arduino IDE software by coding in embedded C. this requires ESP8266 board installation in Arduino IDE from the board manager and assigning communication port.

3.2 BLOCK DIAGRAM

The block diagram gives the functionality of the overall project. The Node MCU unit is the microcontroller or the main controlling unit of the system. The user uses the mobile application in setting commands for the functioning of the appliances. The mobile application interprets the commandform in the user in voice or switch mode and sends a signal to the Node MCU unit, over a wireless network established by Wi-Fi communication. Hence the Wi-Fi module (actually inbuilt into Node MCU), helps the microcontroller establish Wi-Fi communication with a device and take commands from an application over the wireless network. The Node MCU further receives the signal and then turns on/off the appliance with the help of the relay. The Node MCU, relay, and final appliances are physically connected. There is a power supply unit that powers the microcontroller, the relay as well as the final appliances. There is also a display

unit that displays the status of the application.

3.2.1 Proposed System

The Android OS provides the flexibility of using the open-source. The inbuilt sensors can be accessed easily. The application used to control the system has the following features. Android Phone acts as a client and data are sent via sockets programming. The application takes commands from the user in two different modes.

1. **Switch mode:** Switch mode uses the radio buttons that are used to control the home appliances. The radio button sends the status of the switch.
2. **BLYNK mode:** Through this Mode is used to control the home appliances using voice commands. Using the inbuilt microphone of the Smartphone, the application creates an intent that fetches the speech data to the Google server which response with string data. The string data are further analyzed and then processed.

A more detailed discussion about the modes of control and how they actually control the system is discussed in the coming chapters

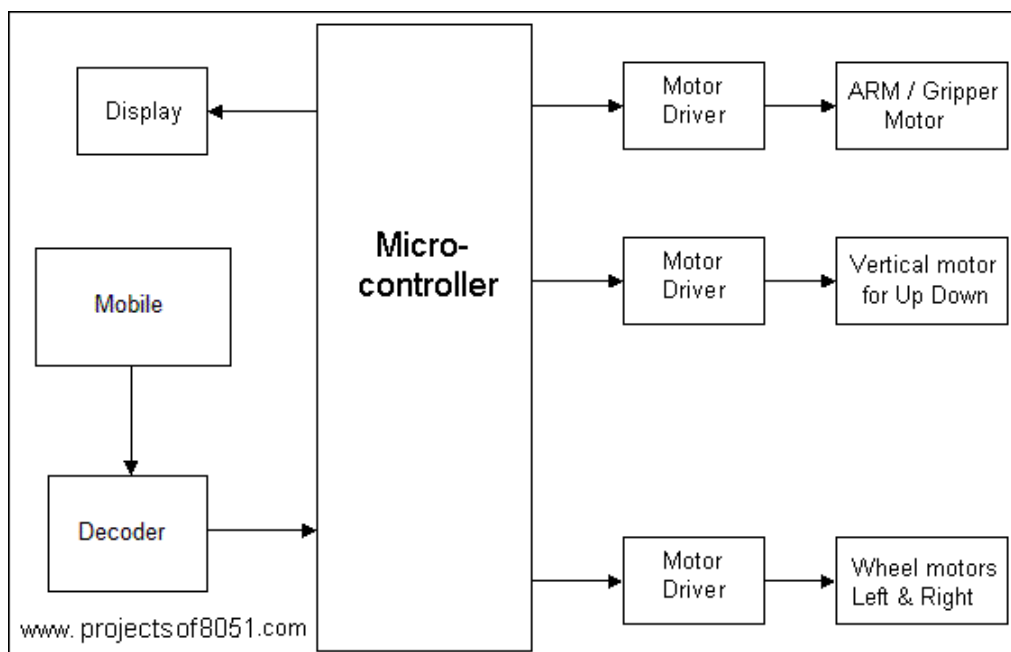


Figure 3.9 Block Diagram of Proposed System

3.3 OVERVIEW OF THE PROJECT.:

The following describes the process of creating an account in the Blynk application and generating a unique ID against a particular device. This ID acts as an identifier for the particular device on the Blynk server. Once the unique ID is generated the next step would be to include this key into the coding written in embedded C to establish communication between Node MCU and Blynk Server.

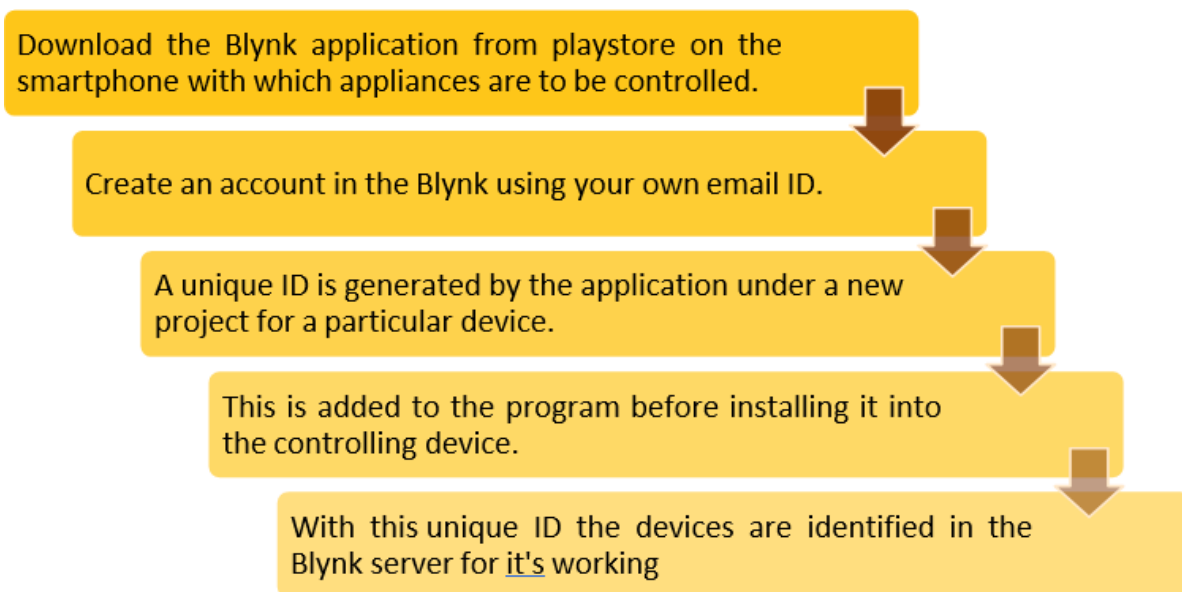


Figure 3.10 Creating an account and generating a unique ID in BLYNK Server

Once the unique ID is generated the next step would be to include this key into the coding written in embedded C to establish communication between Node MCU and BlynkServer.

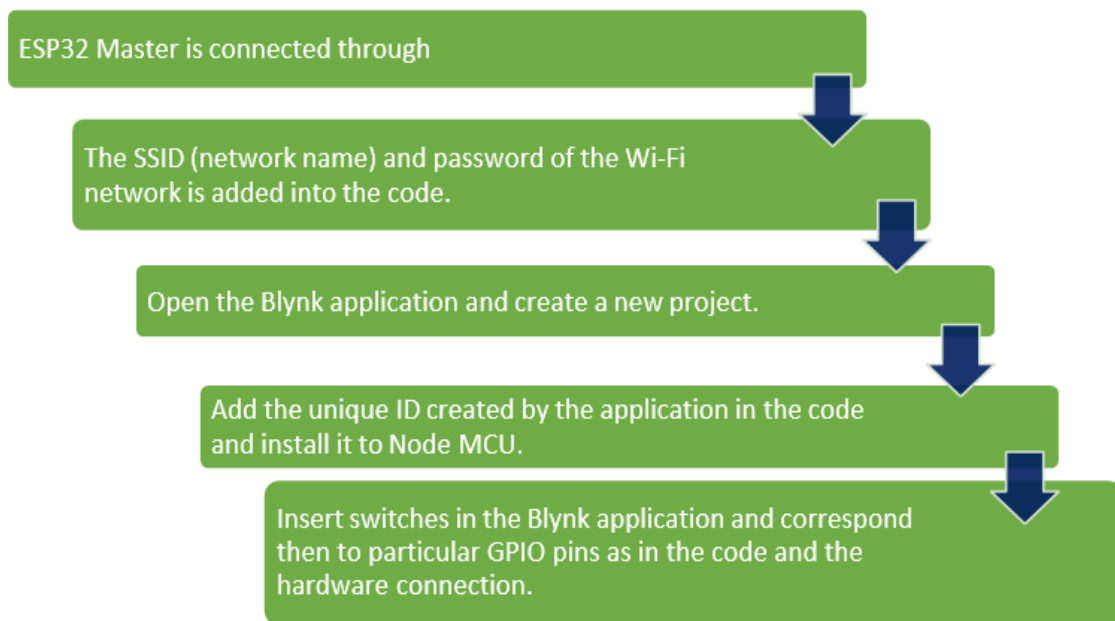
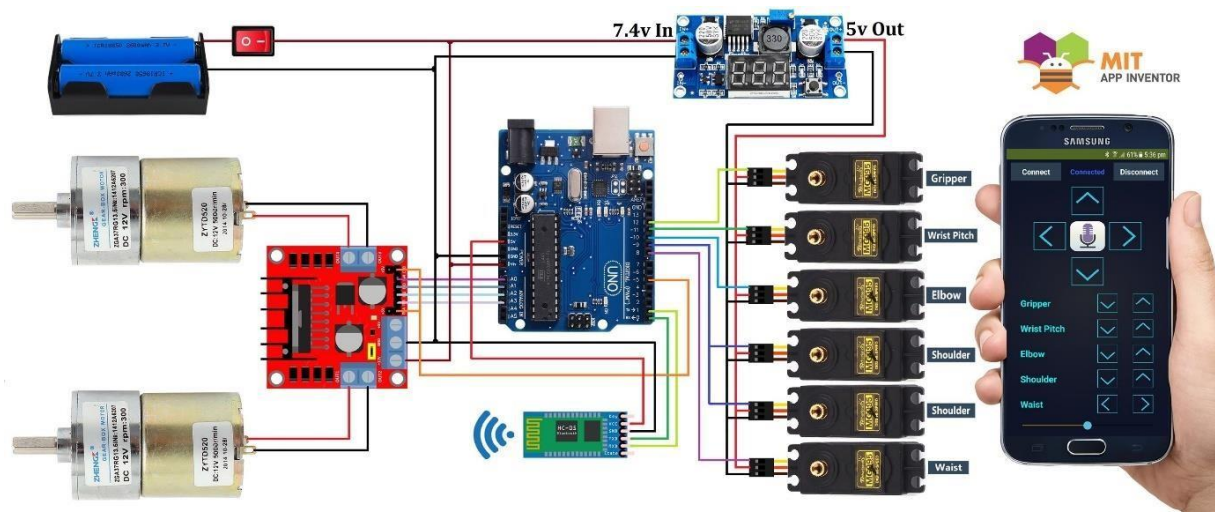


Figure 3.11 Setup to Control ESP32 Master from Blynk Application

3.4 CIRCUIT DIAGRAM:



F.1figure 3.12 Connection Diagram of ESP32 Master 4 Channel Relay Module

Existing System

There are different types of systems are existing now. They are all used for the

automated book management system.



Figure 3.13 Existing model ¹robot

Proposed Methodology

In our proposed model we use the concept of limit switch to find the proper positions of data and book allocation unit. Here the data all united to a single soc system while moving from the book stack to the reallocation stack. Progress will be précised since we use the concept of QR codes to find the book shelves

Advantages of Proposed System

1. Effective space management
2. Semi-Automated work of Librarians
3. Reduces the existing complexity of the system
4. Can be implement with little investments
5. Maintenance will be too low to manage the centralized libraries

CHAPTER 4

RESULT

After the complete fabrication of proto type library management robot. We conduct actual testing of robot, we found that less time is required to search and locate the book, when we scanned required book barcode tag and positioning before doing work through pre program micro controller command to judge within two-three second and pick and place the book within 5 minute, its depend upon library layout as compared to manual operation.

CHAPTER 5

Conclusion

This website provides a computerized version of library management system which will benefit the students as well as the staff of the library. It makes entire process online where student can search books, staff can generate reports and do book transactions. It also has a facility for student login where student can login and can see status of books issued as well request for book or give some suggestions. It has a facility of teacher's login where teachers can add lectures notes and give necessary suggestion to library and also add info about workshops or events happening in our college or nearby college in the online notice board.

Future Scope

There is a future scope of this facility that many more features such as online lectures video tutorials can be added by teachers as well as online assignments submission facility, a feature Of group chat where students can discuss various issues of engineering can be added to this project thus making it more interactive more user friendly and project which fulfills each users need in the best way possible.

CHAPTER 6

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