

**G-BOT PERSONAL ASSISTANT
MEDI BOT FOR OLD AGE
PEOPLE**

PROJECT REPORT
SUBMITTED BY
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ABSTRACT

Many older adults value their independence and prefer to age in place. Robots can be designed to assist older people with performing everyday livelihood tasks and maintaining their independence at home. Worldwide demographic trends of a growing societies raise the demand for assistive technologies for senior people, including in particular robotic aids. Robot systems can support the domestic medication of an elderly person. So, our project 'An IOT Based Personal Assistant Medi-BOT for old age people (G-BOT)' is aimed at providing a helping hand for our older generations. The BOT has functions such as providing the right medicines at the right time, providing water, video calling to their loved ones using voice commands. The BOT can also be used to monitor the old ones. During any emergency situations the bot will be able to provide notifications and calls to the relatives of the user and also give information to the nearest medical emergency crew to save the users life. So, G-Bot can provide a fruitful life for the old age people by giving them care, attention and the entertainment they need on time. Thus, organizing their life and their day-to-day schedules.

Keywords: Automated medicine dispenser; GSM emergency SMS; provide water; voice commands; Arduino IDE

CHAPTER 1 INTRODUCTION

In today's busy World as most of the people don't have time to be with the old age people. People might not be able to take care of them. The consumption of medicines for such people is really difficult. Old ones might not be able to keep a track on the time to consume their medicines. Many of them will be having memory loss or diseases like dementia. So our project 'A Personal Assistant Medi-BOT for old age people (G-BOT= Geriatric-Bot)' is aimed at providing a helping hand for our older generations. Our bot will surely make the life of the old people much organized and easier. The BOT has functions such as providing the right medicines at the right time, providing water, speaking out the time and sending SOS SMS in case of an emergency. During any emergency situations the bot will be able to provide notifications and thus alert the relatives of the user and also give information to the nearest medical emergency crew to save the users life. It also have the functionality of providing water with the help of a voice command. Our bot will have added functionalities like internet connected voice assistance that will help in providing small entertainments and getting information's through the internet with the help of a voice command, it will also have added functionalities like making a remainder for any events stated by the user, these features can be added in the near future, due to time limitations we haven't included them. The bot will travel towards the patient and provides the medicine and water at the right time. So our bot will become a new stepping stone for medicine dispensing and old age assistant bots.

CHAPTER 2 PROBLEM DEFINITION

People are very busy with their life, they are now unable to give care or help their old ones all the time. They are unable to even speak to them or entertain them. The increasing age of the people will reduce their memory capacity and their illnesses, they may not be able to walk all the time, they may need more rest, some may be bedridden, some won't be able to think logically. So for taking their medicines on the right time and for getting remainder for doing their daily needs out bot will aid them. It will be difficult for them to walk and drink water all the time so they will ignore the fact that they need to drink water and will skip it. If it was possible to provide water at the right time near them then they will drink it. Our bot will also aid them for this purpose. It will be difficult for old age people to identify the time on the clock due to lack of proper eye sight. Our Bot will aid them in this process. During the old age they may need constant surveillance .Their children can get SOS sms if something goes wrong. Sometimes there won't be anyone in the house so in case there is some medical emergency something bad can happen. Our bot will provide emergency alerts to their relatives and the emergency services near them. So immidiate attention can be givent to the patient.

CHAPTER 3 LITERATURE SURVEY

3.1. Design and Proto type of Smart Automated Pill Dispenser (2020-21)

The product is a stationary machine of the size of a box which dispenses medicines which are filled in it at the right time. It also gives are minder about having the medicine at right time.

3.2. HERA: Home Environment Robot Assistant (2019)

The bot act as a companion for kids by providing music and knowledge using voice command. The bot also provides alarm facility to wake kids up cheerfully. It simply can define as a companion for kids to make them cheerful as well as bring out the talent within them.

3.3. Robot for Delivery of Medicines to Patients in Health Care

The bot can be used to give medicine to patient by not going near the patients. The bot is controlled using a remote. By using the remote the bot is moved towards the patient from which the medicine can be consumed by the patient. The project was done during covid when going near the patient was not a good idea for nurses to give medicine.

CHAPTER 4 FINAL SOLUTION

G-Bot was able to solve the problem of old age people's timely medicine consumption. The bot was able to provide water and speak out time whenever asked. The bot is able to move towards the user and provide them the medicine and water so they don't need to walk towards it also. Voice commands helped in hands free operations. Medical emergencies were handled properly on time. The family of the old age people will be able provide help when an emergency situation arises as g bot will alert them during emergencies. G-Bot is a complete solution for the problems faced by the old people during their 70 sand 80s. Self-charging facility of the bot enable all time working of the bot.

CHAPTER 5 BLOCK DIAGRAM

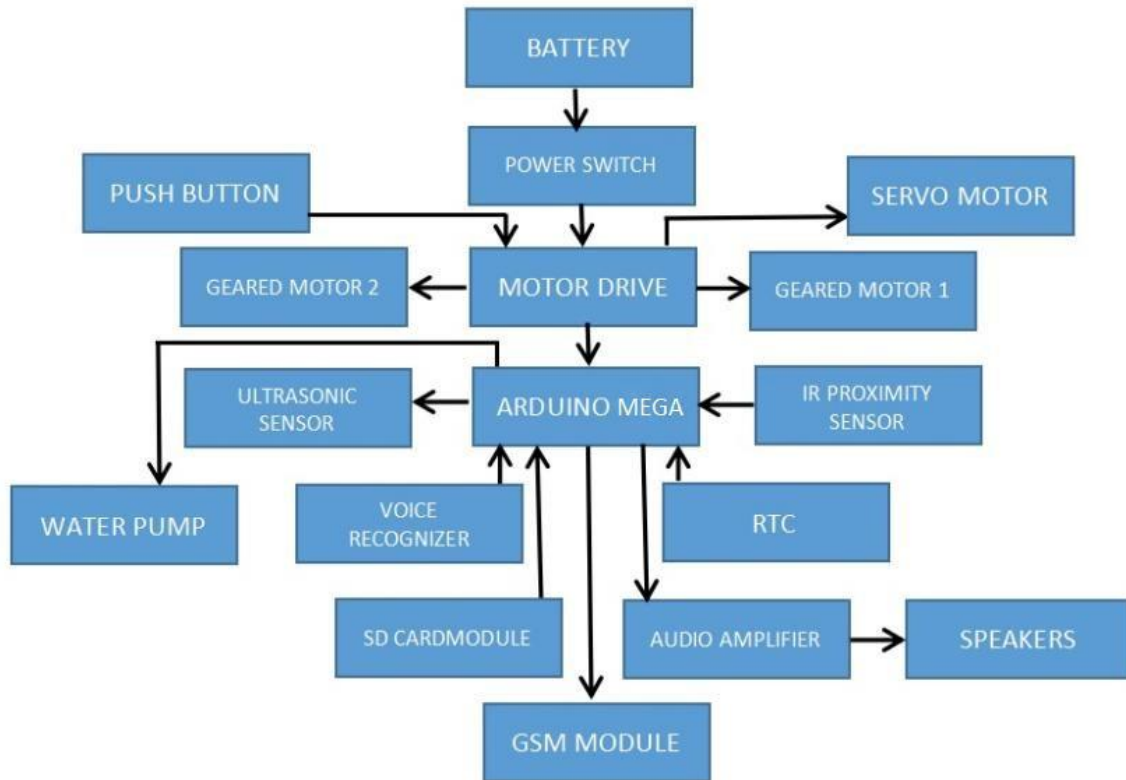


Figure 5.1 Block diagram of system

EXPLANATION OF BLOCK DIAGRAM

The Arduino Mega 2560 is powered by a 12V battery. The RTC module connect to the Arduino will send the accurate time to it. When the time for medication is reached the Arduino sends information to the servo motor so that it will move towards the patient following a given path.

This movement is facilitated with the help of the ultrasonic sensor and the proximity sensors. The DC-DC boost converter is used for providing proper high voltage to the geared motors. When the bot reaches near the user the servo motors will work the medicine dispenser and the medicines are provided to the user. Whenever a voice command is received through the voice recognizer needed output is given or provided as voice message. The SD card module is used for saving the needed

programs which can be accessed by the Arduino. Audio amplifier amplifies the output audio signal and sends out voice message through the speaker. The LCD display displays all the required digital outputs.

CHAPTER 6 FLOW CHART

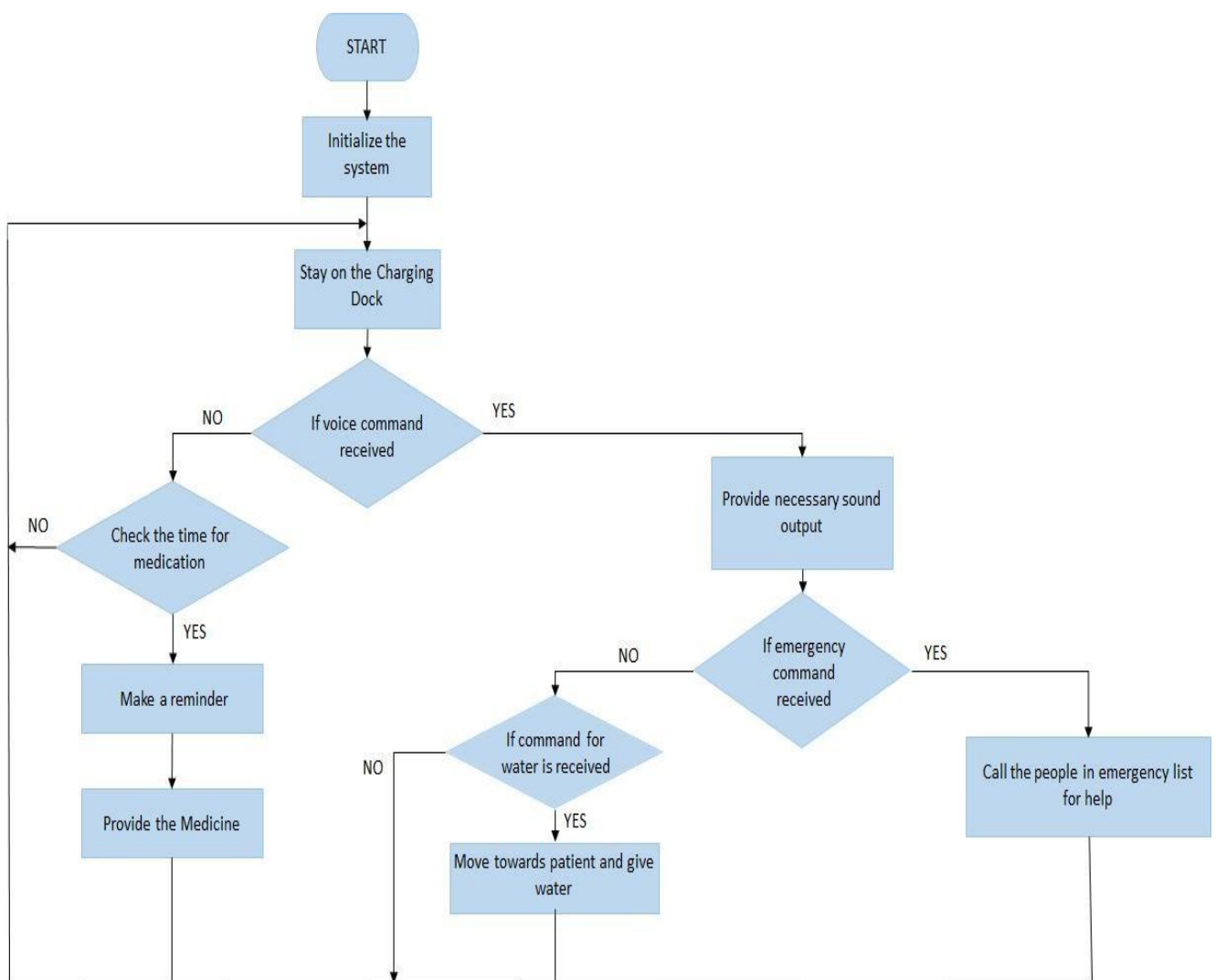


Fig 6.1 Flow chart of system

EXPLANATION OF BLOCK DIAGRAM

Initialize the system and bot will stay on the charging dock itself. Bot checks whether any voice command is received.

If any voice command is received,

Provide necessary sound outputs. Bot checks whether any emergency command is received. If received, call the people in emergency list for help. If not received, bot checks any command for water is received. If received, move towards the patient and provide water. If not, command received bot stays on the charging dock.

If no voice command is received,

Bot checks the time of medication. If time of medication is reached make a reminder and provide the medicine. If time of medication is not reached is bot stays on the charging dock.

CHAPTER 7 HARDWARE DESCRIPTIONS

7.1 ARDUINO MEGA 2560

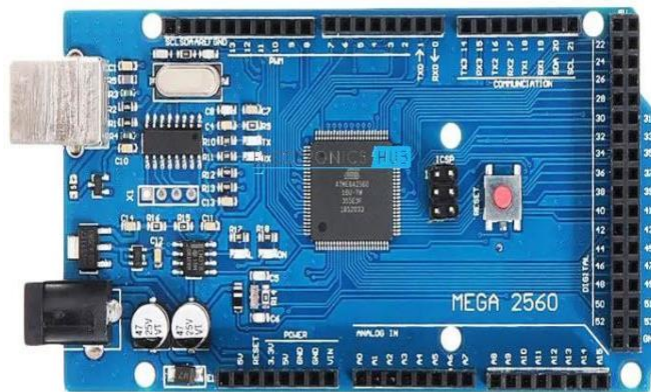


Fig.7.1.1 Arduino MEGA 2560

The Arduino Mega2560 has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega2560 provides four hardware UARTs for TTL (5V) serial

SPECIFICATIONS

- Advanced RISC architecture – On-chip 2-cycle multiplier
- High endurance, non-volatile memory segments
- JTAG (IEEE 1149.1 compliant) interface
- QTouch library support
- Power-on reset (POR) and programmable brown-out detection
- Internal Calibrated RC oscillator
- External and internal interrupt sources

7.1 GEARED MOTOR (12V 60 RPM)



Fig7.2.1 Geared Motor

Geared motors are used in G-BOT to provide high torque. A geared DC motor has a gear assembly attached to the motor. This speed of motor is counted in terms of rotations of the shaft per minute and is termed as RPM. The gear assembly helps in increasing the torque and reducing the speed.

SPECIFICATIONS

- Motor Type : DC with Gear Box, Metal Gears
- Base Motor : DC 18000 RPM
- Shaft Type : Circular 6mm Dia with M3 thread hole.
30 mm shaft Length
- RPM : 60 RPM at 12V

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- Weight : 180 Gms
 - Max Load Current: Up to 7.5A (Max)

7.1 MOTOR DRIVER (VNH2SP30)



Fig7.3.1 MOTOR DRIVER (L298N)

We use motor drivers to give high power to the motor by using a small voltage signal from a micro controller or a control system. If the microprocessor transmits a HIGH input to the motor driver. The driver will rotate the motor in one direction keeping the one pin as HIGH and one pin as LOW.

SPECIFICATIONS

- Dual H Bridge Motor Drive
- L298N Motor Driver IC
- Drives up to 2 Bi-Directional motors
- Integrated 5V power regulator
- 5V to 35V power regulator
- 5V to 35V drive voltage
- 2A max drive current

7.4 SERVO MOTOR(MG995)



Fig.7.4.1 SERVO MOTOR(MG995)

Servo motors are used for robotic applications that require precision positioning. Before diving too deeply into the ways servos are used in robotics.

SPECIFICATIONS

- Operating voltage : 4.8V
- Idle current : 5mA
- No load speed: 0.17sec/60°
- Running current: 350mA
- Peak stall torque: 9.0kg.cm

7.5 VOICE RECOGNIZER (SKU: 25586)



Fig.7.5.1 VOICE RECOGNIZER (SKU: 25586)

The Voice Recognizer used in robot to understand spoken instructions. So, the robot can recognize defined commands and the design robot will navigate based on the instruction through Voice Recognizer. **SPECIFICATIONS:**

- Voltage: 4.4 -5.5 V
- Current:40 mA
- Digital Port: UART Port and GPIO 5V TTL Level
- Simulate Port: 3.5mm mono microphone connector and microphone pin interface
- Recognition accuracy: 99% (in an ideal environment)
- Supports up to 80 voice commands, 1500ms per voice (one or two words)
- Up to 7 voice commands are valid at the same time

7.6 12V 7Ah BATTERY



Figure 7.6.1 12v 7ah BATTERY

The main sources of electrical for robots are batteries. The type of battery that is used for a robot varies depending on the safety, life cycle and weight. Lead acid batteries are commonly used battery.

SPECIFICATIONS

- Nominal Voltage: 12v.
- Nominal Capacity @ 20hr rate (AH): 7.0.

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- Discharge Current @ 20hr rate (mA): 350.
 - Dimensions: 15.1 x 6.5 x 9.4cm (5.95 x 2.56 x 3.7")
 - Weight: 2.7kg.

7.7 SPEAKER =5W 8Ohms



Figure 7.7.1 Speaker =5W 8Ohms

A speaker in robot to deliver a speech or to make the sound from the robot louder. It is an electroacoustic transducer that converts an electrical audio signal into a corresponding sound.

SPECIFICATIONS

- Power: Rated Power / Maximum Power 5.0W / 5.5W.
- Impedance: 8 Ohms Plus/Minus 15%.
- Size: 70 mm * 31 mm * 16 mm / 3.1 inch * 1.2 inch * 0.63 inch (L * W * T).
- Compatible With Arduino, Robot, Raspberry Pi, Advertising Machine, Game Machine, Integrated Machine Special Speaker etc, Projects.

7.8 AUDIO AMPLIFIER

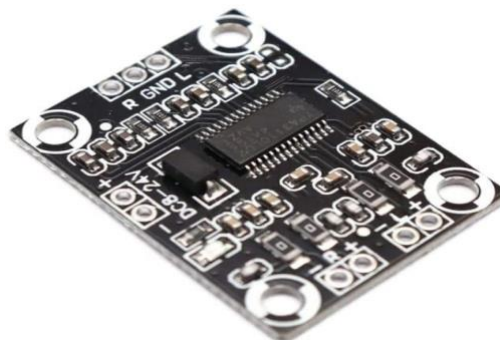


Figure 7.8.1 Audio Amplifier

It is designed to drive Professional Stereo Audio Speakers. This Amplifier Board is mostly used with 8-ohm speakers but it can successfully drive the speaker as low as 4 ohms. It's a very highly efficient board which eliminates the need of using a heat sink. This device is fully protected against the shorts to GND, VCC & Output to Output.

SPECIFICATIONS

- Operating voltage range: 8V to 24V
- Amplifier chip: TPA3110 / HDX8816A
- Output power: 2 x 15W
- Dimension: 25mm x 33mm x 3mm

7.9 Timer RTC (ds3231)

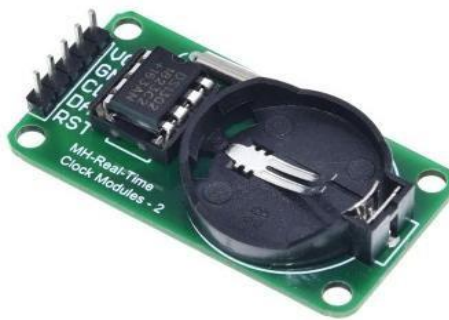


Figure 7.9.1 Timer RTC (ds3231)

A Real Time Clock or RTC is a digital clock with a primary function to keep accurate track of time even when a power supply is turned off or a device is placed in low power mode. RTC's are comprised of a controller, oscillator and an embedded quartz crystal resonator.

SPECIFICATIONS

- 318 temporary data storage RAM
- Working current of 2.0V, less than 300nA
- 8 pin DIP package or optional 8 pin SOIC package based on the surface assembly
- Simple 3 wire interface

7.10 Ultrasonic sensor JSN-SR04T



Figure 7.10.1 Ultrasonic sensor JSN-SR04T

The ultrasonic sensor is useful for detecting objects that are some distance away from the robot. However, unlike the touch sensor, the ultrasonic sensor does not rely on physical contact. The distance gives more space in which respond.

SPECIFICATIONS

- Operating Voltage: 5 V
- Sonar Sensing Range: 2-400 cm
- Max. Sensing Range: 4500 cm
- Frequency: 40 KHz
- Thickness: 2.8-3.1 mm
- The diameter of mounting hole: 3.8mm
- Mounting Bracket Material: acrylic

7.11 SD Card Module 5V I2C



Figure 7.11.1 SD Card Module 5V I2C

An SD Card module is an essential component for all microprocessor / microcontroller which helps in data login and creates a local data backup which can be accessed at any point later in time, unlike in systems which lack a card reader module where the data from sensor or other input devises is immediately lost as soon as the system powers off.

SPECIFICATIONS

- Support Micro SD Card ($\leq 2\text{G}$), Micro SDHC card ($\leq 32\text{G}$) (high-speed card)
- The level conversion circuit board that can interface level is 5V or 3.3V
- Power supply is 4.5V ~ 5.5V, 3.3V voltage regulator circuit board
- Communication interface is a standard SPI interface
- 4 M2 screw positioning holes for easy installation
- Size: 4.1 x 2.4cm

7.12 Water pump



Figure 7.12.1 Water pump

A mini submersible water pump is a centrifugal water pump, which means that it uses a motor to power an impeller that is designed to rotate and push water outwards.

SPECIFICATIONS

- Material: Polyvinyl Chloride
- Style: Submersible

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- Power Source : ac/dc
 - Maximum Flow Rate :120 Liters Per Hour

7.13 IR PROXIMITY SENSOR



Figure 7.13.1 IR Proximity Sensor

- Detection range: Few centimetres to several meters.
- Operating voltage: IR Proximity sensor include 3.3V,5V & 12V

7.14 SIM900A



Figure 7.14.1 SIM900A

This is an ultra-compact and reliable wireless module. The SIM900A is a complete Dualband GSM/GPRS solution in a SMT module which can be embedded in the customer applications allowing you to benefit from small dimensions and cost-effective solutions

SPECIFICATIONS

Dimensions: 24x24x3mm

Weight: 3.4g

Control via AT commands (GSM 07.07 ,07.05 and SIMCOM enhanced AT Commands)

SIM application toolkit

Supply voltage range: 3.2 ... 4.8V

Low power consumption: 1.0mA (sleep mode)

Operation temperature: -40°C to +85 °C

CHAPTER 8 CIRCUIT DIAGRAM

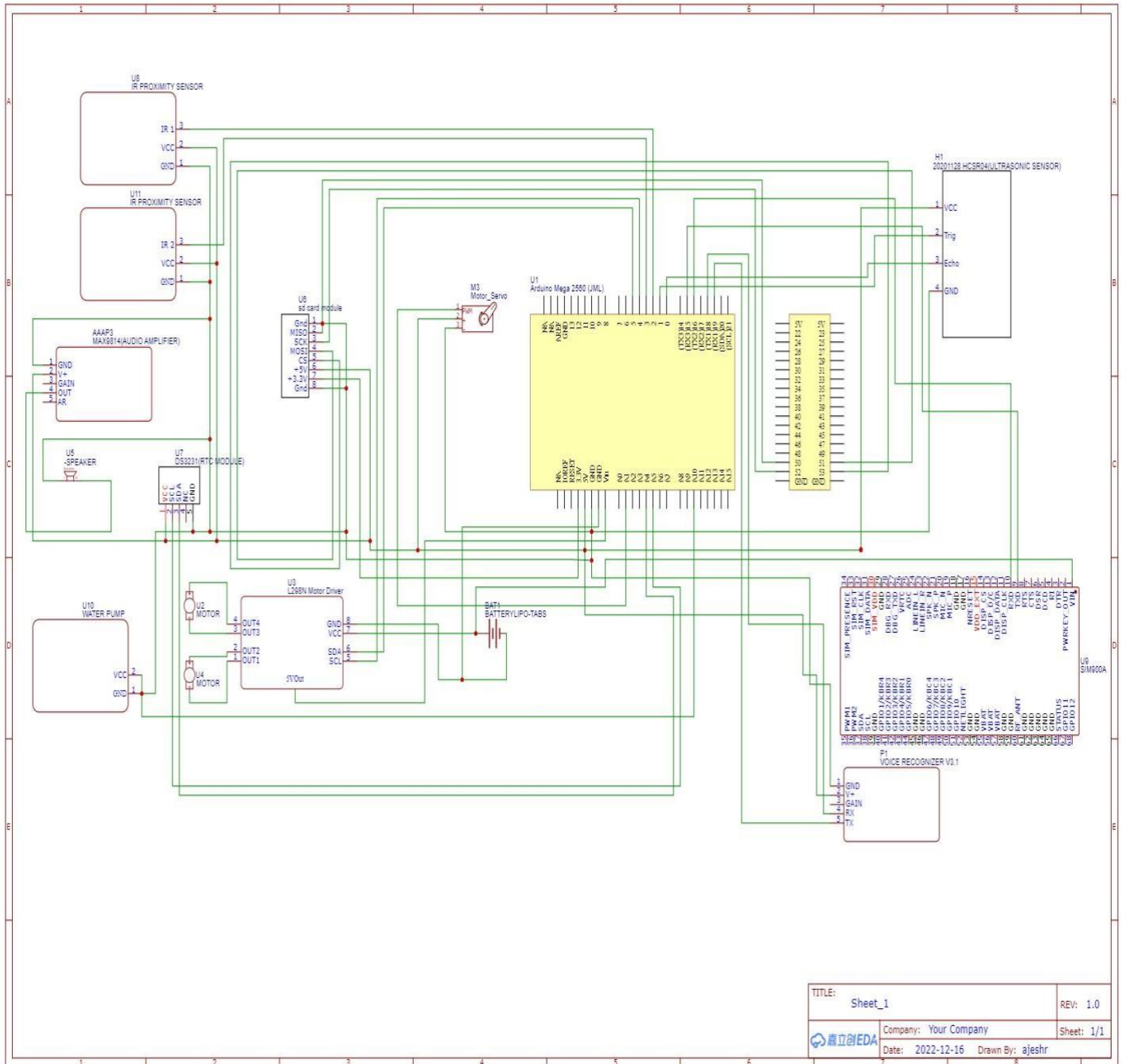


Figure 8.1 Circuit diagram

EXPLANATION OF CIRCUIT DIAGRAM

The figure shows the detailed circuit diagram of G-Bot : The 12v battery powers the motor drive with 12v supply and the 5v output from the motor driver gives power to the Arduino. The Rtc module connected to the Arduino sends the live time to the Arduino using its SCL and SDA pins which are connected to the Arduino mega to establish an I2C communication. When the required time is reached, the Arduino mega collects data from the IR proximity sensors which are connected to the digital pins of the Arduino from the IR1 and IR2 pins of the IR proximity sensor modules which is powered by 5v by the Arduino mega. According to the sensor readings the motor drive is given instructions to turn the 2 geared motors. The IN1, IN2, IN3&IN4 are the 4 pins that controls the direction in which the motors are to be driven by the motor drive the EnA and EnB pins connected to the Arduino from the motor drive controls the speed of the motors. The ultrasonic sensor is connected to the Arduinos digital pins to check whether any obstacles are Infront of the bot. For that the eco and the trigger pins provides information to the Arduino. The voice recognizer module is constantly checking for voice signals. The RX pin of the voice recognizer is connected to the Arduinos TX pin and the TX pin of the voice recognizer is connected to the RX pin of the Arduino. A 5v supply is provided to the voice recognizer by the Arduino. These pins help recognize any voice signals and provide necessary outputs. The water pump is connected to the Arduino to pump water during medicine dispensing period and on voice commands. In case of any emergency a voice command can be given which will be recognized by the voice recognizer, the GSM module whose transmitter and receiver pins are connected to the pins 15 and 16 gets activated and sends the emergency message to the saved contacts. In case of voice command for time the speaker connected with the out pin of amplifier whose pins are connected to the amplifier gives the sound output of the time at that instance. The main feature of the G-BOT which is to give medicine is made possible with the help of a servo motor which rotates at particular delay to drop the medicine at right time. The servo motor is connected to the A1 pin of the Arduino along with VCC and GND connected appropriately

CHAPTER 11

RESULTS

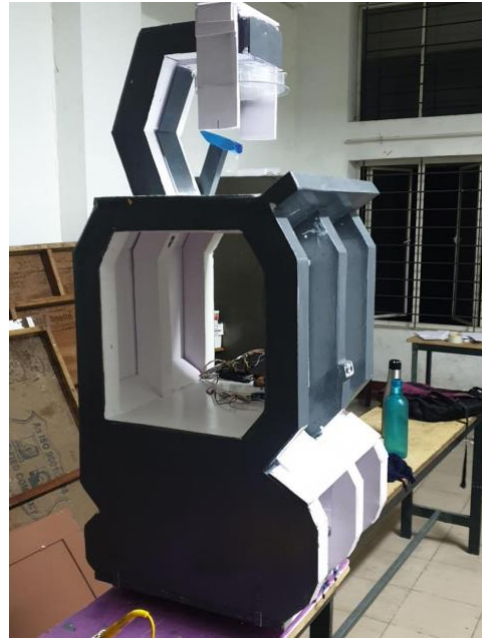
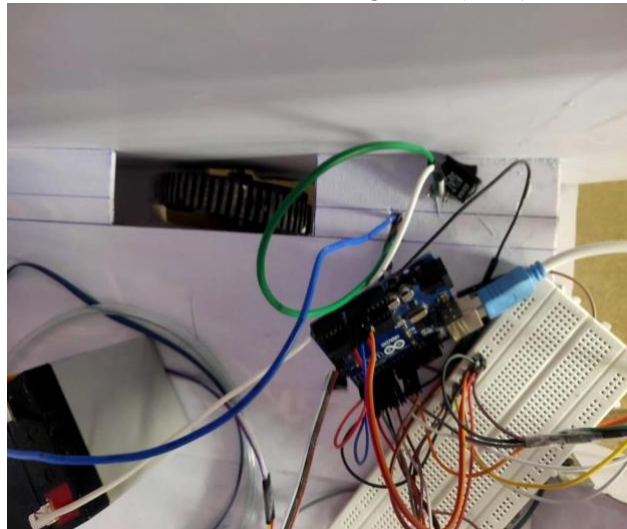


Figure 11(a,b,c)



CHAPTER 13 CONCLUSION

An IOT Based Personal Assistant Medi-BOT for old age people (G-BOT)' is aimed at providing a helping hand for our older generations. Our bot will surely make the life of the old people much organized and easier. The Bot has functions such as providing the right medicines at the right time, providing water, video calling to their loved ones using voice commands. The Bot can also be used to monitor the old ones with the help of the video camera which can be accessed using a smartphone or a computer, during any emergency situation the Bot will be able to provide notifications and calls to the relatives of the user and also give information to the nearest medical emergency crew to save the users life. It also has the functionality of providing water with the help of a voice command. Our bot will have added functionalities like internet connected voice assistance that will help in providing small entertainments and getting information's through the internet with the help of a voice command. The Bot will travel towards the patient and provides the medicine and water at the right time. It will also have added functionalities like making a remainder for any events stated by the user. So, our project will become a new milestone in the field of medicine dispensers and geriatric Bots.

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