JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Implementation of IoT-Based Task Assistant for Task Management

Divya Shree S[1], Sukanya DM[2], Ms. Preetha Kamath B [3]

[1-2]Student,Electronics and Communication Engineering, K.S Institute of Technology, Bangalore, India

[3]Assistant Professor ,Electronics and Communication Engineering, K.S Institute of Technology, Bangalore, India

ABSTRACT: The IoT-Based Smart Assistant for Task Management is designed to provide an automated and user-friendly solution for managing daily tasks, schedules, and medicine reminders. The system is particularly useful for elderly people, patients, working professionals, and individuals who frequently forget important activities. An Arduino microcontroller acts as the central control unit and coordinates the reminder and medicine management functions. A DF Mini MP3 player with a speaker is integrated with the Arduino to provide predefined voice reminders at scheduled times. An LCD display provides visual information about the current task, reminder status, and medicine-related activities. By combining audio and visual notifications, the system helps users recognize important tasks without continuously checking a mobile phone or digital calendar.

The system also incorporates an automated medicine reminder and dispensing mechanism. At the predefined medicine time, the Arduino activates a DC motor through an L293D motor driver to open the medicine box, allowing the user to access the required medicine. After the required interval or operation, the motor can be controlled to close the medicine compartment. The voice reminder provides an audible notification while the LCD displays the corresponding information. The proposed system reduces dependency on manual task tracking and provides an economical embedded solution for daily schedule and medicine management. It can be further enhanced with IoT connectivity, mobile notifications, cloud-based scheduling, and personalized reminder management.

Keywords: IoT, Smart Task Management, Task Scheduling, Automation, Real-Time Monitoring, Cloud Computing, Mobile Application.

INTRODUCTION:

Modern lifestyles involve numerous activities, appointments, household responsibilities, work-related tasks, and health-related schedules. Managing these activities manually can become difficult when a person has several tasks to complete throughout the day. Missing an important appointment, forgetting a household activity, or taking medicine at the wrong time can create inconvenience and, in the case of medication, potentially affect health management. Traditional methods such as handwritten notes, alarms,

and mobile phone reminders require users to regularly check or interact with the reminder system. This creates a need for an automated system capable of providing reminders at the appropriate time.

The IoT-Based Smart Assistant for Task Management is proposed as an embedded automation system for managing daily tasks and reminders. The system uses an Arduino microcontroller as the primary controller. It is connected to a DF Mini MP3 player and speaker for providing predefined voice reminders. Audio files containing task and medicine reminder messages are stored in the MP3 module and played according to the programmed schedule. An LCD display is also connected to the Arduino to show task information, reminder messages, and the current operating status of the system.

A major feature of the proposed system is its automated medicine reminder mechanism. Medicine schedules can be predefined according to the user's daily requirements. When the scheduled medicine time is reached, the Arduino activates a DC motor through an L293D motor driver. The motor operates the medicine box mechanism to open the required compartment. At the same time, the DF Mini MP3 player produces an audible medicine reminder through the speaker, while the LCD displays information about the medicine reminder. This combination of mechanical, audio, and visual assistance makes the system more interactive than a conventional alarm-based reminder.

The proposed system is particularly applicable to elderly people, who may need regular medication and may sometimes have difficulty remembering multiple schedules. It can also support busy individuals who need assistance in remembering recurring daily activities. Instead of depending completely on a smartphone application, the system provides reminders through dedicated hardware. The LCD provides visual feedback, while the speaker provides voice-based notification, making the system accessible to users who may not continuously monitor a display.

The term IoT-based in the project represents the possibility of extending the embedded reminder system with network connectivity and remote monitoring capabilities. The basic implementation can operate using predefined schedules stored within the controller, while future versions can integrate Wi-Fi or other communication technologies to allow schedules to be updated remotely. Notifications could also be transmitted to caregivers or family members when required. The system follows a centralized control approach in which the Arduino coordinates the different components. Based on the programmed schedule, the controller determines when a particular task or medicine reminder should be activated. The corresponding voice message is played through the DF Mini MP3 module, the information is displayed on the LCD, and the motor mechanism is activated for medicine-box operation. The integration of these components creates a compact automated assistant for daily task management. The project demonstrates how embedded systems, audio playback, display technology, and motor control can be combined to address a practical daily-life problem. The proposed system can serve as a foundation for more advanced smart-assistance applications involving remote scheduling, sensor-based monitoring, mobile applications, and intelligent healthcare assistance.

LITERATIURE REVIEW:

[1] An IoT-based medicine reminder and monitoring system was designed to improve healthcare management and medication adherence. The system provides timely reminders to help users take medicines according to their prescribed schedules. IoT technology enables communication between connected devices and users. It can support remote monitoring and improve the convenience of medicine management. Such systems are especially useful for elderly people and patients who require regular medication.

[2] An IoT-based medication reminder system was developed to support elderly individuals in managing their daily medication schedules. The system uses connected devices and reminder functions to notify users when medicines are due. It helps reduce the chances of forgetting medication and supports independent living. The integration of technology can make medicine management easier for older adults. It also provides a foundation for developing more advanced automated medicine dispensers.

[3] A systematic literature review examined the use of smart medication systems to support older adults who follow complex drug regimens. The study explored technological solutions designed to improve medication management and support daily routines. Smart devices can provide reminders and help users organize multiple medicines. These systems may reduce the burden on patients and caregivers. The review highlights the potential of technology to promote medication adherence and independent living.

[4] An IoT-based smart medicine dispenser was proposed to provide automated alerts and medication reminders. The system notifies users when it is time to take their prescribed medicines. By using programmed schedules, it reduces dependence on memory and helps users maintain regular medication routines. Additional hardware components can support automated dispensing and user interaction. Such a system can improve convenience and reduce the likelihood of missed doses.

[5] A systematic review investigated medication reminder technologies used by older adults living independently at home. The study examined how reminder devices support medication management and adherence. These technologies can include electronic reminders, connected devices, and automated notification systems. They may help users follow treatment schedules without continuous assistance. Evaluating their effectiveness is important because results can vary according to user needs, technology design, and daily living conditions.

[6] The Arduino Uno Rev3 is a microcontroller development board commonly used in embedded system applications. It supports digital and analog input/output operations and can interface with sensors, displays, buttons, and motor drivers. In a smart medicine dispenser, the Arduino Uno can act as the central controller for processing user inputs and executing programmed medication schedules. It can also control audio alerts, LCD messages, and the dispensing mechanism. Its simple programming environment makes it suitable for developing and testing low-cost prototype systems.

[7] The DF Player Mini MP3 module is a compact audio playback device that can be controlled by a microcontroller. It plays predefined audio files stored on a compatible memory card and communicates with

Arduino through serial communication. In a smart medicine dispenser, the module can announce medication timings and provide voice reminders. It can also play different audio messages for different reminder events. This feature improves accessibility, especially for elderly users and people who may have difficulty reading display messages.

[8] The L293x motor driver family is used to control suitable motors in embedded electronic systems. It enables a microcontroller to control motor operation and direction while supplying the required drive current within the driver's specifications. In an automated medicine dispenser, the motor driver can operate a motor connected to the dispensing mechanism. The Arduino sends control signals according to the programmed schedule. This arrangement supports automated operation, although suitable motor selection and mechanical design are necessary for accurate dispensing.

[9] The HD44780U LCD controller is widely used in character-based liquid crystal display applications. Compatible LCD modules can display medication timings, reminder messages, menu options, and system status. In a smart medicine dispenser, the Arduino updates the display according to user inputs and scheduled events. The LCD provides a simple interface for checking medication information and system operation. Combining visual information with audible alerts can make the device easier to understand and operate.

[10] Arduino programming techniques provide the foundation for developing microcontroller-based embedded applications. They explain how to write programs, configure input/output pins, interface electronic modules, and implement control logic. In a smart medicine dispenser, these techniques are used to create medication schedules, compare the current time with reminder times, and activate alerts. The program can also process button inputs and control the dispensing motor. Proper programming and testing are essential for reliable operation and accurate timing.

[11] Practical Arduino development methods demonstrate how different electronic components can be integrated into a single embedded system. These methods cover hardware interfacing, serial communication, input processing, and device control. A smart medicine dispenser can use these principles to combine an LCD, audio module, push buttons, and motor driver. The controller coordinates these components according to predefined instructions. This modular approach simplifies prototype development, troubleshooting, and future improvements.

[12] Physical computing combines electronic hardware and software to create interactive systems that respond to user inputs and environmental conditions. Microcontrollers provide a central platform for coordinating sensors, displays, audio modules, and actuators. In a medicine reminder project, the controller can manage medication schedules and display relevant information. It can also generate voice announcements and activate a dispensing mechanism at the appropriate time. This approach supports the development of an affordable and user-friendly automated medicine management prototype.

[13] An IoT-based smart medicine box was proposed to help elderly individuals manage their medication schedules more independently. The system uses connected technologies and reminder functions to support regular medicine intake. Depending on its implementation, it can provide notifications and maintain medication-related records. These functions can help users and caregivers monitor daily routines more conveniently. The approach demonstrates how smart devices can support medication management in home environments.

[14] An IoT-based smart medicine dispenser combines embedded hardware with connected technologies to improve medication management. The system can integrate a microcontroller, programmed schedules, alert mechanisms, and dispensing controls. Connectivity may enable remote monitoring and sharing of medication-related information with authorized caregivers. Such features can improve convenience and help identify missed or delayed doses when supported by suitable sensors. Reliable operation requires appropriate hardware integration, software testing, and safeguards against incorrect dispensing.

[15] IoT-based smart-home automation offers opportunities to integrate medicine management with connected household devices. A medicine reminder system can communicate with a home network to provide alerts and share relevant status information. Automated reminders may help users follow their daily medication routines without needing to check the device continuously. Integration with other smart-home services can improve accessibility and convenience. However, network reliability and user privacy must be considered when implementing connected healthcare functions.

[16] An IoT-based healthcare monitoring and medication management system uses connected devices to support healthcare activities outside conventional clinical settings. Such systems can collect and share relevant information through communication networks. In medication management, they may help users organize schedules and allow authorized caregivers to review reported medication events. This can support more coordinated care and improve access to medication-related information. Data security, connectivity, and the accuracy of reported events remain important design considerations.

[17] An IoT-based medicine reminder system combines a microcontroller, programmed medication schedules, and alert mechanisms to provide timely notifications. The system checks scheduled times and activates suitable reminders when medication is due. Depending on its design, it can use an LCD, speaker, or connected notification service to inform users. Sensor integration may also help record dispensing or compartment activity. These functions can improve the organization of medication routines, but a reminder or sensor event alone does not confirm that medicine has actually been swallowed.

[18] An IoT-based smart medication dispenser uses electronic control and connected technologies to automate selected medicine management tasks. The system can combine medication scheduling, audible alerts, and motor-based dispensing. Connectivity can support remote status updates and communication with users or caregivers. Multiple compartments can be incorporated to organize different medicines according to their schedules. The effectiveness of such a system depends on correct scheduling, reliable dispensing, appropriate sensor feedback, and suitable safety measures.

[19] Medication adherence is an important factor in the treatment of long-term health conditions. Patients may miss doses because of forgetfulness, complicated schedules, difficulties understanding instructions, or other personal circumstances. Reminder systems and simplified medicine management devices can help address some of these challenges. Features such as audible alerts, clear displays, and organized compartments may make medication routines easier to follow. However, technology should complement professional medical advice and cannot guarantee adherence or improved treatment outcomes.

[20] Medication adherence plays an important role in achieving effective healthcare outcomes. Difficult treatment schedules and missed doses can reduce the effectiveness of prescribed treatment. Practical support measures include patient education, clear medication instructions, organized storage, and timely reminders. Smart medicine dispensers can combine these approaches with electronic scheduling, audio notifications, and automated dispensing. Additional features such as caregiver notifications and medication records may provide further support. Their actual benefits depend on the system's reliability, the user's needs, and correct use of the device.

SYSTEM ARCHITECTURE:

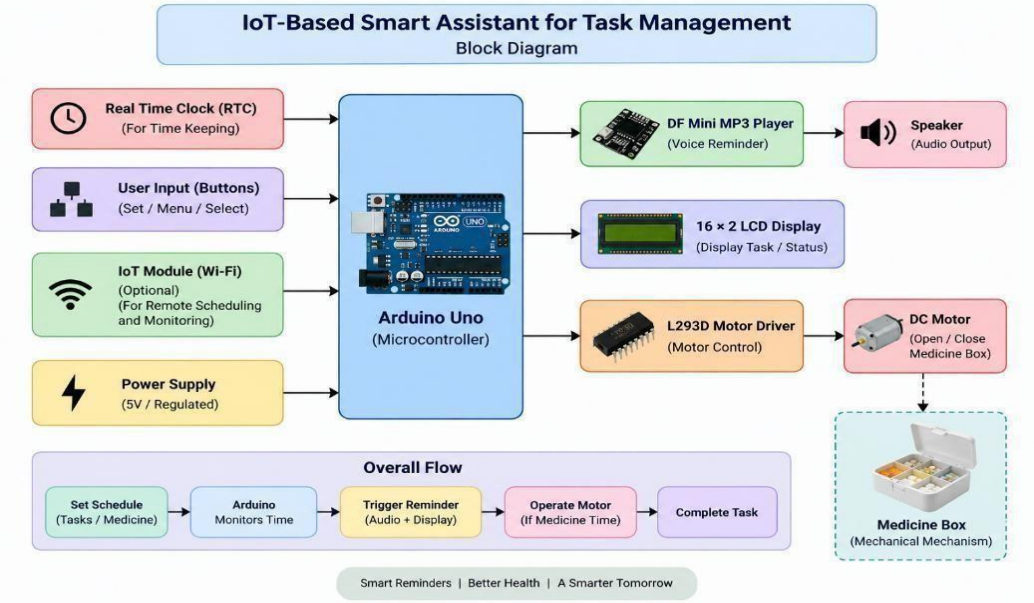


Fig. 1. Block diagram of the IoT Based Smart Assistant For Task Management

The proposed IoT-Based Smart Assistant for Task Management is implemented using an Arduino Uno as the main controller. The system consists of a Real-Time Clock (RTC), user input buttons, a 16×2 LCD display, DF Mini MP3 player, speaker, L293D motor driver, DC motor, and an optional Wi-Fi module. The RTC module provides accurate time information to the Arduino, which continuously compares the current time with the predefined task schedule. Users can set and manage tasks using the input buttons, while the LCD displays the selected task, time, and task status. When the scheduled time is reached, the Arduino activates the DF Mini MP3 player to provide an audio reminder through the speaker and simultaneously displays the task information on the LCD. For tasks requiring physical operation, the

Arduino sends control signals to the L293D motor driver, which drives the DC motor to operate the connected mechanism, such as opening or closing a medicine box. The optional Wi-Fi module enables remote scheduling and monitoring of tasks through IoT connectivity. Thus, the system integrates time-based scheduling, audio-visual reminders, and automated mechanical operation to provide an efficient and user-friendly smart task management solution.

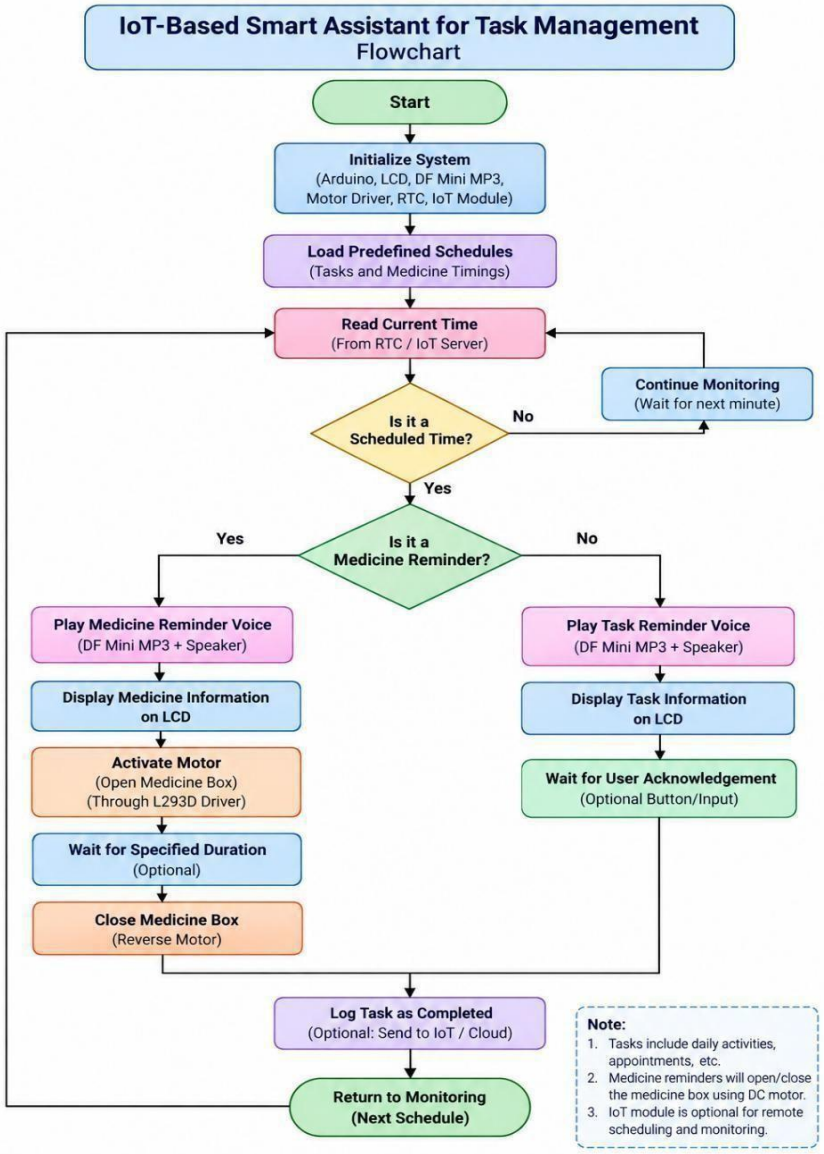


Fig. 2. Flowchart of the IoT Based Smart Assistant For Task Management.

The flowchart represents the complete operational sequence of an IoT-based smart assistant for task and medicine management. The system begins with the initialization of all the required hardware and software components, including the Arduino controller, LCD display, DF Mini MP3 module with speaker, motor driver, real-time clock (RTC), and IoT communication module. After initialization, predefined schedules containing daily activities, appointments, and medicine timings are loaded into the system. The RTC continuously provides the current time, while the IoT module can support remote scheduling and monitoring through a cloud platform.

The system then continuously compares the current time with the scheduled activities. If the current time does not match any scheduled event, the system waits for the next minute and continues monitoring without

interrupting the user. When a scheduled time is reached, the system determines whether the event is a medicine reminder or a general task reminder. For a medicine-related event, the DF Mini MP3 module generates a voice notification through the speaker, while the LCD displays the corresponding medicine information. At the same time, the motor driver activates the DC motor to open the medicine box, making the required medication accessible to the user.

After the medicine box is opened, the system can maintain the open position for a predefined duration. Once the specified time has elapsed, the motor operates in the reverse direction to close the medicine box automatically. This mechanism helps organize medicine access according to the programmed schedule. For a general task or activity, the system instead generates a task-specific voice reminder and displays the task information on the LCD. An optional acknowledgement mechanism allows the user to confirm that the reminder has been noticed or completed.

After either a medicine reminder or a task reminder is processed, the system can record the activity as completed and optionally send the status information to an IoT or cloud platform. This provides the possibility of remote monitoring and maintaining a record of scheduled activities. Once the current event has been completed, the system returns to the monitoring stage and waits for the next scheduled time. Therefore, the overall flow creates a continuous closed-loop operation, where scheduling, time checking, reminder generation, medicine-box control, user acknowledgement, and cloud-based monitoring are repeatedly performed throughout the day. This design integrates automation, audio-visual notifications, motorized medicine management, and IoT connectivity into a single smart assistant system intended to improve the organized management of daily tasks and scheduled medication.

METHODOLOGY:

The proposed IoT-based assistant for task management is designed to help users organize daily tasks and receive timely reminders using a microcontroller and connected hardware components. Initially, the system is powered ON, and the microcontroller initializes the connected components, including the display, audio alert module, and input controls. The user enters or selects task details, such as the task name, scheduled time, and priority, using the available input mechanism. The task information is stored in the system memory, and the current time is monitored to compare against the scheduled tasks.

When the scheduled time of a task is reached, the system activates an audio alert to notify the user. At the same time, the display shows the task name, scheduled time, and reminder status, allowing the user to identify the task that needs attention. The user can acknowledge the reminder using the provided control button, and the system updates the task status accordingly. This process helps users keep track of pending and completed tasks and reduces the chances of forgetting important activities.

The system can be further integrated with Wi-Fi connectivity to support remote task management through a mobile or web-based application. This allows users to view, add, modify, or delete scheduled tasks and monitor their status remotely. Additional features, such as recurring reminders, task prioritization, and notifications for overdue tasks, can be incorporated to improve the overall functionality of the assistant.

The proposed system provides a simple and user-friendly approach to daily task organization by combining scheduled reminders, audio notifications, and visual task information. Future enhancements may include voice-based task entry, cloud-based storage, synchronization across multiple devices, and AI-based task prioritization. These features can improve flexibility, accessibility, and efficiency in personal task management.

The proposed IoT-based assistant for task management is designed to help users organize their daily activities and receive timely reminders. The system uses Arduino Uno as the main controller, along with a DFPlayer Mini, speaker, 16×2 LCD display, L293D motor driver, DC motor, and power supply. When the system is switched ON, the controller initializes all connected components. The user can enter or select task details, and the system monitors the scheduled time to provide reminders.

When the scheduled time is reached, the speaker produces an audio alert, and the LCD displays the task information. The user can acknowledge the reminder using a control button, allowing the system to update the task status. In the future, Wi-Fi connectivity, voice-based task entry, and cloud storage can be added to improve the system. Overall, the proposed system provides a simple and effective way to manage daily tasks, improve time management, and reduce the chances of forgetting important activities.

RESULTS:

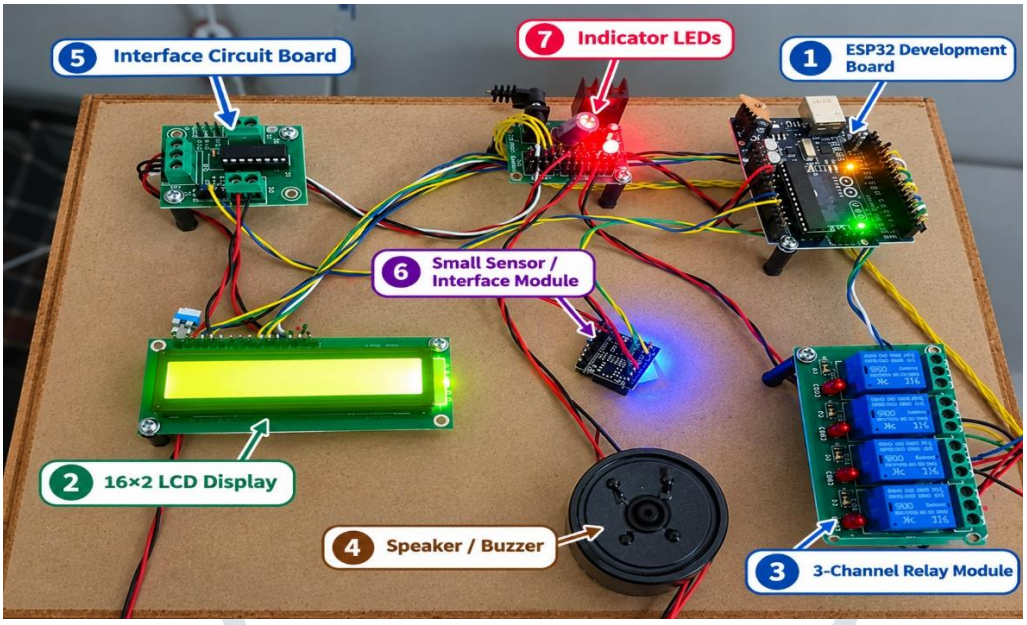
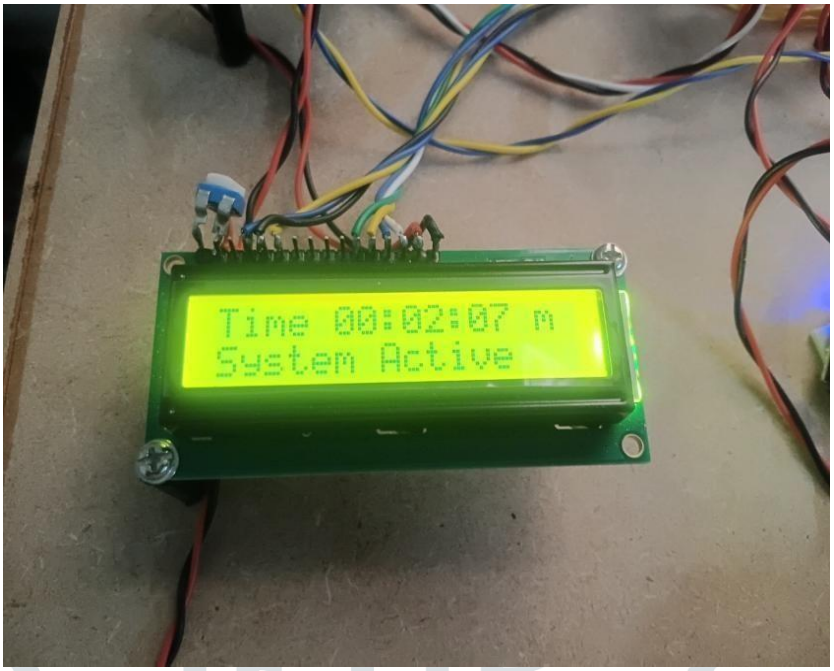


Fig. 3. Complete prototype showing controller, LCD, relay section, audio output and connected wiring.



Fig. 4. LCD output showing "Timer Started" during system initialization.



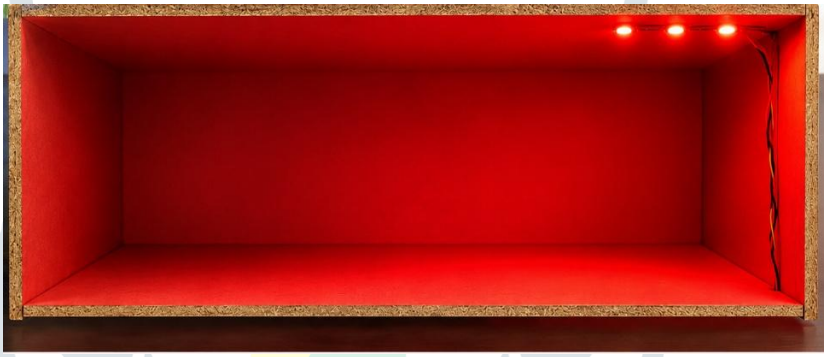
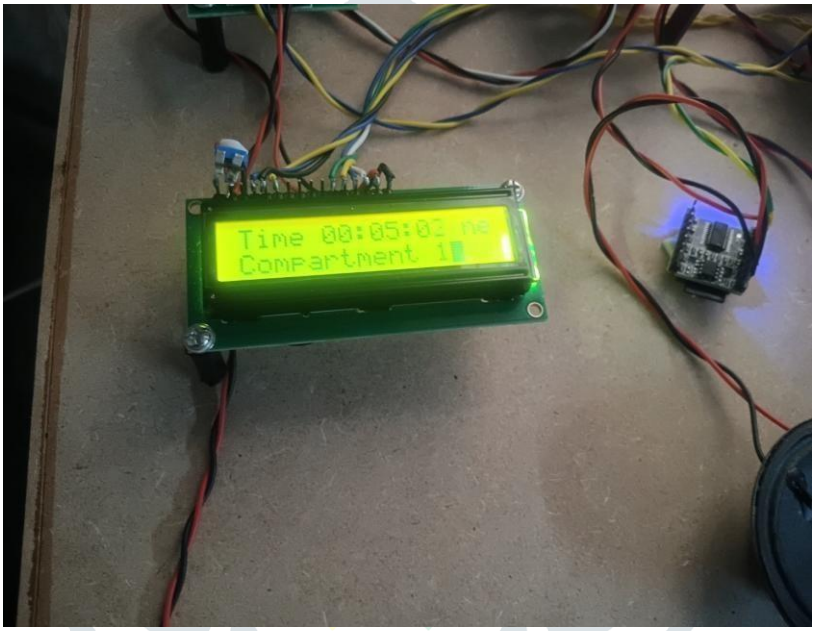


Fig. 5. LCD output showing "System Active" during normal monitoring





Fig. 6. LCD output showing "Prepare Medicine" before the medicine event



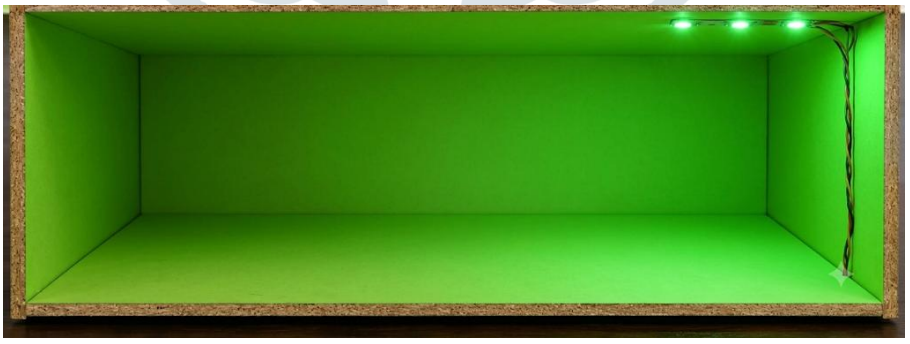


Fig. 7. LCD output showing the scheduled time and compartment status.

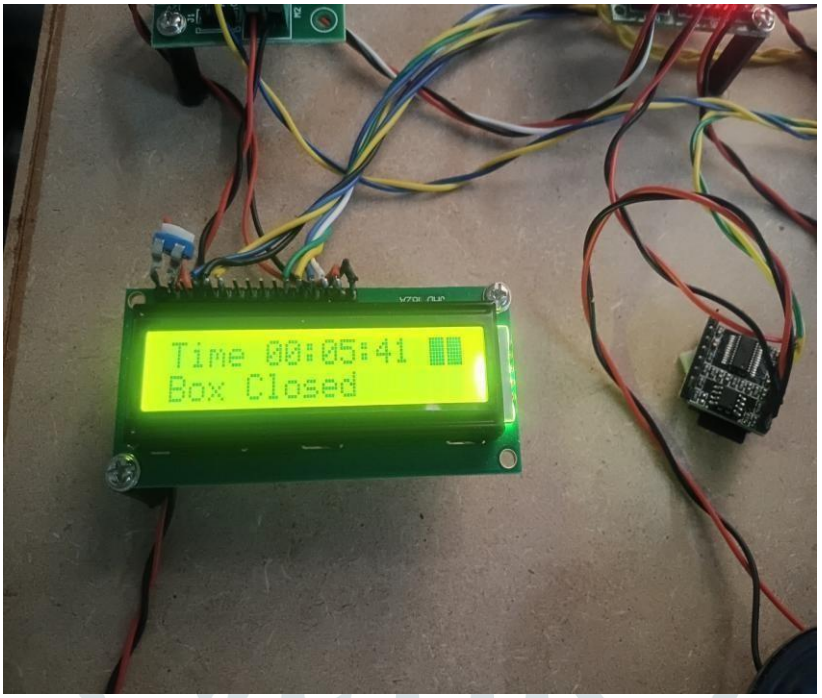




Fig. 8. LCD output showing "Box Closed" after the compartment operation.

RESULTS

Fig. 3. Complete Prototype
Figure 3 shows the complete prototype of the proposed system, including the Arduino Uno controller, LCD display, relay section, audio output, and connected wiring. The Arduino Uno controls the overall operation of the system, while the LCD displays the system status and reminder messages. The audio output provides alerts to notify the user, and the relay section controls the connected components as required.

Fig. 4. Timer Started
Figure 4 shows the LCD message "Timer Started" during system initialization. This indicates that the timer function has started and the system is beginning its scheduled operation. It confirms that the system has entered the initial stage of the reminder process.

Fig. 5. System Active
Figure 5 displays the message “System Active” on the LCD. This indicates that the system is operating normally and monitoring the scheduled time. The system remains active until the required reminder time is reached.

Fig. 6. Prepare Medicine
Figure 6 shows the message “Prepare Medicine” on the LCD before the scheduled medicine event. This message alerts the user that the medicine time is approaching or that preparation is required. It helps the user prepare for the scheduled activity.

Fig. 7. Scheduled Time and Compartment Status
Figure 7 displays the scheduled time and compartment status on the LCD. The screen shows the time as “08:30 AM” and compartment 1 as “Closed.” This information helps the user identify the scheduled time and check the current compartment status.

Fig. 8. Box Closed
Figure 8 displays the message “Box Closed” after the compartment operation. This indicates that the medicine box compartment has returned to or remains in the closed state. It helps the user identify the compartment status and confirms the completion of the closing operation.

CONCLUSION AND FUTURE SCOPE:

The IoT-Based Smart Assistant for Task Management successfully provides an automated solution for managing daily tasks and medicine reminders. The system uses an Arduino Uno as the central controller to coordinate the DF Mini MP3 player, speaker, LCD display, L293D motor driver, and DC motor. Predefined schedules are monitored by the controller, and appropriate voice and visual reminders are generated when a scheduled event occurs.

The automated medicine-box mechanism further enhances the functionality of the system by allowing the medicine compartment to be opened and closed using a DC motor. The combination of voice notification, LCD-based information, and mechanical medicine-box control provides a practical assistance system for elderly people, patients, and busy individuals. The project demonstrates how embedded-system components can be integrated to reduce manual effort in daily task and medicine management.

The proposed system can be enhanced by integrating IoT connectivity for remote monitoring and schedule management through Wi-Fi. A mobile or web application can allow users to add, modify, and delete medicine schedules remotely. Caregiver notifications can be provided when reminders are missed. IR, weight, or other sensors can be added to detect actual medicine intake, while multiple compartments can support different medicines and timings.

An RTC module can be integrated to maintain accurate time and improve schedule reliability during power interruptions. Text-to-speech technology can provide personalized voice reminders instead of fixed audio messages. An emergency alert button can send notifications to a predefined caregiver. Cloud storage can maintain medicine schedules, reminder history, and system activity for remote access.

The dispensing mechanism can be improved using limit switches or position sensors to detect the motor position and prevent excessive operation. Voice-controlled scheduling can enable users to create or modify reminders using speech commands. Finally, a rechargeable battery backup with a power-management circuit can maintain system operation during temporary power failures. These enhancements can improve the system's reliability, automation, accessibility, and remote monitoring capabilities.

Improvement Over Existing System

Sl. No.	Existing System	Improvement
1	Manual task management	Automated task scheduling using Arduino Uno
2	Limited reminders	Timely reminders for scheduled tasks
3	No audio notifications	Audio alerts using DF Player Mini and speaker
4	Limited information display	Task information displayed on a 16×2 LCD
5	Manual operation	Motor-controlled operation using the L293D motor driver
6	Frequent manual monitoring	Automatic monitoring of scheduled tasks
7	Separate reminder functions	Integrated audio and visual reminder system
8	Tasks may be forgotten	Timely alerts to help users follow schedules
9	Limited user interaction	User control through input buttons

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