DELIBOT : MODERN DELIVERY SYSTEM

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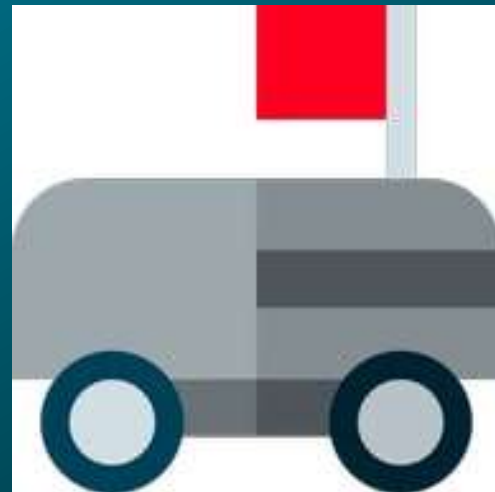
CONTENT

1

INTRODUCTION

DELIBOT

◉ DeliBot is new generation delivery service provider technology which uses **an automated robot that brings your delivery directly to your door.**

◉ It allows the delivery of goods to customer without any need of interference of human interverntion on the delivery side .

◉ This Robot is the secure, simple, and easy to delivery of goods by a courier service or a food delivery service. We use the gps to control the movement of the autonomous delivery robot . Gps helps us to guide the robot from the starting point to the final destination at the customers house .

1.1

DELIBOT

- An android application is to give this gps location to the robot and this app giver the ability to use this gps coordinates provided from the robot .

- A QR scanner is also provide in the app to use to get the delivery from the delivery box using the QR code provided to the customer. With the use of Node MCU Board, it becomes much easy to design. Program a code and upload it to Node MCU just like a plug and play device.

- It is simple and cost efficient project and can be used as a basic Gps coordinates to drive the robot .

- In this project we have implemented multiple ways to give user a totally secure an faster delivery .
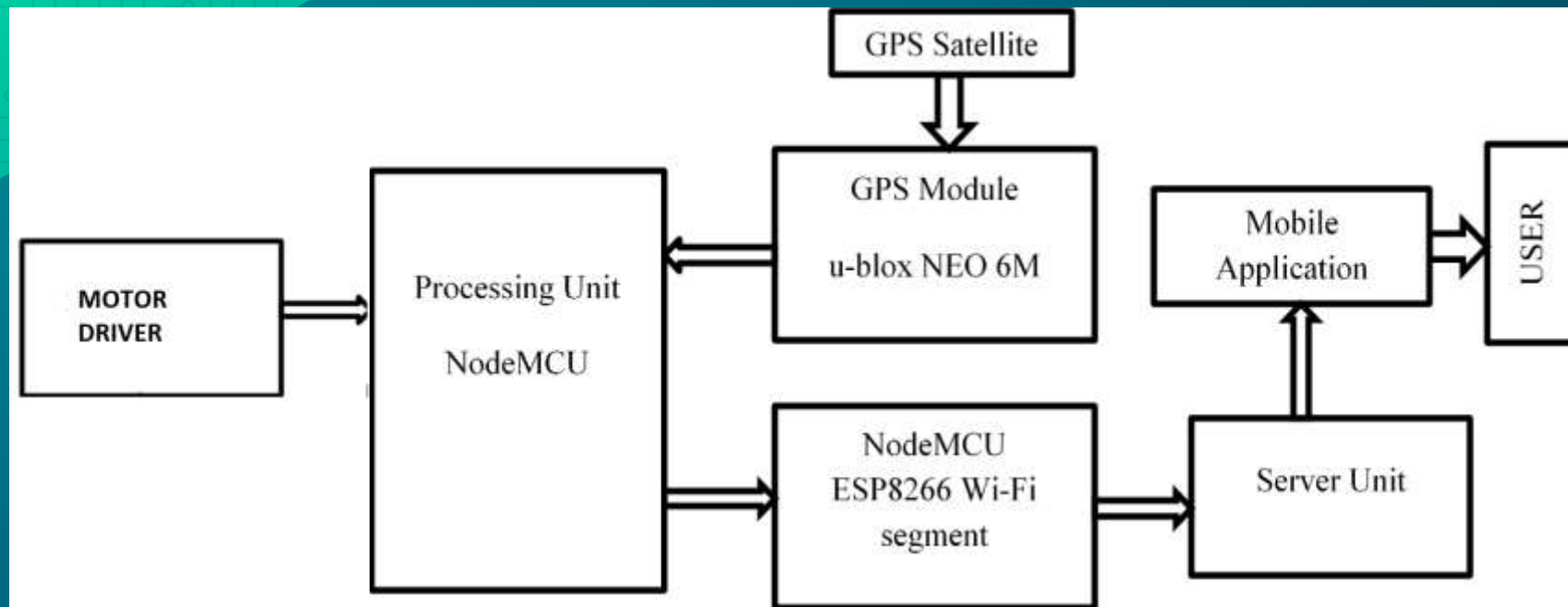
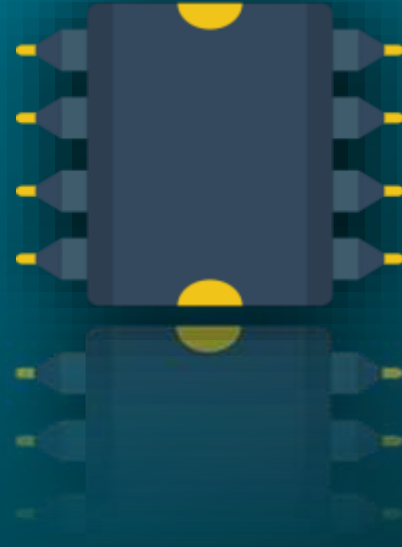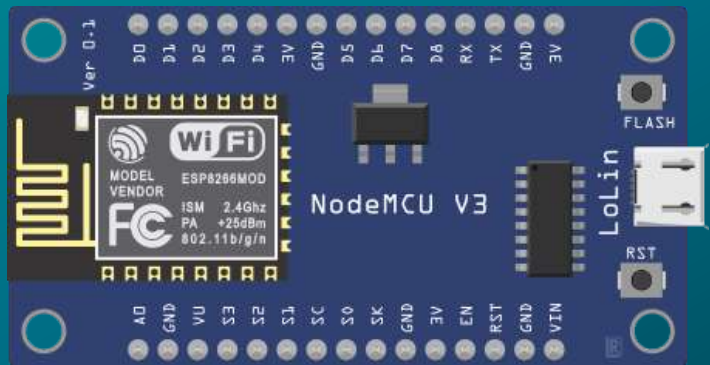**Block Diagram for DELIBOT**

2

HARWARE
IMPLEMENTATION

- DELIBOT

2.1

NODE MCU

- NodeMCU is an open source firmware for which open source prototyping board designs are available.
- The name "NodeMCU" combines "node" and "MCU" (microcontroller unit).The term "NodeMCU" strictly speaking refers to the firmware rather than the associated development kits Both the firmware and prototyping board designs are open source.
- The firmware uses the Lua scripting language. The firmware is based on the eLua project, and built on the Espressif Non-OS SDK for ESP8266. It uses many open source projects, such as lua-cjsonnd SPIFFS.

2.2

SERVO MOTOR

- A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration.It consists of a suitable motor coupled to a sensor for position feedback.

- It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors. Servomotors are not a specific class of motor, although the term servomotor is often used to refer to a motor suitable for use in a closed-loop control system.

- Servomotors are used in applications such as robotics, CNC machinery or automated manufacturing.Servo we use here is SERVO MOTOR SG90. IT is Tiny and lightweight with high output power. Servo can rotate approximately 180 degrees (90 in each direction), and works just like the standard kinds but smaller.
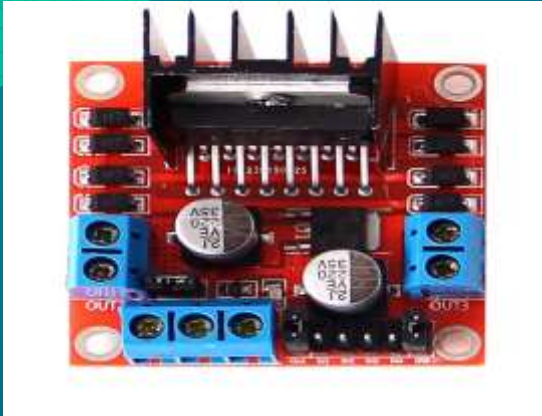
2.3

RGB LED

- RGB LED means red, blue and green LEDs. RGB LED products combine these three colors to produce over 16 million hues of light.
- Note that not all colors are possible. Some colors are "outside" the triangle formed by the RGB LEDs.
- Also, pigment colors such as brown or pink are difficult.

2.4

◉ This L298N Motor Driver Module is a high power motor driver module for driving DC and Stepper Motors. This module consists of an L298 motor driver IC and a 78M05 5V regulator. L298N Module can control up to 4 DC motors, or 2 DC motors with directional and speed control. The module has an on-board 78M05 5V regulator from STMicroelectronics. It can be enabled or disabled through a jumper.

◉ When this jumper is in place, the 5V regulator is enabled, supplying logic power supply(Vss) from the motor power supply(Vs). In this case, 5V input terminal acts as an output pin and delivers 5V 0.5A. You can use it to power up the Arduino or other circuitry that requires 5V power supply. When the jumper is removed, the 5V regulator gets disabled and we have to supply 5 Volts separately through 5 Volt input terminal

2.5

- This is a complete GPS module that is based on the **NEO 6M GPS**. This unit uses the latest technology to give the best possible positioning information and includes a larger built-in **25 x 25mm** active GPS antenna with a UART TTL socket. A battery is also included so that you can obtain a GPS lock faster .

- The GPS module has serial TTL output, it has four pins: **TX, RX, VCC, and GND**.
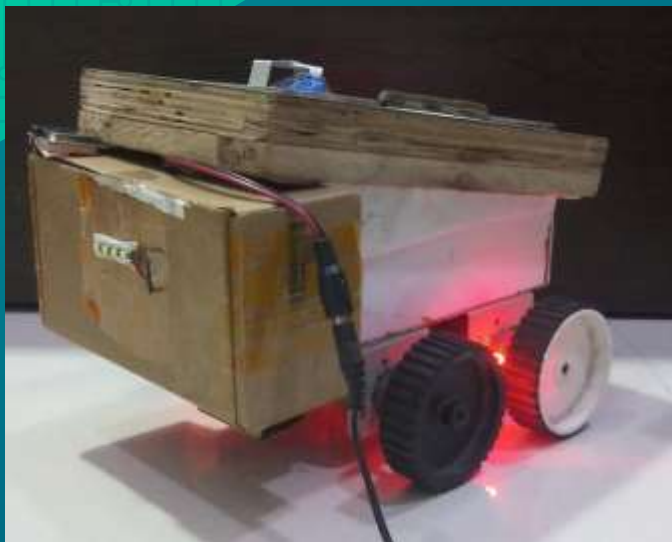
3
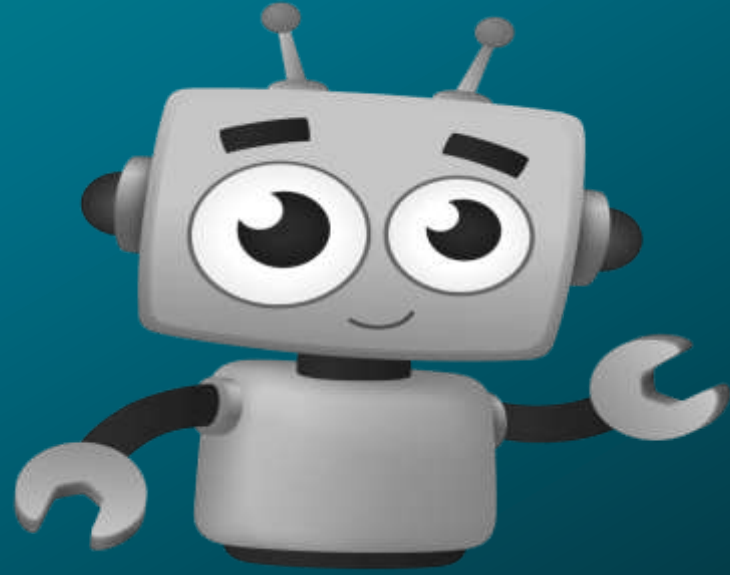
WORKING

- DELIBOT

3.1 WORKING

- In this project we have used a NodeMCU. The power to this NodeMCU is supplied through a 5 volt power supply. When this power supply starts the NodeMCU gets started which in turn starts the whole circuit and the code that has been stored in the NodeMCU starts compiling in the backend. Now that we have started the NodeMCU which connects to the cloud servers and the GPS module to the satellite .

- Now we connect our phone to this cloud that is same to the one connected to the NodeMCU to established the common ip connection. The application uses that ip address to pass the http based command. This cloud source is used to provide the GPS coordinates to the APP we have designed for the user to know the GPS route the robot will take and the current location of the package that is being delivered by the services . It has large range can be of gps location as it's a satellite based connection to the cloud .

- The cloud connection provides a transparent serial connection setup for transfer of gps data .This source is used to provide communication between NodeMCU and the smart phone, which will have Android Apps to monitor the DELIBOT .

- The cloud source is used as it has the capability for transferring data wirelessly and efficiently. The cloud source is first connected to an android application.

- Once wireless communication between Smartphone and NodeMCU is established through a cloud source , the location of the robot by transferring the GPS location are sent as longitudes and langitutdes to the main controller board and transferred inturn to the application . Then, NodeMCU controller is used to interpret the location and determines the place where the robots is on the path of the delivery and tracks it till it reaches the destination .

- The Arduino is programmed with C language. The application on the reaching the destination informs the customer to used the QR scanner . This scanner is used to open the package by scanning the QR code and taking the contents of the delivery that are to be of the customer .

4

MOBILE APPLICATION

– DELIBOT

DELIBOT App

MOBILE APPLICATION
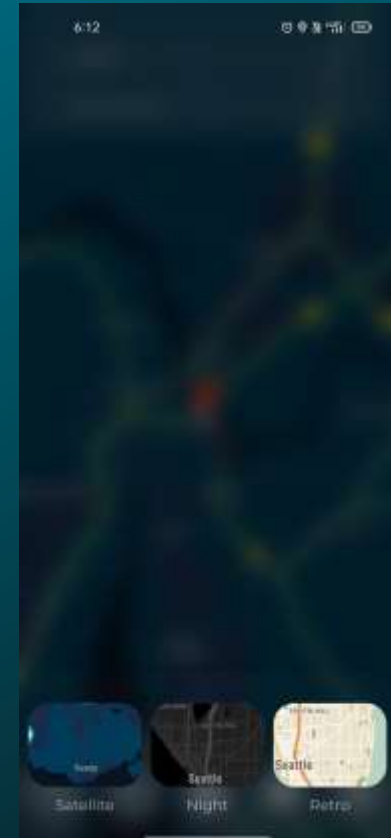
Your Shipment, Our Responsibility

Get Started

Welcome Back!
Please sign in to your account.

Email Address

Password

Sign In

G Sign In with Google

Don't have an Account? Sign Up

Origin

Destination

Bhiwandi

THANE WEST

Kashel

Thane

Dombi

BALUNG WEST

MUMBRA

AIROLI

NEW Gaon

KOPAR
KHAIRANE

WADHI

Satellite

Night

Retro

4.2

- The DeliBot uses app to provide information to the customer to track the delivery .
- The application is based application which uses cloud based connection for transmitting and receiving the Location and for QR code to open the received package respectively. This application also uses Firebase for log GPS tracking .
- The application has basically an GPS based to receive the location and which also saves the log for every GPS location of the robot to the application.
- Further the application helps us in safe transmission of the package and also provides us a QR code scanner which is to scan the QR code on the the delivery box which the user is provided access to by the service .

5

FUTURE SCOPE

– DELIBOT

5.1

FUTURE SCOPE

- For future scope, the device can be paired with a CCTV module to enhance the security.

- Additional Face Recognition can be installed.

- Device can be integrated speech based AI to enhance customer interaction .

- Can be used for deliveries in various other sectors too.

- Can be used for more secure and easily trackable delivery.
- Practically any place where there is a need of fast delievery is required .

6

ADVANTAGES

- DELIBOT

6.1

- ◉ In the era of technology , this modern technique of delivery system is a more faster and cost efficient way to delivery goods by a courier or restaurant services .
- ◉ The gps cloud based autonomous delivery robot solution is also easy to open the mobile phone APP all the operations ,the emergence of GPS based delivery bot , all the distance Tracking and real time delivery status ,traditional delivery ways can not solve the problem are solved easily.
- ◉ These robots can work daily with only one day maintaince and so there is no need to worry about deliveries even in holidays.

7

CONCLUSION

- DELIBOT

7.1

- The system(DELIBOT) has minimum requirements for hardware and supports a Faster , safer and and also reduces chance of spread of the recent COVID transmission as it has no human interaction with customer .

- The intrusion alert enhances the security of the system. The prototype built shows that the design consumes minimal power and gives a more faster and easily trackable delivery method .

8

REFERENCES.

– DELIBOT

8.1

- https://en.wikipedia.org/wiki/node-mcu
- https://www.google.com/nodemcu+img
- https://components101.com/servo-module
- https://en.wikipedia.org/wiki/Radio-frequency_identification

DELI-BOT : DELIVERY ROBOT SYSTEM

A Report on Mini Project Submitted for the requirement of
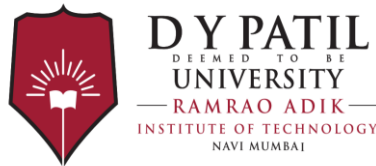
University of Mumbai

The practical work done during Semester - V in

Mini Project – 2A
(Electronics Engineering)
by

SHIVAM MISHRA
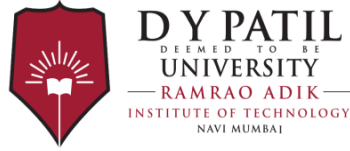**ABHISHEK SHARMA**
JAINAM KOTHARI

Under the Guidance of

PARAG PATIL

Department of Electronics Engineering
Ramrao Adik Institute of Technology
(Affiliated to the University of Mumbai)
Dr. D. Y. Patil Vidyanagar, Sector 7, Nerul,
Navi Mumbai 400 706.
November 2020

Ramrao Adik Education Society's

Ramrao Adik Institute of Technology

(Affiliated to the University of Mumbai)

Dr. D. Y. Patil Vidyanagar,Sector 7, Nerul, Navi Mumbai 400 706.

Certificate

This to certify that Miniproject entitled as

"DELI-BOT : DELIVERY ROBOT SYSTEM "

is a bonafide work done by
SHIVAM MISHRA
ABHISHEK SHARMA
JAINAM KOTHARI

is approved for the practical work done during Semester- V in

**Mini Project – 2A (Electronics
Engineering)**

for the

University of Mumbai.

Project supervisor	Project Coordinator

Head of Department	Principal

Certificate of Approval by Examiners

This is to certify that the submission entitled for the project **"DELI-BOT : DELIVERY ROBOT SYSTEM "**is a bonafide work done by **SHIVAM MISHRA, ABHISHEK SHARMA, JAINAM KOTHARI** "under the guidance of **"PARAG PATIL "** .This project work

has been approved for semester **V** in **Mini Project - 2A** , University of Mumbai.

Examiners:

_____

Internal Examiner: External Examiner:

Acknowledgment

I am very glad to thank to my H.O.D. Dr.Vishwesh A. Vyawhare and our Project guide Mr./Ms PARAG PATIL for their encouragement and tremendous guidance. I would like to express my special thanks to my colleagues and my parents for their support and help. I have been fortunate to received many useful suggestions from them which have greatly improved the clarity of my project. I would also like to thank our mini project coordinators for their constant support and timely guidance. I would also like to thanks to our Principal Dr. M.D Patil wholeheartedly. I would like to appreciate suggestions and criticisms about the report from the readers.

Contents

- **Introduction**
- **Review of Literature**
- **Hardware Implementation/**
- **Software Implementation**
- **Results**
- **Future Implementation of the Project**
- **Conclusions**
- **References**

INTRODUCTION

Over the years, technology has been used to provide solutions to complex problems facing various sectors around the world. In today's world we have , most of the hard work and dangerous work done by machine . We see machine in every sector of our livelihood , from industry's to fitness . An robots are the modern day machine we use to make better interactions with people who use them. We can use these robots in service sector too. And one such application of it is Delivery Robots delivery. A delivery robot is an automated robot that brings your delivery directly to your door. In package delivery business the most wasteful part is the last-mile delivery. It means delivering packages from package sorting office to client's door. This kind of delivery takes a lot of time and energy which also adds on the client's delivery cost. By using autonomous delivery robots these costs can be brought down to about fraction of the usual cost. Also clients can have more control over the time the package arrives to the door. Delivery efficiency is even more increased by fact that robots don't need to rest like humans and can work 24/7. Robots usually run on batteries and are thus very environment friendly and can move along sidewalks (UGV) or fly above buildings (UAV).

The traditional method of delivery was done using delivery vans and bicycles operated by human beings who used a manual system to locate the destination of their potential customers (Pafford, 2018). In addition, prior to the introduction of technology, the traditional delivery method was characterized by package theft, which lowered to the credibility of the delivery system and also resulted in the lack of trust as there was no accountability. In addition, there were delays in the local delivery while the methods used were also considered costly.

These robots aren't walking and talking humanoids; rather, these robots are cute delivery containers on six wheels, resembling small car shaped robots with a delivery package on it with a safe lock.As with other delivery services, you make your purchases through an app with vendors based on your location. The robot trundles to the vendor, whether for shopping, food, drinks, or otherwise and then it makes its way to your home.

During the exercise we build a simple ground vehicle platform which has the ability to move along people. This kind of robot platform is the basis of a delivery robot. By adding camera, sensors and connectivity the robot can be made fully autonomous and also remotely controllable for difficult to pass through areas.

REVIEW OF LITERATURE

Mobile robots are main testbed platforms of the current industrial revolution (Industry 4.0) [7]. For robots to become able to move, several problems should be solved. Path planning is considered a fundamental problem and is one of the most studied problems in robotics [8–14]. Research distinguishes between two architectures of path planning: reactive and deliberative path planning [5, 6]. In the reactive paradigm, a lowlevel control is implemented that produces an autonomous behaviour through a loop of sense-act couplings. In contrast, an AGV system which operates in a deliberative fashion applies a top-down approach that enables the robot to first sense relevant components of the operating environment, then plan its next step, and finally proceed with the corresponding action [6, 15]. Other researchers refer to the reactive and deliberative planning architectures as local and global planners, respectively [9, 16–19]. Local path planning assumes no a priori knowledge about the environment. Instead, the robot perceives existent environmental obstacles through the embedded sensors and generates its path in real time with relatively low computational effort [20]. By contrast, global path planning utilises a previously known map of the environment with all what it includes to generate a relatively safe path. Consequently, algorithms within the class of global path planning converge for sure only in static environments. Dynamic environments, however, require re-planning, which results in increased computational times for the applied method.

Hardware Implementation

1. NODE MCU

- Node MCU is an open source firmware for which open source prototyping board designs are available.
- The name "Node MCU" combines "node" and "MCU" (micro-controller unit).The term "Node MCU" strictly speaking refers to the firmware rather than the associated development kits Both the firmware and prototyping board designs are open source.
- The firmware uses the Lua scripting language. The firmware is based on the eLua project, and built on the Espressif Non-OS SDK for ESP8266. It uses many open source projects, such as lua-cjson and SPIFFS.

2. SERVO MOTOR

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- It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors. Servomotors are not a specific class of motor, although the term servomotor is often used to refer to a motor suitable for use in a closed-loop control system.
- Servomotors are used in applications such as robotics, CNC machinery or automated manufacturing.Servo we use here is SERVO MOTOR SG90. IT is Tiny and lightweight with high output power. Servo can rotate approximately 180 degrees (90 in each direction), and works just like the standard kinds but smaller.
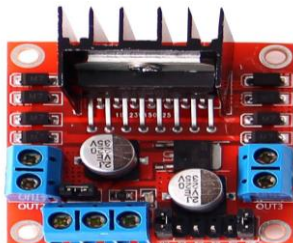- We have used a total of 4 servomotors to drive the delivery robot .

3. DC MOTOR

- A direct current (DC) motor is a type of electric machine that converts electrical energy into mechanical energy. DC motors take electrical power through direct current, and convert this energy into mechanical rotation.

- DC motors use magnetic fields that occur from the electrical currents generated, which powers the movement of a rotor fixed within the output shaft. The output torque and speed depends upon both the electrical input and the design of the motor.

- DC motors were the first form of motor widely used, as they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliance.


4. Motor Driver(L298N)

- This L298N Motor Driver Module is a high power motor driver module for driving DC and Stepper Motors. This module consists of an L298 motor driver IC and a 78M05 5V regulator. L298N Module can control up to 4 DC motors, or 2 DC motors with directional and speed control. The module has an on-board 78M05 5V regulator from STMicroelectronics. It can be enabled or disabled through a jumper

- When this jumper is in place, the 5V regulator is enabled, supplying logic power supply(Vss) from the motor power supply(Vs). In this case, 5V input terminal acts as an output pin and delivers 5V 0.5A. You can use it to power up the Arduino or other circuitry that requires 5V power supply. When the jumper is removed, the 5V regulator gets disabled and we have to supply 5 Volts separately through

5. <u>NEO-6M GPS Module with EPROM</u>

- This is a complete GPS module that is based on the NEO 6M GPS. This unit uses the latest technology to give the best possible positioning information and includes a larger built-in 25 x 25mm active GPS antenna with a UART TTL socket. A battery is also included so that you can obtain a GPS lock faster.

- This is an updated GPS module that can be used with ardupilot mega v2. This GPS module gives the best possible position information, allowing for better performance with your Ardupilot or other Multirotor control platform.

- The GPS module has serial TTL output, it has four pins: TX, RX, VCC, and GND.
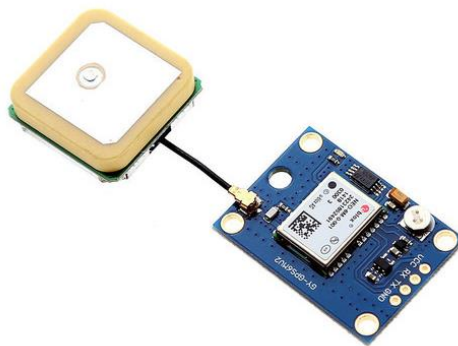
6. <u>JUMPER WIRES</u>:
- Jumper wires are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. Jumper wires are typically used with breadboards and other prototyping tools in order to make it easy to change a circuit as needed. Fairly simple.

7. <u>RESITORS</u>:

- A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses. High-power resistors that can dissipate many watts of electrical power as heat, may be used as part of motor controls, in power distribution systems, or as test loads for generators.
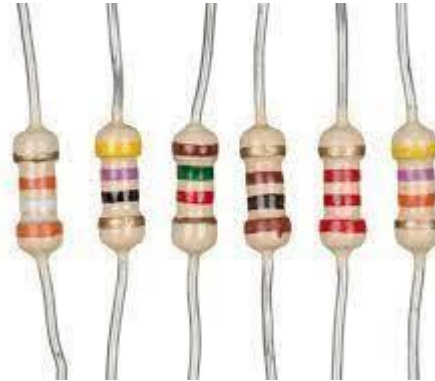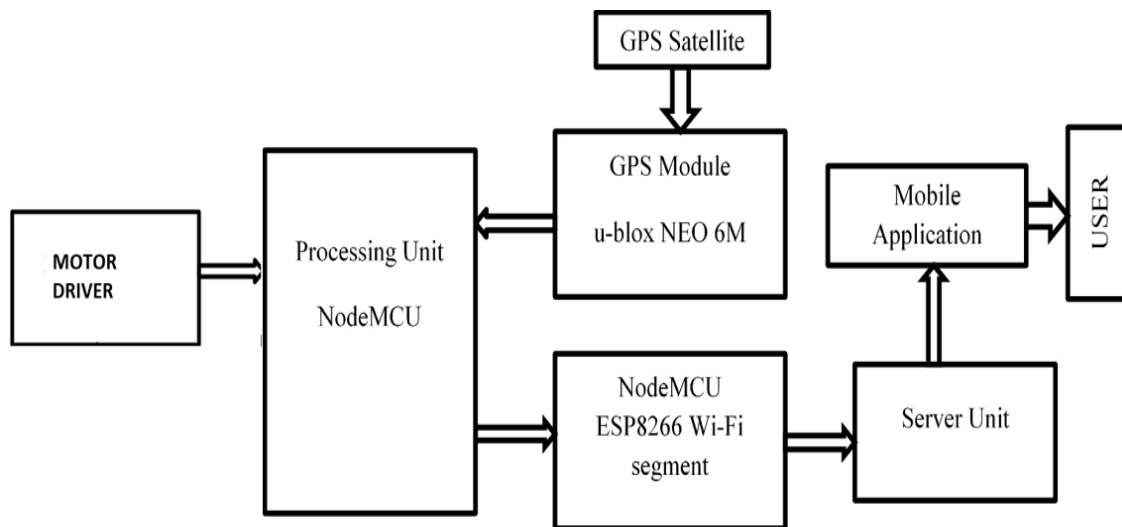

8. <u>RGB LED</u>:

- RGB LED means red, blue and green LEDs. RGB LED products combine these three colors to produce over 16 million hues of light. Note that not all colors are possible. Some colors are "outside" the triangle formed by the RGB LEDs. Also, pigment colors such as brown or pink are difficult.

BLOCK DIAGRAM

WORKING

- In this project we have used a NodeMCU. The power to this NodeMCU is supplied through a 5 volt power supply. When this power supply starts the NodeMCU gets started which in turn starts the whole circuit and the code that has been stored in the NodeMCU starts compiling in the backend. Now that we have started the NodeMCU which connects to the cloud servers and the GPS module to the satellite .

- Now we connect our phone to this cloud that is same to the one connected to the NodeMCU to established the common ip connection. The application uses that ip address to pass the http based command. This cloud source is used to provide the GPS coordinates to the APP we have designed for the user to know the GPS route the robot will take and the current location of the package that is being delivered by the services . It has large range can be of gps location as it's a satellite based connection to the cloud .

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- The Node MCU is programmed with C language. The application on the reaching the destination informs the customer to use the QR scanner . This scanner is used to open the package by scanning the QR code and taking the contents of the delivery that are to be of the customer .

CIRCUIT DIAGRAM
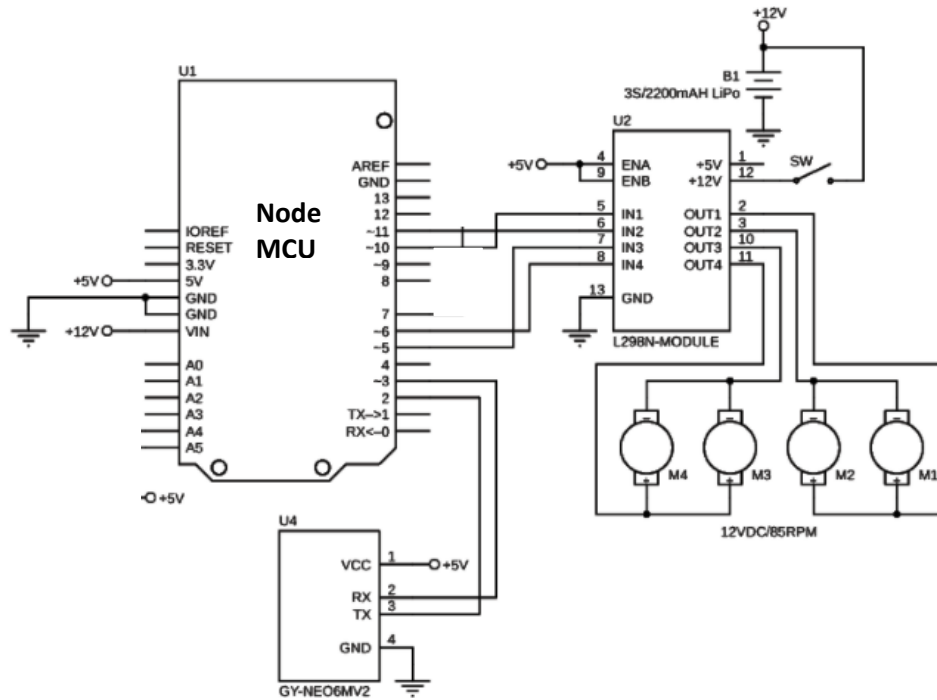
SOFTWARE IMPLIMENTAION:

- Firebase is a platform developed by Google for creating mobile and web applications. It was originally an independent company founded in 2011. In 2014, Google acquired the platform and it is now their flagship offering for app development

- The DeliBot uses app to provide information to the customer to track the delivery and to know the location and provides

- The application is based application which uses cloud based connection for transmitting and receiving the Location and for QR code to open the received package respectively. This application also uses Firebase for log GPS tracking .

- The application has basically an GPS based to receive the location and which also saves the log for every GPS location of the robot to the application.

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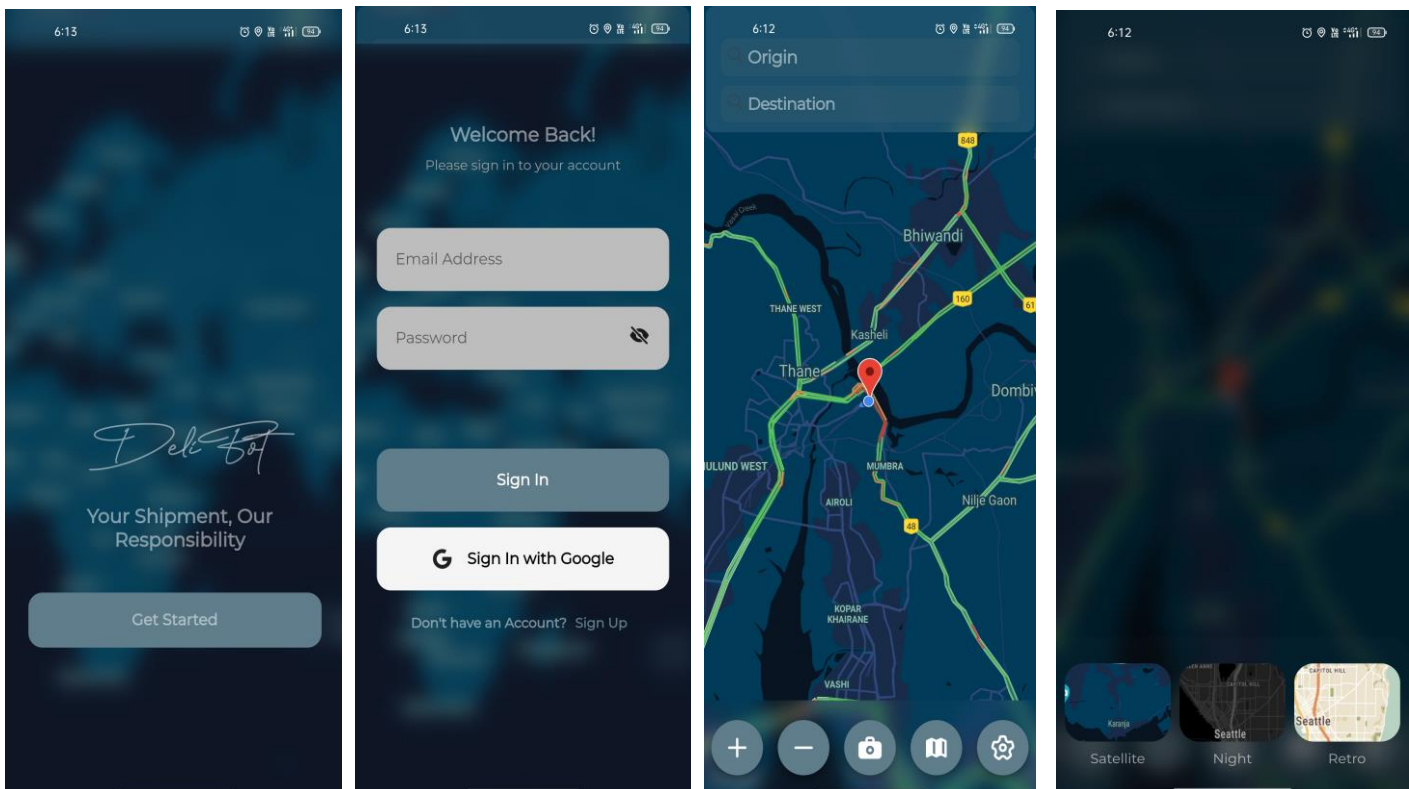
RESULT:

- This project goes through the primary result and objectives achieved by   this thesis.

- The goal was to create a functioning IoT product that helps is in modernizing the delivery system , by using autonomous robts to deliver good.

- It also provides a software to the user to real time tracking and safe delivery of goods with out the need of any human interaction with the customers

- The increase in the secure tracking and faster application of the delivery has been observed .

- A test was applied on every subsystem during the development until reaching the last milestone where we had functioning product .

- All the final results are in the preferred range and the error in the practical test of the product has been kept in the viable range and to its minimum after multiple testing .
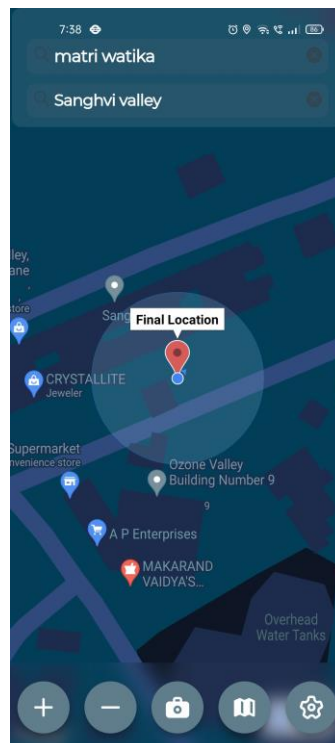
Future Implementation of the LockRity

◉ For future scope, the device can be paired with a CCTV module to enhance the security.

◉ Additional Face Recognition can be installed.

◉ Device can be integrated speech based AI to enhance customer interaction .

◉ Can be used for deliveries in various other sectors too.

◉ We can enhance its security by providing and special anti-theft properties , like alarm , when it goes 10 meter away from the the required path coordinates .

◉ It can be made faster by using more complex and faster response motor and More sophisticated micro-controller like audrino Mega .

◉ It practically be used in any place where there is a need of fast delievery is required with lesser human interaction with customer.

Conclusion

In conclusion, it was discovered that the project performed according to specification and can be implemented or set up in various places such as home, offices and industrial areas.

The Automated Delivery Robot can provide a faster and contactless delivery to customers by using this system. It can thus be concluded that the initial objectives which we set out to achieve as stated in this report has being successfully attained which were: To design autonomous robot than deliver goods using gps location and an android phone Develop mobile phone application that can be installed to track this robot and to provide Qr code for getting the delivery from the box.

To design a hardware cloud based delivery system .To interface the Android phone to the GPS location from cloud system by writing a C program a prototype of automatic access control system for use in an environment is presented.

The range and distance of the GPS system and the operating device Have been drascitcally increased by a satellite access and the size and hardware of used have been reduced with better application use than before.

 The system can be installed on a special made autonomous bot specially to deliver the various goods like small courier packages to food delivery items (the Working model has a capacity of 1 kg , which can be increased by increasing the size of the robot when in practical usage).

Reference

- https://en.wikipedia.org/wiki/NodeMCU
- https://www.electroschematics.com/neo-6m-gps-module/
- https://lastminuteengineers.com/l298n-dc-stepper-driver-arduino-tutorial/
- https://circuitdigest.com/microcontroller-projects/interfacing-gps-with-nodemcu-esp12
- https://firebase.google.com/