MEDICINE DISPENSOR SYSTEM

A MINI PROJECT REPORT

Submitted by

MUHAMMED AFRIN MUHAYIDHEEN

(VJC21EC041)

MATHEWS ROY

(VJC21EC039)

NEVIN VINOD

(VJC21EC045)

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of

Bachelor of Technology in

Electronics and Communication Engineering

Department of Electronics and Communication Engineering

VISWAJYOTHI COLLEGE OF ENGINEERING & TECHNOLOGY, VAZHAKULAM

Muvattupuzha 686670

2021 – 2025 Batch

May 2024

VISWAJYOTHI COLLEGE OF ENGINEERING AND TECHNOLOGY

VAZHAKULAM

Department of Electronics and Communication Engineering

Vision

Moulding Electronics Engineers with Professional Competence and Global Outlook

Mission

- To create a vibrant academic ambience conductive for progressive learning.
- Build up excellent infrastructure and lab facilities to train the students in the current & emerging technology.
- Maintain well qualified faculty who are willing to upgrade their knowledge continuously.
- Groom students towards successful careers by facilitating industry-institute relationships and value addition through regular skill-development programs.

Program Educational Objectives

Our Graduates shall be,

- Suitably employed in allied industries/services with professional competency and knowledge of modern tools.
- Capable of developing economically viable, technically, feasible eco-friendly electronic systems.
- Capable to pursue higher studies/research in the field of engineering and management.

Program Outcomes

- Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solutions of complex engineering problems.
- Program analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics,natural sciences, and engineering sciences.
- Design / development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

- Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

- Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

- The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

- Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

- Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

- Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

- Communication: Communication effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentation, and give and receive clear instructions.

- Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply this to one’s own work as a member and leader in a team, to manage projects and multidisciplinary environments.

- Life-long learning: Recognize the need for and have the preparations and ability to engage in independent and life-long learning in broadcast context of technological change.

DECLARATION

We undersigned hereby declare that the project report **MEDICINE DISPENSOR SYSTEM**, submitted for partial fulfilment of the requirements for the award of degree of Bachelor of Technology of the APJ Abdul Kalam Technological University, Kerala is a bonafide work done by us under supervision of Ms. Ranjini Surendran and Mr. Manu Jose. This submission represents our ideas in our own words and where ideas or words of others have been included, we have adequately and accurately cited and referenced the original sources. We also declare that we have adhered to ethics of academic honesty and integrity and have not misrepresented or fabricated any data or idea or fact or source in our submission. We understand that any violation of the above will be a cause for disciplinary action by the institute and/or the University and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been obtained. This report has not been previously formed the basis for the award of any degree, diploma or similar title of any other University.

Place : Vazhakulam Signature

Date :

MUHAMMED AFRIN MUHAYIDHEEN

MATHEWS ROY

NEVIN VINOD

DEPARTMENT OF ELECTRONICS AND COMMUNICATIN ENGINEERING

VISWAJYOTHI COLLEGE OF ENGINEERING AND TECHNOLOGY, VAZHAKULAM

CERTIFICATE

This is to certify that the mini project report entitled '**MEDICINE DISPENSOR**' submitted by **MUHAMMED AFRIN MUHAYIDHEEN (VJC21EC041), MATHEWS ROY (VJC21EC039), NEVIN VINOD (VJC21EC020),** to the APJ Abdul Kalam Technological University in partial fulfilment of the requirements for the award of the Degree of Bachelor of Technology in Electronics and Communication Engineering is a bonafide record of the project work carried out by them under our guidance and supervision. This report in any form has not been submitted to any other University or Institute for any purpose.

Internal Supervisor(s) External Supervisor(s)

(If any)

Project Coordinator Head of the Department

ACKNOWLEDGEMENT

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ABSTRACT

The Medicine Dispenser System is a crucial innovation designed to support the well-being of elderly individuals by ensuring timely and accurate medication management. Utilizing advanced technology, this smart alarming system offers customizable alarm settings tailored to the unique medication schedules of each individual. Its user-friendly interface and intuitive design empower elderly users to interact with and manage their medication regimen independently, promoting a sense of autonomy and confidence. Equipped with smart sensors and monitoring capabilities, the system provides real-time alerts to caregivers or family members in the event of missed doses or medication errors, enabling timely intervention and support. Safety is paramount, with secure storage compartments preventing accidental overdoses or unauthorized access. Furthermore, the system serves as a comprehensive health monitoring tool, tracking medication adherence over time and generating detailed reports for healthcare professionals. By combining convenience, reliability, and peace of mind, the Medicine Dispenser System offers a holistic solution for managing medication adherence among elderly individuals, promoting better health outcomes and improved quality of life. As an essential component of aging-in-place strategies, it enables elderly individuals to maintain their independence and stay connected to their healthcare support network, reducing the need for institutional care and enhancing overall well-being.System is basically made of ESP32 and ESP8266 for Bluetooth and wifi interfacing respectively.

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ABBREVIATIONS

ESP	Espressis Systems
RTC	Real Time Clock
IDE	Integrated Development Environment
IOT	Internet of Things

CHAPTER 1
INTRODUCTION

1.1 GENERAL BACKGROUND

The Medicine Dispenser System is a comprehensive solution designed to address the challenge of medication management, particularly for elderly individuals who may require assistance in adhering to their medication schedules. At its core, the system consists of an Android application that allows users or caregivers to set personalized alarms for medication reminders.

- **Alarm Setting:**

  The actual process is to interact the device to a phone via Bluetooth and transfer serial data input into the system where essential time and data to alarm including the number of medicines to be taken must be transfered

- **Time Tracking:**

  Once the data from phone is taken out to the system continues looping of the time datas must be working constantly to provide the alarm at the exact same time.Another procest is to identify the methods to convert these serial datas into right form

- **Real-Time System:**

  A system is essential to check continuisly according to the time data inputed to alarm the system and it should work parallel to the system of the time provided and the exact time when both becomes equal , the should work accordingly

- **Pill Dispensing:**

  The most essential system is the dropping the pill in accordance with the number provided by the user and for this convenient method which should precisely drop the required number of pills itself.

- **Reset System:**

  The respective system is to be reseted in accordance just after the medicine is taken and this is essential to run the system for the next time alarm and this can actually ensure that the medicine is taken in time accordance.

- **Alert System:**

  The alert is yet the last thing in the system which alert the user maybe the person who need to know the data and it is as such important part

- **Emerging Scopes:**

  This system can actually be implemented in hospital field that the workload of nurses and other staff can be reduced and this can be implanted since single units can be implemented.

CHAPTER 2
LIRERATURE SURVEY

Numerous studies have evaluated the effectiveness of different types of medication reminder systems, such as smartphone apps, automated phone calls, and electronic pill dispensers. These studies often measure medication adherence rates before and after the implementation of the reminder system to assess its impact on adherence behavior. Research has investigated the user experience and acceptance of medication reminder systems among different user groups, including elderly individuals, patients with chronic conditions, and caregivers. Studies often employ qualitative methods such as interviews and surveys to gather insights into users' preferences, usability issues, and satisfaction with the systems.Some research has focused on evaluating the impact of medication reminder systems on health outcomes, such as hospitalization rates, disease management, and quality of life. These studies aim to determine whether improved medication adherence leads to better health outcomes and reduced healthcare costs

1. J Biomed Biotechnol (2012) :

In this paper, a smart medication dispenser with a high degree of scalability and remote manageability is proposed and constructed. The proposed smart medication dispenser allows multiple users to use a single medication dispenser, thus providing scalability to the device. It also allows medical staff and system administrators, instead of end users, to manage medication dispensers, thus leading to cost efficiency and safe operation of the device. Medications for each patient are stored in a medication cartridge and a cartridge is placed in a Medication dispenser tray (MDT). One smart medication dispenser has basically one MDT, but it can be extended depending on the number of patient (six MDTs maximum). The medication schedule configured in the dispenser is updated remotely by medical staff workers. Also, the system settings, embedded programs, and operational errors are managed remotely by system administrators.

2.BMC Health Care Services (2020) :

Background:

Implementing digital technology in home care services challenges care arrangements built on face-to-face encounters. Digital welfare technology has been suggested as a solution to increasing demands on health care services from an ageing population. Medication delivery is a major task for home care services, and digital medication devices could lessen the need for resources. But technology has scripts based on how designers picture its use, and these might not fit with users' needs and practices. New technology must go through processes of domestication among its users. In the present study, we investigate how health professionals experienced the implementation of a digital medication dispenser into home care services in Norway.

Methods:

This was a qualitative interview study with 26 health professionals from home care services in five municipalities.

Results:

All five municipalities had implemented a digital medication dispenser in home care services. Prior to the introduction of the dispenser, medication practices had been based on home visits. The safety of medication practices was the main concern of health professionals who had to negotiate the technological script in order to make it work in a new care arrangement. Rationalities of effectiveness collided with rationalities of care, symbolized by warm hands. Professionals who had been used to working independently became dependent on technical support. Being unfamiliar with the new medication arrangement led to resistance towards the digital dispenser, but more direct experiences changed the focus from technology to new care arrangements. Negotiating practical and organizational arrangements led health professionals to trust the digital medication dispenser to contribute to safe and good care for service users.

Conclusions:

Implementing digital technology in home care services must be informed by previous practices in the field, especially when it concerns safety for patients. Through processes of domestication, health professionals negotiate technological scripts to make them fit professional ideals and practices. Policymakers and managers must address questions of care arrangements and individualized adaptions to patients' needs in order to receive support from health professionals when implementing digital technology in home care services..

CHAPTER 3
PROJECT OVERVIEW

3.1 BLOCK DIAGRAM

Here's the block diagram of how a medicine dispenser system works:

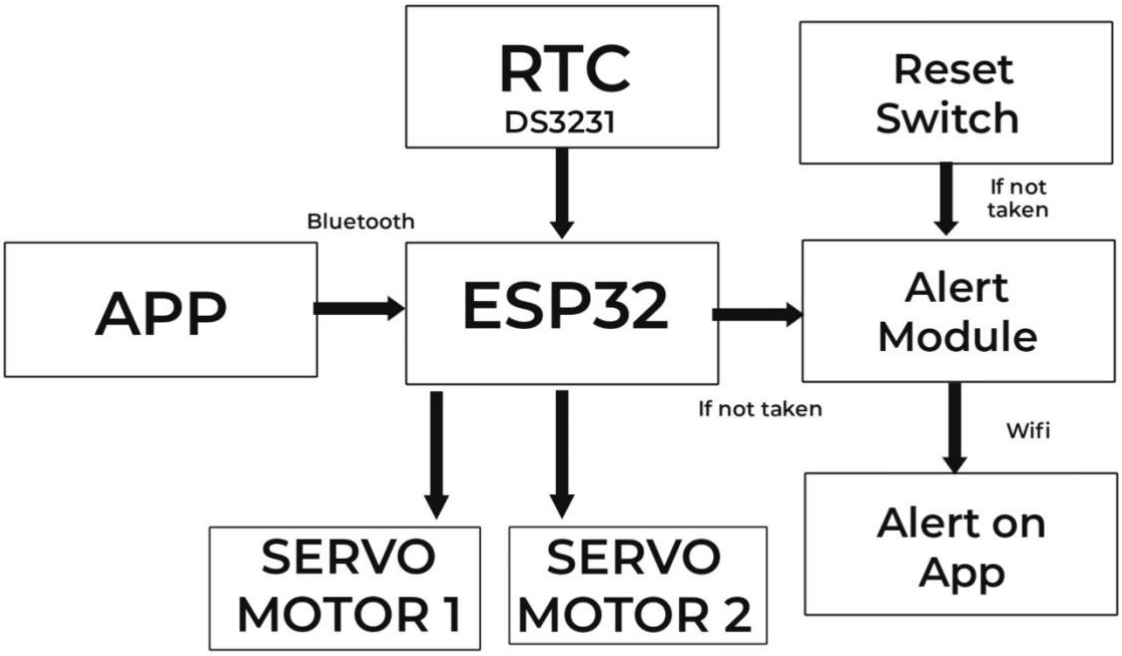


Fig 3.1 Block diagram of Medicine Dispensor System

Explanation for a block diagram of how a face recognition bot work:

The block diagram outlines the flow of data and signals within the project, illustrating the interaction between different components. Here's an explanation of each component and their interactions:

- **App (via Bluetooth):**
  - The mobile application serves as the user interface for setting medication reminders and configuring alarm settings.
  - It communicates with the ESP32 microcontroller via Bluetooth to send instructions and alarm schedules.
- **ESP32 Microcontroller**:
  - Acts as the central control unit of the system, receiving commands from the mobile app and coordinating the operation of other components.

- Interfaces with the Real-Time Clock (RTC) module to keep track of time and schedule alarm events.

- **RTC (Real-Time Clock):**
  - Provides accurate timekeeping functionality to the system, ensuring that alarms are triggered at the specified times.
  - Sends time data to the ESP32 microcontroller for synchronization and alarm scheduling.
- **Alarm:**
  - Represents the alarm functionality triggered by the RTC module at specified times.
  - Signals the ESP32 microcontroller to activate the servo motor and notify the user when a medication dose is due.
- **Servo Motor:**
  - The servo motor is controlled by the ESP32 microcontroller to actuate the medication dispenser mechanism.
  - Upon receiving the signal from the microcontroller, it rotates to dispense the medication dose as per the scheduled alarm.
- **Reset Button:**
  - Provides manual control to reset the system or acknowledge medication dispensing events.
  - When pressed, it sends a signal to the ESP8266 module to reset the alarm status or perform other actions as programmed.
- **ESP8266 Module**:
  - Handles communication with the internet and facilitates Wi-Fi connectivity for the system.
  - Sends notifications to the user's smartphone via Wi-Fi when medication doses are dispensed or when system events occur.
- **Phone Notification (via Wi-Fi):**

- Enables the system to send notifications to the user's smartphone through a Wi-Fi connection.

- Notifications include alerts for medication doses, system status updates, or any other relevant information.

Overall, the block diagram illustrates how the various components of the project work together to create a smart medication dispenser system that enables users to manage their medication schedules efficiently and receive timely reminders and notifications.

3.2 HARDWARE COMPONENTS

3.2.1 SERVO MOTOR

Servo motors come in various types, each with its own characteristics and applications. Here are some common types of servo motors: DC Servo Motors, AC Servo Motors, Brushed Servo Motors, Brushless Servo Motors, Linear Servo Motors, Analog Servo Motors, Digital Servo Motors. These are some of the common types of servo motors, each suited for different applications based on factors such as precision requirements, power source, and environmental conditions.

Fig 3.2 Servo Motor

This servo motor is designed to operate at 5v. It's important to provide the motor with the specified voltage to ensure proper functionality without causing damage. It takes 0.1 seconds for the servo meter to move 60 degrees. This indicates the speed at which the motor responds to commands to change its position. For instance, if you want the motor to move 90 degrees, it might take around 0.15 seconds. The motor has a range of motion from 0 degrees to 180 degrees. The range allows for a precise control over angular movement within the span.

3.2.2 ESP32

The ESP32 is a powerful microcontroller chip developed by Espressif Systems, renowned for its versatility and capabilities in the realm of embedded systems and Internet of Things (IoT) applications. Built on a dual-core Xtensa LX6 processor architecture, the ESP32 boasts a high level of computational power while maintaining energy efficiency, making it suitable for a wide range of projects requiring both processing capability and low power consumption.

One of the standout features of the ESP32 is its comprehensive set of integrated peripherals and connectivity options. Equipped with built-in Wi-Fi and Bluetooth capabilities, the ESP32 enables seamless wireless communication, allowing devices to connect to local networks, the internet, and

other Bluetooth-enabled devices. This connectivity is fundamental for IoT applications, enabling devices to transmit data, receive commands remotely, and interact with cloud services..

Fig 3.3 ESP32 DEVKIT V1

Moreover, the ESP32's rich development ecosystem and extensive community support contribute to its popularity among hobbyists, makers, and professional developers alike. With an abundance of resources, tutorials, and libraries available online, developers can leverage the ESP32's capabilities to bring their ideas to life quickly and efficiently.

In essence, the ESP32 serves as a cornerstone in the realm of embedded systems and IoT, offering a potent combination of processing power, connectivity options, and ease of use. Its flexibility, affordability, and robust feature set make it a preferred choice for a wide array of projects, driving innovation and enabling the creation of connected devices that enhance our daily lives..

3.2.3 RTC Module DS3231

The DS3231 is a highly accurate Real-Time Clock (RTC) module manufactured by Maxim Integrated. It serves as a crucial component in electronic systems requiring precise timekeeping functionality, offering exceptional accuracy and reliability for a variety of applications.

At the heart of the DS3231 module lies an advanced temperature-compensated crystal oscillator (TCXO) and a precision analog-to-digital converter (ADC). This combination ensures consistent timekeeping performance across a wide range of operating conditions, minimizing the effects of temperature variations on the oscillator's frequency and enhancing long-term stability.

Fig 3.4 RTC Module DS3231

One of the standout features of the DS3231 is its ability to maintain accurate timekeeping with minimal power consumption. By employing low-power standby modes and advanced power management techniques, the DS3231 can operate for extended periods on a single coin cell battery, making it ideal for battery-powered devices and applications requiring energy efficiency.

Additionally, the DS3231 module incorporates a suite of integrated features designed to enhance its functionality and ease of use. These include a battery backup input to maintain timekeeping during power outages, programmable square-wave output signals for clock/calendar alarms, and a built-in temperature sensor for monitoring environmental conditions.

Furthermore, the DS3231's compact form factor and simple interface make it easy to integrate into a wide range of electronic systems. With its standard Inter-Integrated Circuit (I2C) communication protocol, the DS3231 can seamlessly interface with microcontrollers, single-board computers, and other digital devices, enabling straightforward integration and communication.

3.2.4 ESP8266 NORD MCU

The ESP8266 is a highly popular and versatile Wi-Fi module developed by Espressif Systems, known for its affordability, compact size, and robust performance. Serving as a fundamental building block for Internet of Things (IoT) projects and wireless communication applications, the ESP8266 has gained widespread adoption among hobbyists, makers, and professional developers alike.

At its core, the ESP8266 features a powerful 32-bit microcontroller unit (MCU) with integrated Wi-Fi connectivity, offering a potent combination of processing power and wireless communication capabilities. The MCU is based on the Xtensa LX106 architecture and operates at clock speeds of up to 80 MHz, providing ample computational resources for a variety of tasks.

Fig 3.5 ESP8266

One of the key advantages of the ESP8266 is its seamless integration of Wi-Fi functionality, allowing devices to connect to local Wi-Fi networks, access the internet, and communicate with other networked devices. This connectivity is essential for IoT applications, enabling devices to transmit data, receive commands, and interact with cloud services, all without the need for additional hardware components.

Furthermore, the ESP8266 supports a wide range of interfaces and peripherals, including GPIO pins, SPI, I2C, and UART, facilitating seamless integration with sensors, actuators, displays, and other external devices. This versatility enables developers to create complex, interconnected systems with ease, whether it be home automation solutions, environmental monitoring devices, or smart appliances.

Moreover, the ESP8266 boasts a rich development ecosystem and extensive community support, with a wealth of resources, tutorials, and libraries available online. Developers can leverage these resources to quickly prototype and deploy IoT solutions, accelerating the development process and reducing time to market.

In summary, the ESP8266 stands as a versatile and cost-effective solution for wireless communication and IoT applications. Its powerful MCU, integrated Wi-Fi connectivity, and extensive development ecosystem make it an ideal choice for a wide range of projects, from simple sensor nodes to complex smart systems. Whether used by hobbyists, students, or professional developers, the ESP8266 continues to empower innovation and drive the advancement of IoT technology.

3.2.5 LM7805

The LM7805 is a popular linear voltage regulator integrated circuit (IC) manufactured by various semiconductor companies. It serves as a fundamental component in electronic circuits, providing stable and regulated output voltage from a higher input voltage source. Widely used across a multitude of applications, the LM7805 is renowned for its simplicity, reliability, and ease of use.

At its core, the LM7805 operates on the principle of linear regulation, meaning it adjusts the output voltage by dissipating excess power as heat. This makes it suitable for applications where precise voltage regulation is required, albeit with relatively low efficiency compared to switching regulators.

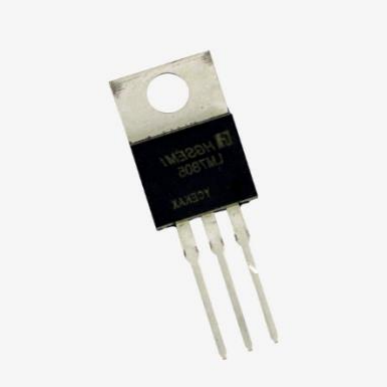


Fig 3.6 LM7805

Moreover, the LM7805 incorporates built-in thermal shutdown and current limiting protection mechanisms, enhancing its reliability and safeguarding against potential damage due to overcurrent or excessive temperature. These features contribute to the LM7805's reputation for robustness and longevity in electronic systems.

In summary, the LM7805 linear voltage regulator is a versatile and widely used component in electronic circuits, providing stable and regulated output voltage for a variety of applications.

3.3 SOFTWARE COMPONENTS

3.3.1 ARDUINO IDE

The Arduino Integrated Development Environment (IDE) is a comprehensive software platform designed to facilitate the programming and development of projects using Arduino-compatible microcontroller boards. It serves as the primary tool for writing, compiling, and uploading code to Arduino-based devices, offering a user-friendly interface and a rich set of features tailored to both beginners and experienced developers.

Key Features:

- Code Editor: The Arduino IDE provides a simple yet powerful code editor where users can write and edit their Arduino sketches (programs). It supports syntax highlighting, auto-indentation, and code completion, making it easier for users to write clean and organized code.
- Library Manager: Arduino IDE includes a library manager that allows users to easily install and manage libraries (collections of pre-written code) to extend the functionality of their projects. These libraries cover a wide range of functions, from interfacing with sensors and actuators to communication protocols and display drivers.
- Board Manager: Arduino IDE includes a board manager that simplifies the process of adding support for different microcontroller boards. Users can select their target board from a list of supported platforms and easily install the necessary board definitions, bootloader files, and drivers directly from the IDE.
- Serial Monitor: The Serial Monitor tool allows users to communicate with their Arduino-based projects via serial communication. It enables users to send and receive data between the microcontroller and the computer, making it useful for debugging, troubleshooting, and monitoring sensor readings or output messages.
- Sketches and Libraries: Arduino IDE organizes projects into sketches, which are individual files containing the code for a specific project. Users can create, open, save, and manage multiple sketches within the IDE. Additionally, the IDE provides access to a vast repository of libraries, allowing users to easily incorporate pre-written code into their projects.
- Built-in Examples: Arduino IDE includes a collection of built-in examples that demonstrate various functionalities and capabilities of Arduino-compatible boards. These examples cover a

wide range of topics, including digital and analog I/O, sensor interfacing, communication protocols, and more, serving as valuable learning resources for beginners and reference material for experienced developers.

- Cross-Platform Compatibility: Arduino IDE is compatible with Windows, macOS, and Linux operating systems, ensuring broad accessibility across different platforms. Users can download and install the IDE on their preferred operating system and seamlessly transition between environments without any compatibility issues.
- Open Source: Arduino IDE is an open-source software project, meaning its source code is freely available for inspection, modification, and redistribution. This openness fosters collaboration within the Arduino community and encourages the development of third-party tools, plugins, and extensions that enhance the functionality of the IDE.

Overall, Arduino IDE serves as the backbone of the Arduino ecosystem, providing a user-friendly environment for developing projects, experimenting with electronics, and learning about programming and hardware interaction. Its intuitive interface, extensive documentation, and vast community support make it an invaluable tool for makers, students, educators, and professionals alike, empowering them to unleash their creativity and bring their ideas to life with Arduino..

3.3.3 MIT APP INVENTOR

MIT App Inventor is a user-friendly, web-based platform developed by the Massachusetts Institute of Technology (MIT) that enables individuals with little to no programming experience to create mobile applications for Android devices. It provides a visual development environment where users can design and build apps using a drag-and-drop interface, eliminating the need for complex coding and syntax. With MIT App Inventor, users can create fully functional apps by simply arranging and connecting visual components, such as buttons, text boxes, sensors, and media players, to define the app's behavior and functionality. The platform also offers a wide range of built-in features and components, including GPS location services, accelerometer readings, and Bluetooth connectivity, allowing users to incorporate advanced functionality into their apps with ease. Additionally, MIT App Inventor provides comprehensive documentation, tutorials, and community support, empowering users to learn and explore mobile app development in a collaborative and accessible environment. Overall, MIT App Inventor democratizes app development by making it accessible to everyone, regardless of their programming background, and encourages creativity, innovation, and experimentation in the world of mobile app development. MIT App Inventor is a groundbreaking platform designed to democratize mobile app development, particularly for those without prior coding experience. Leveraging a visual

programming interface, App Inventor enables users to construct sophisticated applications by simply dragging and dropping pre-defined components and connecting them together. This intuitive approach abstracts away the complexities of traditional programming, allowing users to focus on the conceptualization and functionality of their apps rather than grappling with intricate code syntax. Moreover, App Inventor provides a plethora of built-in features and functionalities, including user interface elements, sensor integration, and communication tools, empowering users to create a diverse range of applications tailored to their needs. With its emphasis on accessibility, education, and community engagement, MIT App Inventor serves as a catalyst for innovation, creativity, and learning in the realm of mobile app development, unlocking opportunities for individuals and organizations alike to realize their app ideas and aspirations.

3.3.4 BYLNK IOT PLATFORM

Blynk is an innovative Internet of Things (IoT) platform that empowers developers, makers, and businesses to create IoT applications and projects with ease. Offering a user-friendly interface, extensive features, and robust functionality, Blynk simplifies the process of building IoT solutions and enables users to connect hardware devices, sensors, and actuators to the internet quickly and efficiently.

Key Features:

- 1.Visual Interface: Blynk provides a visual interface that allows users to design custom IoT applications using a drag-and-drop approach. Users can easily add widgets such as buttons, sliders, graphs, and gauges to create intuitive user interfaces for controlling and monitoring their IoT devices.
- 2. Cross-Platform Compatibility: Blynk supports a wide range of hardware platforms, including Arduino, Raspberry Pi, ESP8266, ESP32, and more. It also offers native mobile apps for iOS and Android devices, ensuring seamless integration and compatibility across different platforms.
- 3. Cloud Connectivity: Blynk leverages cloud infrastructure to enable secure and reliable communication between IoT devices and the Blynk cloud servers. This cloud connectivity allows users to remotely control and monitor their devices from anywhere in the world using the Blynk mobile app or web dashboard.
- 4. Plug-and-Play Integration: Blynk provides a library of pre-built widgets and components that users can easily integrate into their projects without writing code. These components include

APIs for accessing weather data, sending notifications, and interfacing with popular IoT services such as IFTTT and Zapier.

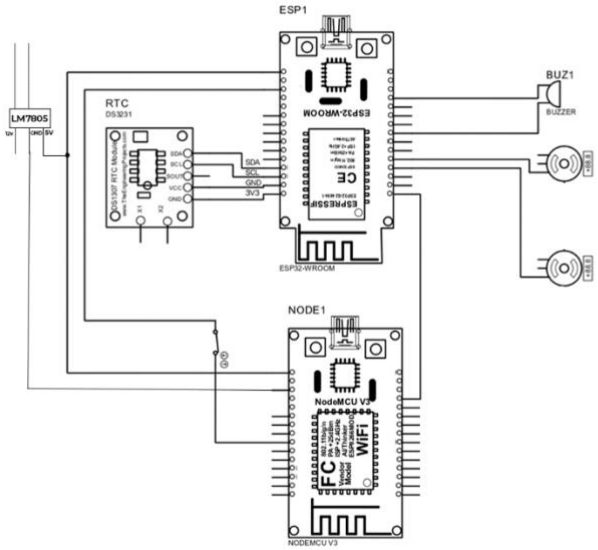
- 5. Advanced Functionality: Blynk offers advanced features and capabilities for building sophisticated IoT applications. Users can implement event-driven logic, automation rules, data logging, and real-time data visualization to create powerful and interactive IoT solutions tailored to their specific needs.
- 6. Security and Privacy: Blynk prioritizes security and privacy, implementing industry-standard encryption protocols and security best practices to protect user data and ensure the integrity of IoT communications. Users can also configure access controls and permissions to restrict access to their IoT devices and applications.
- 7. Community and Support: Blynk boasts a vibrant community of developers, makers, and enthusiasts who actively contribute to the platform's growth and development. Users can access documentation, tutorials, forums, and online resources to learn, troubleshoot, and collaborate on IoT projects.

Overall, Blynk is a versatile and powerful IoT platform that empowers users to unleash their creativity and build innovative IoT solutions. Whether you're a hobbyist experimenting with DIY projects or a business developing commercial IoT applications, Blynk provides the tools, resources, and support you need to succeed in the world of IoT development.

CHAPTER 4
DESIGN METHODOLOGY

4.1 CIRCUIT DIAGRAM

The circuit diagram of this project is compromised of esp32, esp8266, rtc module,servo motor,buzzer which is supplied a 5V power which is converted from 12V powered via adaptor and suitable voltage regulator is used (LM7805).



4.1 Circuit Diagram of Medicine Dispensor System

4.2 WORKING

Certainly! Let's dive into how the Medicine Dispenser System works at a circuit level:

- **ESP32 Microcontroller:**
  - The ESP32 serves as the central processing unit of the system.
  - It communicates with various hardware components and manages the overall operation of the system.
  - The ESP32 receives instructions and data from the mobile application via Bluetooth communication.

- **RTC Module (DS3231):**
    - The Real-Time Clock module ensures accurate timekeeping.
    - It provides the current time to the ESP32, allowing the system to trigger medication dispensing at predefined times.
    - The RTC module is powered by the ESP32 and communicates with it via I2C protocol.
- **Servo Motors:**
    - The servo motors are connected to the medication compartments.
    - They receive commands from the ESP32 to dispense medication doses at specified times.
    - The ESP32 controls the servo motors' position and rotation angle to accurately dispense the required dosage.
- **ESP8266 Module:**
    - The ESP8266 module provides WiFi connectivity.
    - It allows for remote monitoring and control of the system via a companion mobile application.
    - The ESP8266 communicates with the ESP32 to relay instructions and status updates.
- **Bluetooth Module:**
    - The Bluetooth module facilitates communication between the ESP32 and the user's mobile device.
    - It allows users to set medication schedules and preferences via a mobile application.
    - The ESP32 receives instructions and data from the mobile application via Bluetooth.
- **Buzzer:**
    - A buzzer is used for visual and auditory notifications.
    - They alert the user when it's time to take medication or if there are any system errors.
    - The ESP32 controls the buzzer based on predefined conditions and events.

- **Power Supply(LM7805):**
    - The entire system is powered by a regulated power supply.
    - It provides stable power to all components to ensure reliable operation.
    - The power supply may include voltage regulators and filters to maintain the required voltage levels and minimize noise.

Operation:

- Upon power-up, the ESP32 initializes the system, including the RTC module, WiFi, and Bluetooth connections.
- The user interacts with the system via a mobile application to set medication schedules and preferences.
- At predefined medication times, the RTC triggers an alarm signal.
- The ESP32 receives the alarm signal and activates the corresponding servo motor to dispense the medication dose.
- Visual and auditory notifications are provided to alert the user to take their medication.
- Caregivers can remotely monitor the system's operation and medication intake status via the mobile application.

In summary, the Medicine Dispenser System integrates various hardware components and communication protocols to accurately dispense medication doses at predefined times, providing users with a convenient and reliable solution for medication management.

CHAPTER 5

RESULTS

5.1 OUTPUT

The Medicine Dispenser System is housed in a compact and durable enclosure, featuring an intuitive user interface for easy interaction. Internal components, including microcontrollers and actuators, work seamlessly to ensure accurate medication dispensing and timing. Connectivity options such as Bluetooth and WiFi enable communication with external devices and remote monitoring. Users can control medication schedules and receive real-time updates through a companion mobile application, providing a comprehensive solution for medication management.

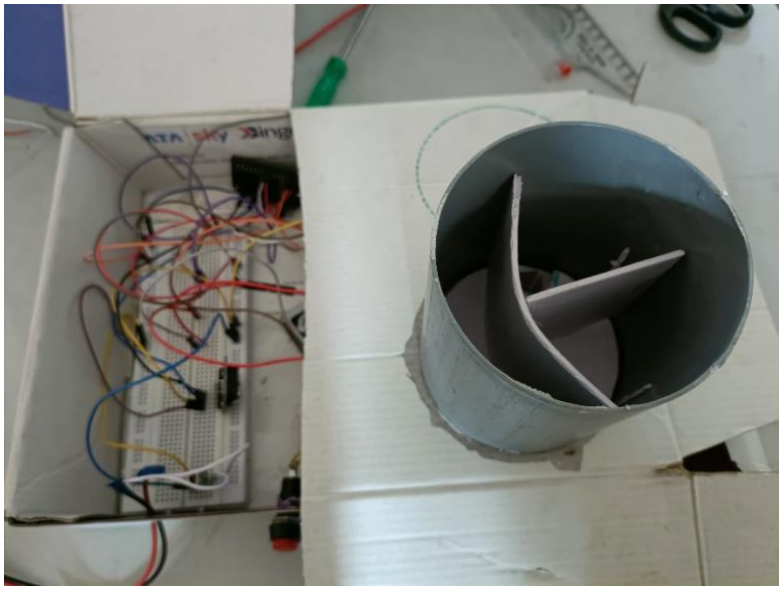


Fig: 5.1 Output image

5.2 ADVANTAGES AND DISADVANTAGES

Advantages :

Our project, the Medicine Dispenser System, offers several advantages:

- **Improved Medication Adherence**: By providing timely reminders and precise dispensing of medication doses, our system helps users adhere to their medication schedules, reducing the risk of missed doses and promoting better health outcomes.

- **Enhanced Convenience**: The intuitive mobile application and remote monitoring capabilities allow users and caregivers to manage medication schedules and monitor intake status from anywhere, providing convenience and peace of mind.
- **Customizable Settings**: Users can easily customize medication schedules, dosage amounts, and preferences through the mobile application, ensuring a tailored experience that meets their individual needs and preferences.
- **Increased Independence**: With automated medication reminders and dispensing, our system empowers users to manage their medication independently, promoting autonomy and dignity in their daily lives.
- **Comprehensive Solution:** By integrating hardware components, software functionalities, and communication technologies, our system offers a comprehensive solution for medication management, addressing various aspects of the medication adherence process.

Overall, our project aims to improve medication adherence, enhance convenience, promote independence, and provide peace of mind for users and caregivers, ultimately contributing to better health outcomes and quality of life.

Disadvantages:

While our Medicine Dispenser System offers numerous advantages, it also has some potential disadvantages:

- **Technical Complexity**: The system's reliance on various hardware components, software functionalities, and communication technologies may introduce technical complexities, requiring users to familiarize themselves with the system and troubleshoot any issues that arise.
- **Dependency on Power Supply**: The system's operation is dependent on a stable power supply, which may pose challenges in regions with unreliable electricity or during power outages, potentially disrupting medication schedules.
- **Initial Setup and Configuration**: Setting up the system and configuring medication schedules through the mobile application may require initial time and effort from users, particularly those who are less familiar with technology or have limited mobility.
- **Cost**: The initial cost of acquiring and installing the Medicine Dispenser System, including hardware components and software development, may be a barrier for some users, particularly those with limited financial resources or access to healthcare services.

- **Maintenance and Support**: Like any electronic system, our Medicine Dispenser System may require periodic maintenance, updates, and technical support to ensure optimal performance, which could incur additional time and expenses for users and caregivers.

  While these disadvantages should be considered, they can be mitigated through proper user education, ongoing support, and careful planning during the implementation of the system. Overall, the benefits of improved medication adherence and enhanced convenience outweigh these potential drawbacks for many users.

5.3 CONCULSION

In conclusion, our Medicine Dispenser System represents a significant advancement in medication management technology, offering a comprehensive solution to address the challenges of medication adherence and administration, particularly among elderly individuals and those with complex medication regimens. Throughout the development and implementation of this project, we have strived to create a user-friendly, reliable, and adaptable system that promotes independence, improves health outcomes, and enhances overall quality of life for users and caregivers alike.

At its core, our Medicine Dispenser System leverages cutting-edge hardware components, including microcontrollers, sensors, actuators, and communication modules, seamlessly integrated with innovative software functionalities to deliver a holistic approach to medication management. The system's intuitive user interface, accessible through a companion mobile application developed using MIT App Inventor, empowers users to easily set medication schedules, dosage amounts, and preferences, while also providing real-time monitoring and feedback to ensure adherence and safety.One of the key strengths of our project lies in its ability to adapt to the diverse needs and preferences of users, offering customizable settings and flexible features to accommodate different medication regimens and lifestyles. Whether users require simple daily reminders or more complex dosage schedules, our system can be tailored to meet their individual requirements, promoting autonomy, dignity, and peace of mind.Furthermore, the implementation of advanced communication technologies, such as Bluetooth and WiFi connectivity, enables seamless interaction between the Medicine Dispenser System and external devices, facilitating remote monitoring, control, and support for users and caregivers. This connectivity not only enhances convenience and accessibility but also

fosters collaboration and engagement within the healthcare ecosystem, ensuring coordinated care and continuity across different settings and stakeholders.While our Medicine Dispenser System offers numerous advantages, including improved medication adherence, enhanced convenience, and increased independence, it is essential to acknowledge its limitations and challenges. Factors such as technical complexity, dependency on power supply, initial setup and configuration, cost, and maintenance requirements may pose obstacles for some users. However, through ongoing education, support, and collaboration with healthcare professionals and stakeholders, these challenges can be mitigated, and the benefits of the system can be maximized.

In summary, our Medicine Dispenser System represents a significant contribution to the field of healthcare technology, offering a scalable, adaptable, and user-centric solution to address the complex and multifaceted challenges of medication management. As we continue to refine and enhance the system through ongoing research, development, and feedback from users and caregivers, we remain committed to improving health outcomes, promoting independence, and enhancing quality of life for all individuals who rely on our innovative solution.

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