VISVESVARAYA TECHNOLOGICAL UNIVERSITY

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A Project Report on

"An Autonomous IOT-Agrobot controlled over a Google Assistant with Solar Powered Agricultural Machine"

A dissertation submitted in the partial fulfillment of the requirement for the Award of Degree of

BACHELOR OF ENGINEERING
in
ELECTRONICS & COMMUNICATION ENGINEERING

Submitted by

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CERTIFICATE

Certified that the Project Work entitled **"An Autonomous IOT-Agrobot controlled over a Google Assistant with Solar powered Agricultural Machine "** is a bonafide work carried out by **Anjum KM-3VC17EC004, Chetana Gumaste Desai-3VC17EC015, Manasa B-3VC17EC031, Sowbhagya Shree N-3VC17EC036** in partial fulfillment for the Award of Bachelor of Engineering in Electronics & Communication Engineering of Visvesvaraya Technological University, Belagavi during the year 2020-2021. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of project work prescribed for the said Degree.

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Lastly, I would like to express my gratitude to all those who have directly or indirectly contributed their efforts in making Project a success.

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DECLARATION

We, **ANJUM KM, CHETANA GUMASTE DESAI, MANASA B, SOWBHAGYA SHREE N** students of Eight semester BE, in the Department of Electronics and Communication Engineering, RYMEC, Ballari declare that the Project entitle **"An Autonomous IOT-Agrobot controlled over a Google Assistant with Solar powered Agricultural Machine "** has been carried out by me at **Dept of ECE RYMEC Ballari,** and submitted in partial fulfillment of the course requirements for the award of degree in **Bachelor of Engineering in Electronics & Communication Engineering**, of Visvesvaraya Technological University, Belagavi during the year 2020-2021.

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Abstract:

Agriculture is the backbone of our nation. India being a land of agriculture majority of people in India still follow agriculture as their primary occupation. However due to shortage of labor and mechanized equipment's, Indian agricultural still follows obsolete methods which heavily affect productivity of agricultural produce. With technological advancements in many other fields, agriculture is still followed by obsolete methods, as majority of the farmers are not literate to operated highly complicated technological devices. Thus this project simplifies the technology for farmers using Google voice. This project involves development of completely autonomous agricultural machines which can be used for different applications such as spraying, sowing, irrigation using voice commands over IOT where farmers can operate the machine in the farm form any corner of the world using google voice. The machine is capable of performing multiple operations such as sowing, spraying, cutting and more. Since the machine is voice activated, the farmers can easily control the machine as it involves just voice commands. Further the machine operates over IOT and is autonomous, so that farmer can control the machine from any corner of the world. Thus this project provides a completely economical solution to problems faced by farmers and automating agricultural operations improving productivity. Further the machine is solar powered which not only makes it green but also ecofriendly and cost free for farmers.

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CHAPTER 1

INTRODUCTION

India is the land of villages. This being said the major occupation of majority of villages in India isagriculture. Near about 70% people are dependent upon agriculture. Agriculture has been the backbone of the Indian economy and it will continue to remain so for a long time.

- Indian agriculture is characterized by agro-ecological diversities in soil, rainfall, temperature, and cropping system. Besides favorable solar energy, the country receives about 3 trillion m^3 of rainwater, 14 major, 44 mediums and 55 minor rivers share about 83 per cent of the drainage basin. About 210 billion m^3 water is estimatedto be available as ground water. Irrigation water is becoming a scarce commodity. Thus proper harvesting and efficient utilization of water is of great importance.
- The nation is striving to find ways and means to keep its burgeoning population adequately fed. On the one hand it is facing the problem of declining productivity and on the other, challenges posed by liberalization. In such a scenario, leveraging the available natural resources and existing infrastructure is the only way to make the ends meet. Management of the already built infrastructure in harmony with natural systems is the clarion call of the day.
- Knowledge of the extent of existing infrastructure and natural resources is one of the most basic pre-requisites to utilize them effectively and in a sustainable manner.
- The productivity of farms depends greatly on the availability and judicious use of farm power by the farmers. Agricultural implements and machines enable the farmers to employ the power judiciously for production purposes. Agricultural machines increase productivity of land and labor by meeting timeliness of farm operations and increase work out-put per unit time.
- Besides its paramount contribution to the multiple cropping and diversification of agriculture, mechanization also enables efficient utilization of inputs such as seeds, fertilizers and irrigation water. Most of the agricultural operations are still following obsolete methods. The technology and Artificial intelligence scope are exponentially expanding day by day.
- The proposed project deals with the development "Google Kisan-An Agrobot for automated agricultural operations". The proposed project can be controlled from any comer of the world using voice commands by farmers.
- The proposed project can recognize the command the farmer gives over google voice and can start performing that particular operation in the field.

CHAPTER 2

LITERATURE SURVEY

Before starting with the project a brief literature review was done regarding the solutions available in the market. Additionally, the number of research papers by different research scholars are also studied to arrive at the scope of the project. According to

[1]This paper proposes the smart agricultural IOT implementation which gives a better performance for producing a crop agricultural field and cloud based agricultural system can give a performance and store the data for future use. This hybrid method may be actualized through reducing time and manual power.

[2]IOT based smart agriculture gives information about irrigation having facilities like smart control and making intelligent decision depending upon real time data from fields. All these operations will be controlled through any smart device placed remotely and the interfacing sensors are used to perform operations along with Wi-Fi, actuators and other hardware devices.

[3]The whole system was developed using infield sensors which collects data from farm and using GPS data is sent to base station where necessary action is to determine to control irrigation according to database available with the system. It takes its own decisions and controls the installed devices and user can control the system using android app or commands in auto and manual mode respectively.

[4]This proposed project made an effort to overcome some problems in agriculture. The system is beneficial to the farmers for the basic seed planting operation. The mode operation of robot for different seed is very simple to configure. Low percentage leading to wastage of seeds can be reduced by the use of this system. Labor problem can be reduced.

[5]Muthunoori Naresh and at all have proposed a thought of consolidating the most recent innovation into the agrarian field to turn the customary techniques for water system to current strategies and making simple profitable and temperate trimming. Some degree of mechanization is presented empowering the idea of observing the field and the product conditions inside some long-separate extents utilizing cloud administrations.

CHAPTER 3

PROBLEM STATEMENT

PROBLEM STATEMENT

Since olden times man has been cultivating and depending heavily on the plants and crops to arrange for the staple food. To do this he had to toil and severe with labor. As the technology advances people wish for more and more comfort, reliability and fast operations. India is a farmer's country and major part of the revenue is generated out of the agriculture industry.

Thus considering the research made in the field of agriculture this project aims at taking the research to further level by development Google controlled agricultural machine which can be controlled by farmer's voice over internet. The machine is autonomous thus providing the complete power to farmers.

CHAPTER 4

OBJECTIVES

- To develop an agrobot which can be controlled by voice commands from farmers using google assistant.
- To implement IOT based control system, which can be used to give commands from anywhere in the world using internet
- To implement seed sowing systems in the project so that the project can be used for sowing the seeds.
- To implement Spraying system in the machine so that the machine can be used for the spraying operation
- To implement the Cutting mechanisms so that machine can be used for cutting operation
- To make the system solar powered so that it is green, eco-friendly and cost free for farmers to operate
- To make the system automated so that it is totally autonomous and performs above operations autonomously once the farmers gives commands over the google assistant.
- To make the system easy to operate.

CHAPTER 5

HARDWARE AND SOFTWARE USED

HARDWARE USED:

1. ESP8266SOC Wi-Fi Module:

Node MCU is an open source lot platform. It includes firmware which runs on the ESP8266 Wi-Fi So from Espresso, and hardware which is based on the ESP-12 module. The term "Node MCU" by default refers to the firmware rather than the dev kits. The firmware uses the Lua scripting language. It is based on the Eula project, and built on the Espressif Non-OS SDK for ESP8266. It uses many open source projects, such as lua-cjson, and spiffs

Figure 1: Node MCU

2. Arduino Mega 2560:

A microcontroller is a self-contained system with peripherals, memory and a processor that can be used as an embedded system for processing signals. Most programmable microcontrollers that are used today are embedded in other consumer products or machinery including phones, peripherals, automobiles and household appliances for computer systems. Due to that, another name for a microcontroller is "embedded controller." Some embedded systems are more sophisticated, while others have minimal requirements for memory and programming length and a low software complexity. Input and output devices include solenoids, LCD displays, relays, switches and sensors for data like humidity, temperature or

light level, amongst others.

A microcontroller (sometimes abbreviated **µC, (uC or MCU)** is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals. Program memory in the form of Ferroelectric RAM, NOR flash or OTP ROM is also often included on chip, as well as a typically small amount of RAM. Microcontrollers are designed for embedded applications, in contrast to the microprocessors used m personal computers or other general purpose applications).

The high-performance, low-power Atmel 8-bit AVR RISC-based microcontroller combines 256KB ISP flash memory, 8KB SRAM, 4KB EEPROM, 86 general purpose I/0 lines, 32 general purpose working registers, real time counter, six flexible timers/counters with compare modes, PWM, 4 USARTs, byte oriented 2-wire serial interface, 16-channel IO-bit AID converter, and a JTAG interface for on-chip debugging. The device achieves a throughput of 16 MIPS at 16 MHz and operates between 4.5-5.5 volts.

By executing powerful instructions in a single clock cycle, the device achieves a throughput approaching 1 MIPS per MHz, balancing power consumption and processing speed.

Features:

- **High Performance:** Low Power AVR® 8-Bit Microcontroller

- **Advanced RISC Architecture:**
  - 135 Powerful Instructions - Most Single Clock Cycle Execution
  - 32 x 8 General Purpose Working Registers
  - Fully Static Operation
  - Up to 16 MIPS Throughput at 16 MHz
  - On-Chip 2-cycle Multiplier

• **High Endurance Non-volatile Memory Segments:**

- 64K/128K/256K Bytes of In-System Self-Programmable Flash
- 4K Bytes EEPROM
- SK Bytes Internal SRAM
- Write/Erase Cycles: 10,000 Flash/ 100,000 EEPROM
- Data retention: 20 years at 85°C/ 100 years at 25°C
- Optional Boot Code Section with Independent Lock Bits

• **In-System Programming by On-chip Boot Program**

• **True Read-While-Write Operation**

- Programming Lock for Software Security Endurance: Up to 64K Bytes Optional External Memory Space

• **JTAG (IEEE std. 1149.1 compliant) Interface:**

- Boundary-scan Capabilities According to the JTAG Standard
- Extensive On-chip Debug Support
- Programming of Flash, EEPROM, Fuses, and Lock Bits through the JTAG Interface

• **Peripheral Features:**

- Two 8-bit Timer/Counters with Separate Prescaler and Compare Mode
- Four 16-bit Timer/Counter with Separate Prescaler, Compare- and Capture Mode
- Real Time Counter with Separate Oscillator
- Four 8-bit PWM Channels
- Six/Twelve PWM Channels with Programmable Resolution from 2 to 16 Bits (ATmega1281/2561, ATmega640 /1280/2560)
- Output Compare Modulator
- 8/16-channel,10-bit ADC (ATmega1281/2561, ATmega640/1280/2560)
- Two/Four Programmable Serial USART (ATmega1281/2561, ATmega640/1280/2560)
- Master/Slave SPI Serial Interface

- Byte Oriented 2-wire Serial Interface
- Programmable Watchdog Timer with Separate
- On-chip Oscillator
- Interrupt and Wake-up on Pin Change

• **Special Microcontroller Features:**

- Power-on Reset and Programmable Brown-out Detection
- Internal Calibrated Oscillator
- External and Internal Interrupt Sources
- Six Sleep Modes: Idle, ADC Noise Reduction, Power-save, Power-down, Standby and Extended Standby

• **I/0 and Packages**

- 54/86 Programmable I/0 Lines (ATmega1281/2561, ATmega640/1280/2560)
- 64-pad QFN/MLF, 64-lead TQFP (ATmega1281/2561)
- 100-lead TQFP, 100-ball CBGA (ATmega640/1280/2560)
- RoHS/Fully Green

• **Temperature Range:**

- -40°C to 85°C Industrial

• **Ultra-Low Power Consumption:**

• Active Mode: 1 MHz, 1.8V: 500 µA

• Power-down Mode: 0.1 µA at 1.8V

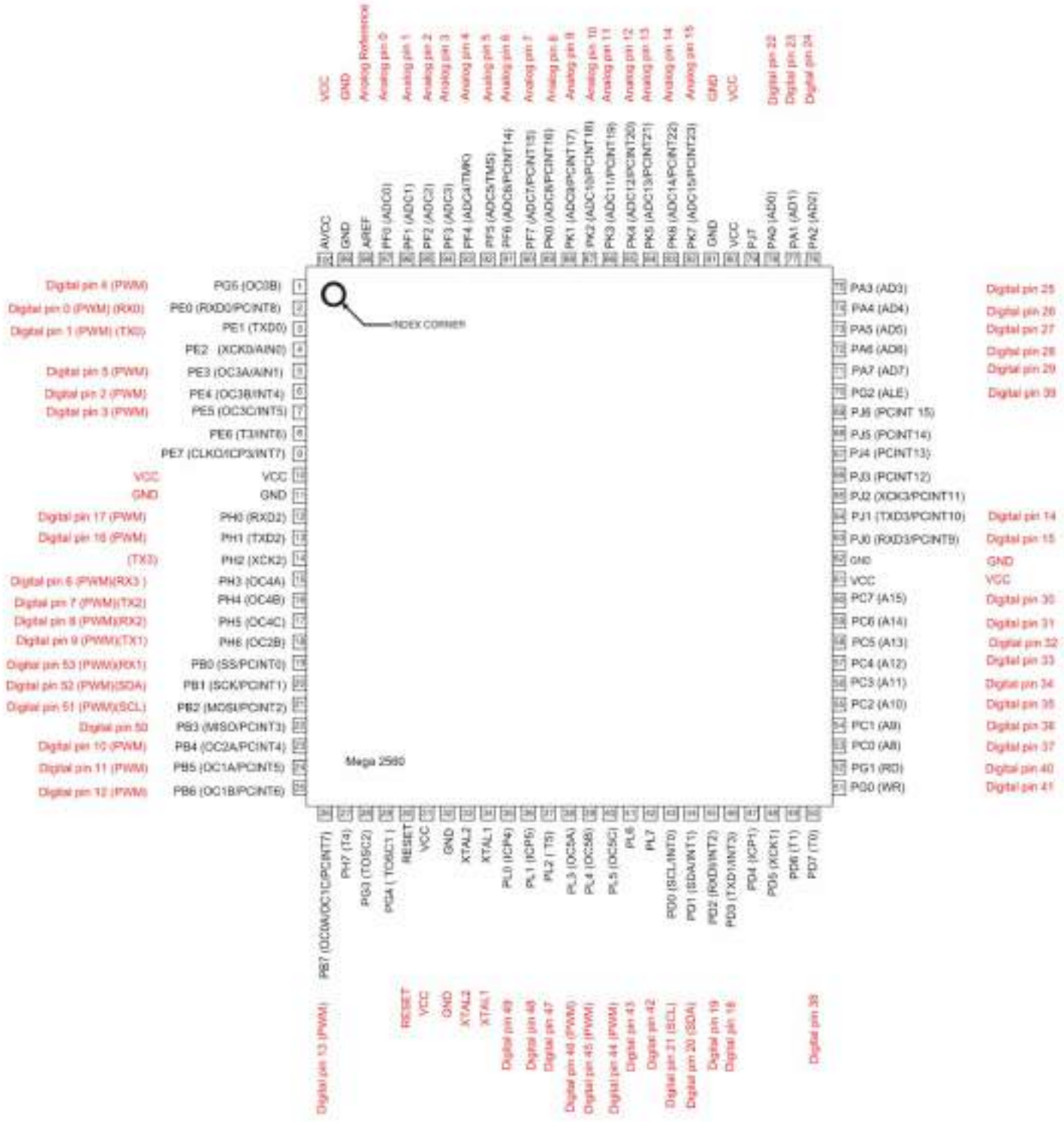


Figure 2: At mega 2560 pinout

3. Encoder Sensor:

A rotary encoder, also called a shaft encoder, is an electro-mechanical device that converts the angular position or motion of a shaft or axle to an analog or digital code. It is used to stop therobot at particular pitch. The rotary encoded is interfaced to the wheel of the robotic vehicle which rotates as the robotic vehicle rotates. This provides as closed loop control system based on which the distance is calculated and thus is the heart of the project. The rotary encoder is chosen in terms of the **PPR** of the rotary encoder. The **PPR** stands for pulse per revolution. The rotary encoder used in this project is 80 **PPR** rotary encoder. This means for one revolution of the rotary encoder we get 80 pulses as output. Also the shaft size of rotary encoder needs to be specified. The rotary encoder used in this project is 6mm shaft 80 PPR rotary encoder.

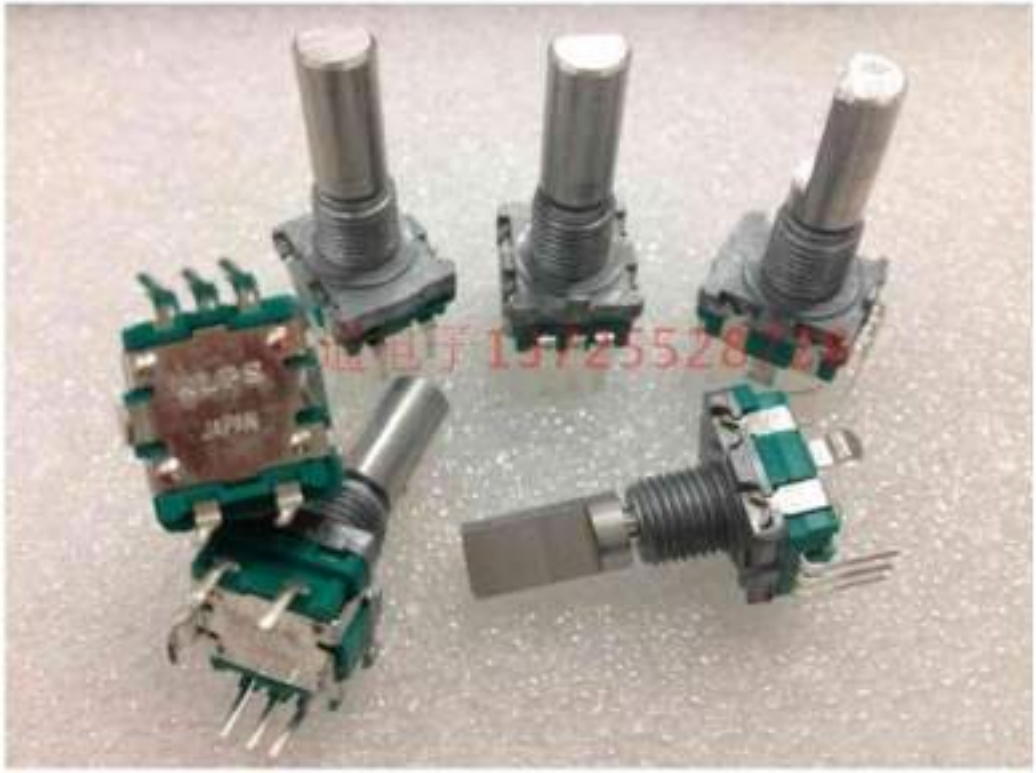


Figure 3: Encoder

4. Battery:

The battery or power supply unit provides the required power to the entire system. The batterychosen for this project was 12 V 1.2 AH battery.

This can continuously supply a current of 1.2 Amp for one hour.

Figure 4:Battery

The following calculations show the power supplied by the battery and other

calculations:Battery voltage: 12 V

Battery current: 1.2 AH

Therefore, power output of the battery is given

byP=VxI

= **12** x **1.2**

P = 14.4Watt

We use 12 V 1 Amp adapter for charging the system. Therefore, time required for charging isgiven by the calculations given below:

Power of adapter = 12 Watt

Therefore, time required for charging the battery is given by:

t = 14.4/12

t = 1.2 Hours

5. **Sonar Sensor:**

The project uses ultrasonic sensor for sensing the obstacles in the path of the google Kisan. But ultrasonic sensors were chosen as they are no susceptible to external radiation as in case of infrared sensor and the operating range of ultrasonic sensor is more.

Figure 5: Ultrasonic Sensor

An ultrasonic sensor transmits ultrasonic waves into the air and detects reflected waves from an object. There are many applications for ultrasonic sensors, such as in intrusion alarm systems, automatic door openers and backup sensors for automobiles. Accompanied by the rapid development of information processing technology, new fields of application, such as factory automation equipment and car electronics, are increasing and should continue to do so. Using its unique piezoelectric ceramics manufacturing technology developed over many years, Murata has developed various types of ultrasonic sensors which are compact and yet have very high performance. The information contained in this catalog will help you to make effective use of our ultrasonic sensors.

The figure shows the ultrasonic sensor used in this project. The following are the specifications of the sensor.

- Power Supply: +5V DC

- Quiescent Current: <2mA
- Working Current: 15mA
- Effectual Angle: <15°
- Ranging Distance: 2cm - 400 cm/1" - 13ft
- Resolution: 0.3 cm
- Measuring Angle: 30 degree
- Trigger Input Pulse width: 10uS
- Dimension: 45mm x 20mm x 15mm

6. Servo Motor:

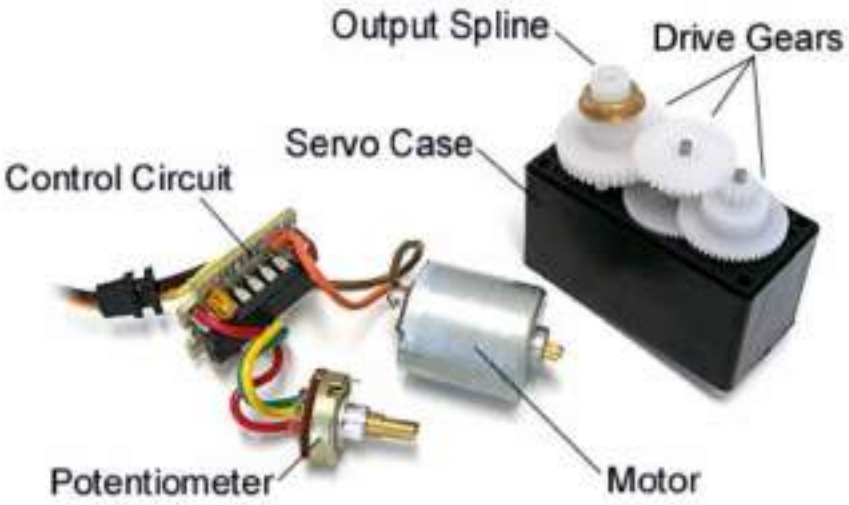
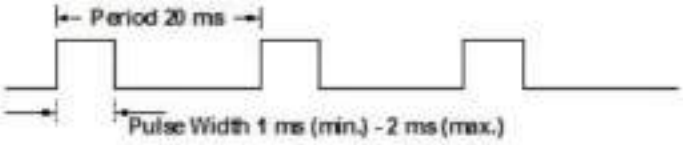
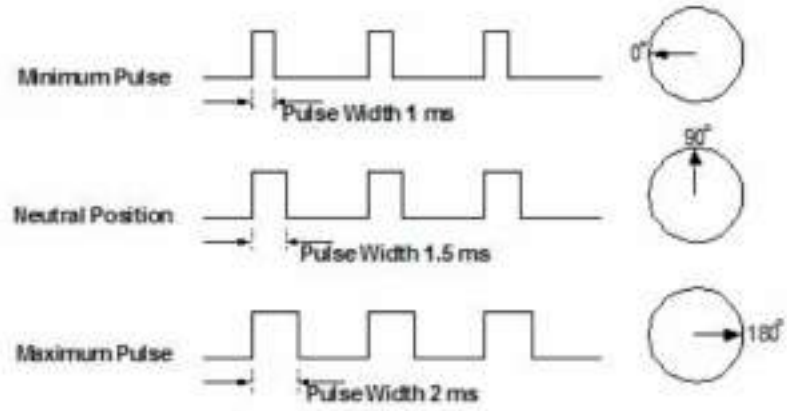


Figure 6: Servo Motor

Servos are controlled by sending them a pulse of variable width. The control wire is used to send this pulse. The parameters for this pulse are that it has a minimum pulse, a maximum pulse, and a repetition rate. Given the rotation constraints of the servo, neutral is defined to be the position where the servo has exactly the same amount of potential rotation in the clockwise direction as it does in the counter clockwise direction. It is important to note that different servos will have different constraints on their rotation but they all have a neutral position, and that position is always around 1.5 milliseconds (ms).



The angle is determined by the duration of a pulse that is applied to the control wire. This is called Pulse Width Modulation. The servo expects to see a pulse every 20 ms. The length of the pulse will determine how far the motor turns. For example, a 1.5 ms pulse will make the motor turn to the 90-degree position.



Another parameter that varies from servo to servo is the turn rate. This is the time it takes from the servo to change from one position to another. The worst case turning time is when the servo is holding at the minimum rotation and it is commanded to go to maximum rotation. This can take several seconds on very high torque servos. The servo used in our project is 9-gram servo.

Figure 7: The 9-gram servo used in our project

7. Spray Pump:

A Sprayer is basically a very simple machine consisting of a tank, a pump and nozzles. The tank holds the insecticide, the pump sucks it from the tank, discharges through a nozzle, where the pressure is converted to velocity in jets, causing atomization. A 12 V de pump is used to fetch the insecticides from the sprayer and feed it to the nozzle.

The specifications of the pump are as shown below.

- Rated Voltage: DC 9 V to 12V (1 amps)
- Load current: 0.7A (Max)
- Flow: 1.5 to 2 Ltr/min
- Max Lift: 3m
- Max Suction: 2m
- Max Water Temp: 70 °C
- Pump Size: 90mm * 40mm * 35mm approx.
- Input/output tube diameter: outer 8.5mm, inner 6mm approx.
- Max Current: Up to 2 Amps while starting up.
- Main Color: Silver Tone, White
- Material: Metal, Plastic
- Life: up to 2500 Hours

8. Relay Module:

Relays are electromechanical switches. They have very high current rating and both AC and DC motors can be controlled through them because motor will be completely isolated from the remaining circuit. Two common available SPDT relays are shown in the picture below.

Figure 8: Relay Module

Working of a relay: Relays consist of an electromagnet, armature, spring and electrical contacts. The spring holds the armature at one electrical contact and as soon as a voltage is applied across the electromagnet, it coils the armature, changes its contact and moves to another electrical contact. The figure below describes it's working.

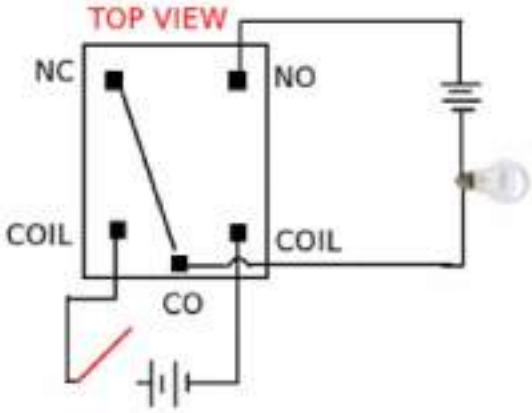


Figure 9: Top view of Relay Model

9. DC geared Motors:

The drive train of the seed sowing robotic vehicle includes the DC Motor with the reduction gear boxes. The drivetrain of a motor vehicle is the group of components that deliver powerto the driving wheels which will facilitate for the navigation of the robot in field. This excludes the engine or motor that generates the power. In contrast, the powertrain is considered to include both the engine or motor and the drivetrain. The function of the drivetrain is to couple the motor that produces the power to the driving wheels that consume this mechanical power. The operating speed of the motor and wheels are also different and must be matched by the correct gear ratio.

Sl. No	Parameter	Value
1	Voltage	12
2	Current	800 mA
3	Shaft size	6 mm
4	Gear Type	Heavy duty metal
5	Weight	300 gms
6	Speed	30 Rpm

This project uses 30 RPM high power DC geared motors for the purpose of navigation. The technical specifications of the motors are as shown above.

10. Solar Panel:

Solar panels are devices that convert light into electricity. They are called "solar" panels because most of the time, the most powerful source of light available is the Sun. Some scientists call them photovoltaics which means, basically, "light-electricity." A solar panel is a collection of solar cells. Lots of small solar cells spread over a large area can work together to provide enough power to be useful. The lighter that hits a cell, the more electricity it produces, so the machine is usually designed with solar panels that can always be pointed at the Sun even as the rest of the body of the machine move around.

Figure 10: Solar Panel

This project uses a 10 Watt 12 V solar panel as it is sufficient to charge the battery. The technical specifications of the solar panel are as shown below.

Electrical Characteristics	
Cells	multi crystal silicon
No. of Cells & Connections	36 Cells in Series
Open Circuit Voltage -Voe	21.6 V
Maximum Power Voltage - Vmp	1 7.2 V
Short Circuit Current - Isc	0.64 A
Maximum Power Current - Imp	0.58 A
Mechanical Characteristics	
Weight	1.5kg
Dimensions	310 x 368 x 18 mm
Power	10 watts

11. I2C LCD display:

The LCD display is used to give the visualization to the farmer regarding the data entered. The LCD display prints the data regarding the pitch entered, Different modes of the vehicle and also the error messages. Further in moisture mode it prints the value of moisture sensor onto the LCD display. The LCD display used in this project is blue backlight 16 x 2-character LCD display.

Figure 11: LCD Display

The 16 represents the number of columns and 2 represents the row. The Type of display used is I2C LCD display.

12. Buzzer:

A **buzzer** or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of **buzzers** and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

SOFTWARE USED:

1. Arduino IDE

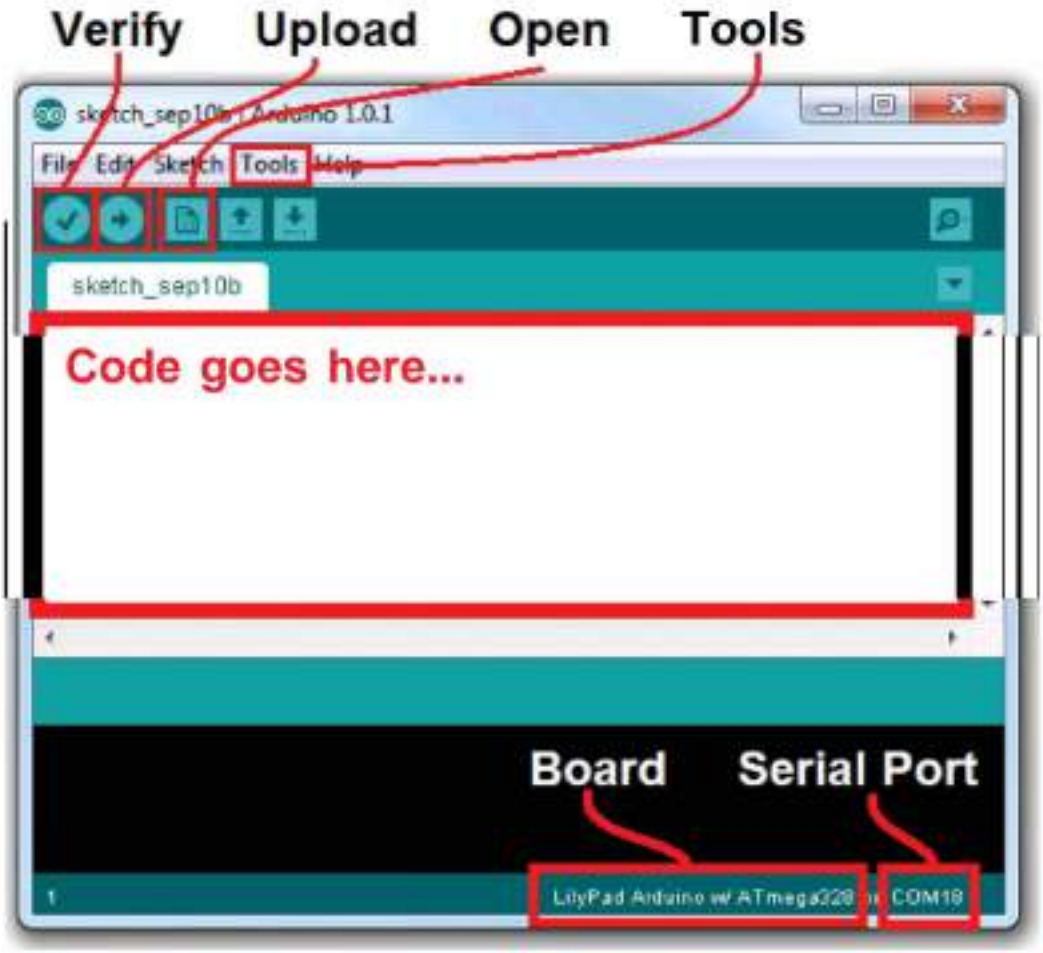


Figure 12: Arduino mega 2560

The Arduino Ide is the software which we will be using to compile and upload the programs to theArduino board.

Procedure:

1.Connect the Arduino board to your PC.

2.Go to control panel-> device manager-> and note the com port to which it is connected

3.0pen Arduino IDE.

4 The code Verify and compile it using the verify button as shown in the figure above

5.Verify and compile it using the verify button as shown in the figure above.6.Go

6. Go to tools select the proper board and com port

7. Click upload to burn the program to the microcontroller.

What is Arduino?

An Arduino is open source platform based on easy-to-use hardware and software. Arduino are able to the read inputs - light on a sensor, finger on a button, or a Twitter message - and turn it into an output activating a motor, turning on an LED, publishing something online.

Arduino Software (IDE), based on Processing.

Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of makers - students, hobbyists, artists, programmers, and professionals - has gathered around this open-source platform, their contributions have added up to an incredible amount of accessible knowledge that can be of great help to novices and experts alike.

Arduino was born at the livre Interaction Design Institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. As soon as it reached a wider community, the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards to products for lot applications, wearable, 3D printing, and embedded environments. All Arduino boards are completely open-source, empowering users to build them independently and eventually adapt them to their particular needs. The software, too, is open-source, and it is growing through the contributions of users worldwide.

Why Arduino?

Thanks to its simple and accessible user experience, Arduino has been used in thousands of different projects and applications. The Arduino software is easy-to-use for beginners, yet flexible enough for advanced users. It runs on Mac, Windows, and Linux. Teachers and students use it to build low cost scientific instruments, to prove chemistry and physics principles, or to get started with programming and robotics. Designers and architects build interactive prototypes, musicians and artists use it for installations and to experiment with new musical instruments. Makers, of course, use it to build many of the projects exhibited at the Maker Faire, for example. Arduino is a key tool to learn new things. Anyone - children, hobbyists, artists, programmers - can start tinkering just following the step by step instructions of a kit, or sharing ideas online with other members of the Arduino community.

There are many other microcontrollers and microcontroller platforms available for physical computing. Parallax Basic Stamp, Net media's BX-24, Phidgets, MIT's Handy board, and many others offer similar functionality. All of these tools take the messy details of microcontroller programming and wrap it up in an easy-to-use package. Arduino also simplifies the process of working with microcontrollers, but it offers some advantage for teachers, students, and interested amateurs over other systems:

Inexpensive - Arduino boards are relatively inexpensive compared to other microcontroller platforms. The least expensive version of the Arduino module can be assembled by hand, and eventhe pre-assembled Arduino modules cost less than $50

Cross-platform - The Arduino Software (IDE) runs on Windows, Macintosh OSX, and Linux operating systems. Most microcontroller systems are limited to Windows.

Simple, clear programming environment - The Arduino Software (IDE) is easy-to-use for beginners, yet flexible enough for advanced users to take advantage of as well. For teachers, it's conveniently based on the Processing programming environment, so students learning to program in that environment will be familiar with how the Arduino IDE works.

Open source and extensible software - The Arduino software is published as open source tools, available for extension by experienced programmers. The language can be expanded through C++ libraries, and people wanting to understand the technical details can make the leap from Arduino to the AVR C programming language on which it's based. Similarly, you can add AVR-C code directly into your Arduino programs if you want to.

Open source and extensible hardware - The plans of the Arduino boards are published under a Creative Commons license, so experienced circuit designers can make their own version of the module, extending it and improving it. Even relatively inexperienced users can build the breadboard version of the module in order to understand how it works and save money.

CHAPTER 6

METHODLOGY

6.1 Block Diagram:

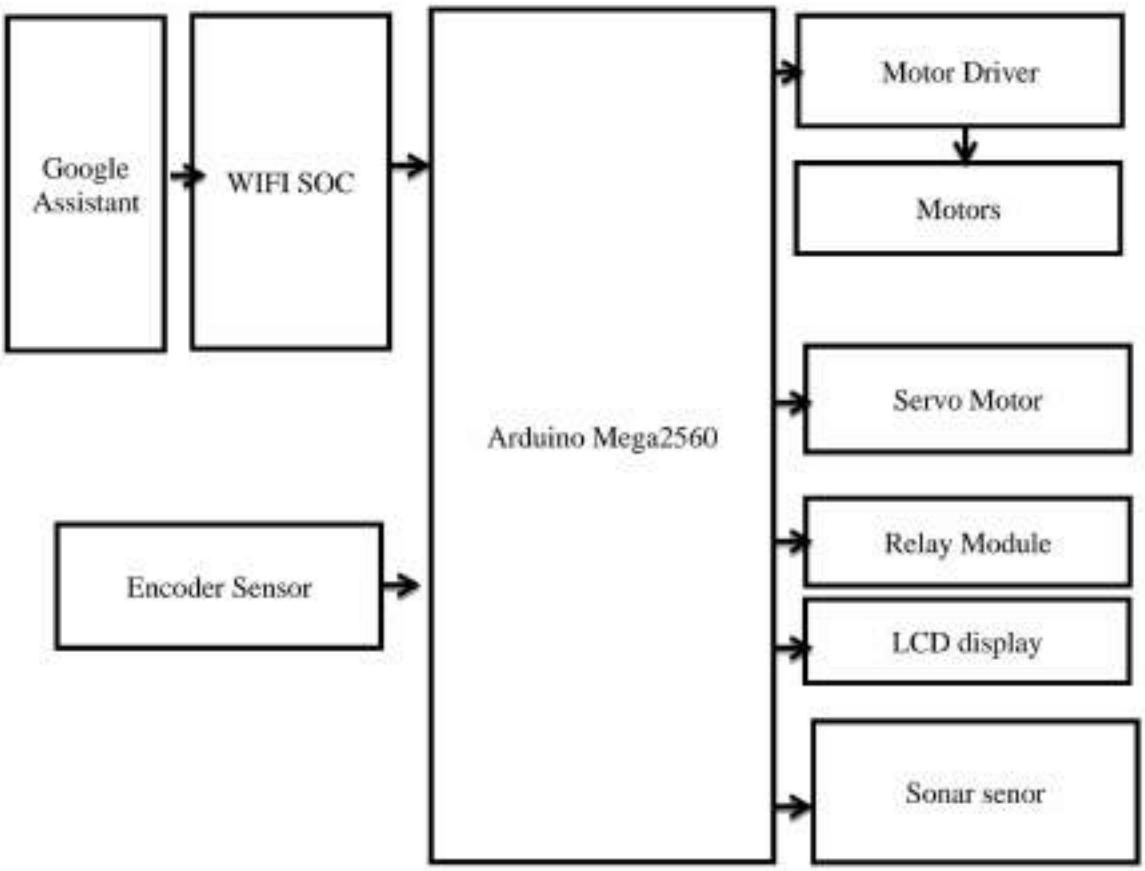


Figure 13: Agrobot controlled over Google assistant using Arduino mega 2560

Before we started with the actual fabrication of project the material survey is to be made to select the appropriate materials for the entire project. The second step is to layout a proper plan for the project so that project can be carried out in stages. Based on the concept of the project the following material was needed to the completion of the project.

1) **Selection of frame material:**

   Since the frame or chassis forms the integral part of the project on which all the other components can be mounted, care has to be taken while choosing the material for the frame of the project.

2) **Choosing the optimum drive system:**

   A proper drive system is needed for transmitting the power from motors to the spinning disc. Thus it is necessary to select the drive system in such a way that it is most efficient to with minimum maintenance. Also the selected drive system for the machine should have a proper transfer of energy and have least maintenance.

3) **Hopper Fabrication:**

   The hopper is used for storing the seeds to be sowed. The hopper is proposed to be made using 1.6 mm sheet metal using welding and cutting.

4) **Chassis Fabrication:**

   With the selected frame the next step is fabrication of the chassis. The chassis should be so fabricated that is light weight, withstand all the forces and should have sufficient space for mounting all the components. The chassis also should sustain the forces which are induced as a result of tilling mechanism as tilling attachment is a part of chassis andis fabricated during the chassis fabrication itself.

5) **The Spraying system development:**

   In this phase the spraying system of the project is developed. The spraying system is responsible for performing the spraying operation in the farm once the farmer commands the spraying operation from google assistant.

6) **The cutting attachment:**

   The cutting attachment is responsible for cutting. Once the command for cutting is received the same will be performed by the agrobot across the field.

7) **The Google Voice control system:**

In this phase the google voice is linked to the agrobot over internet. This involves development of hardware as well as software to connect the machine to the internet. The farmers can give voice commands to the machine using google assistant present in their phone.

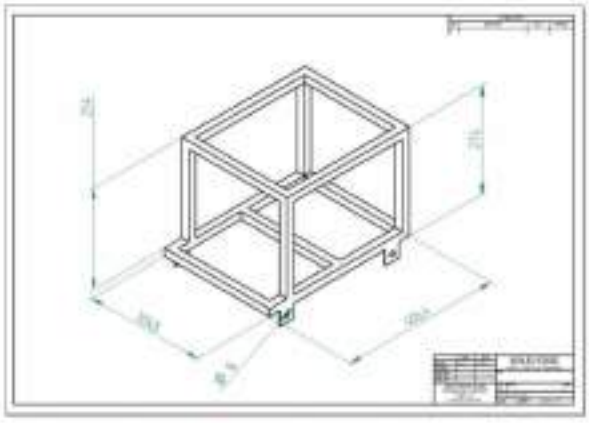


Figure 14: Chassis

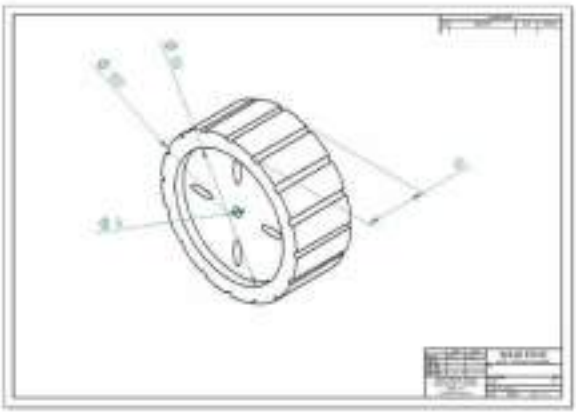


Figure 15: Wheel drawing

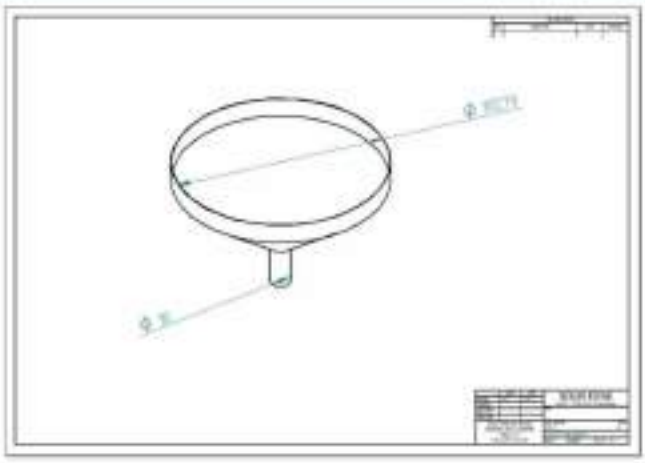


Figure 16: Seed Hopper

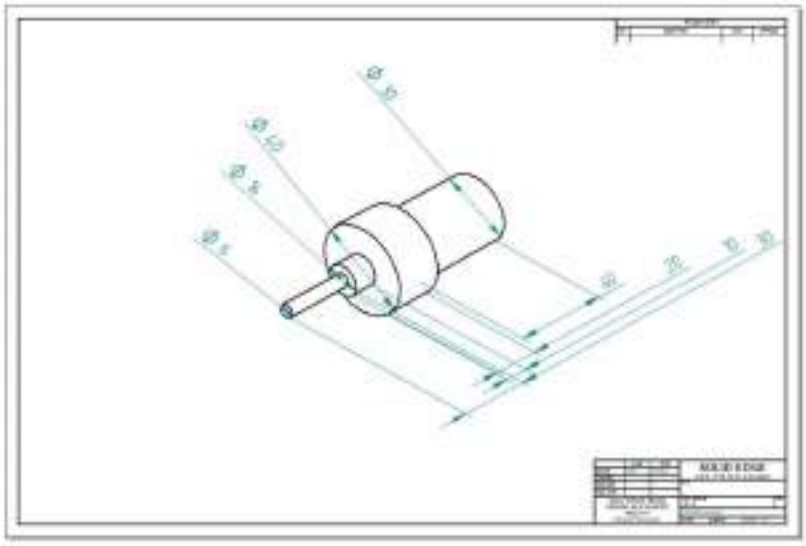


Figure 17: Motor Drawing

6.2 WORKING PRINCIPLE

The illustrative diagram below shows the working principle of the project. As shown in the illustrative diagram, the system consists of google Kisan- a google assistant controlled agriculture vehicle. The Google Kisan is an agrobot which will reside in the farm waiting for farmer's commands. When the farmer gives voice commands using the google assistant present in farmer's phone, the system starts working. The farmers voice is detected and google assistant finds out which particular command farmer has given. The command is recognized and sent to the cloud server which will then command the machine to perform those operations. The machine is also totally autonomous and does not require any manual intervention. The solar energy provides all the energy to the machine to operate.

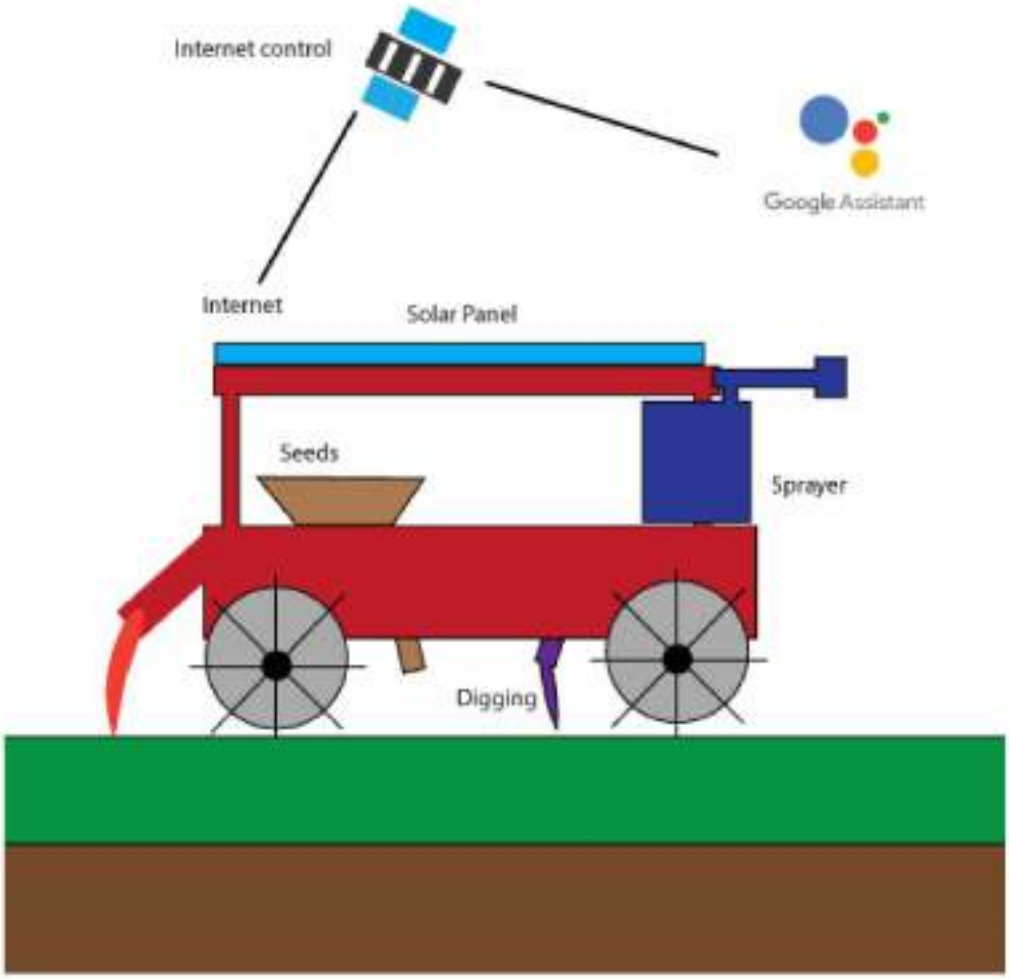


Figure 18: Model of IOT Agrobot

Hardware Implementation:

The hardware is designed using an EDA software and PCB for the same is fabricated:

The figure below shows the schematic and PCB.

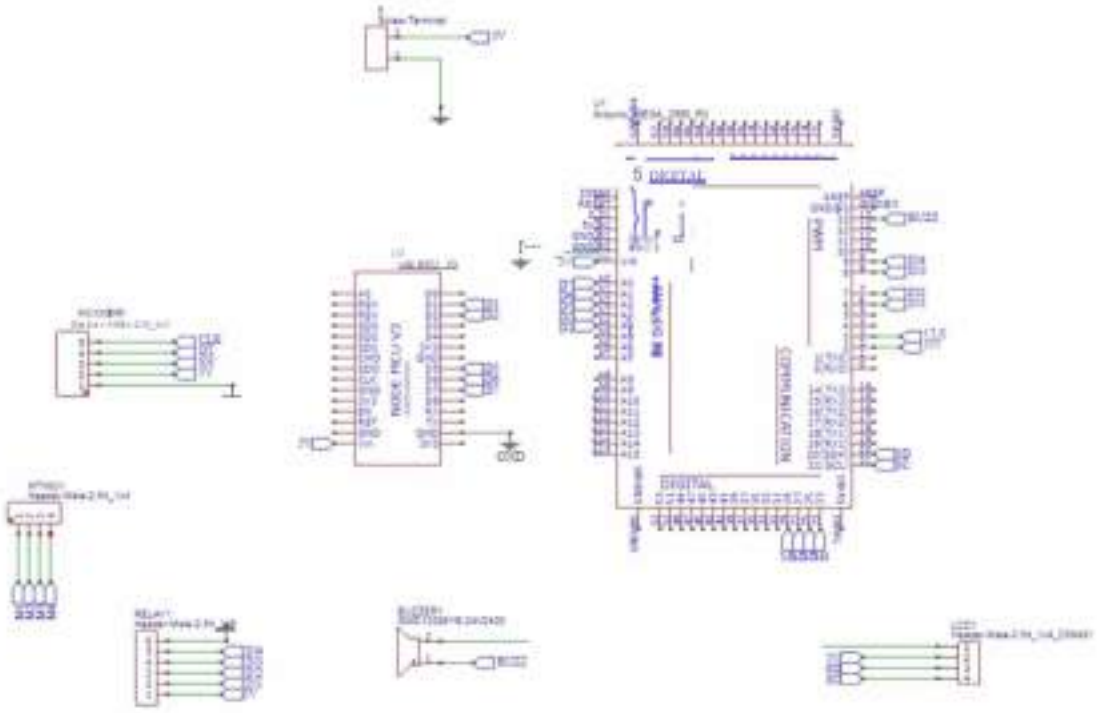


Figure 19: Pin Configuration

From the Developed schematic the PCB is routed as shown below. The Routed PCB 1s taken for fabrication on PCB fabrication CNC machine.

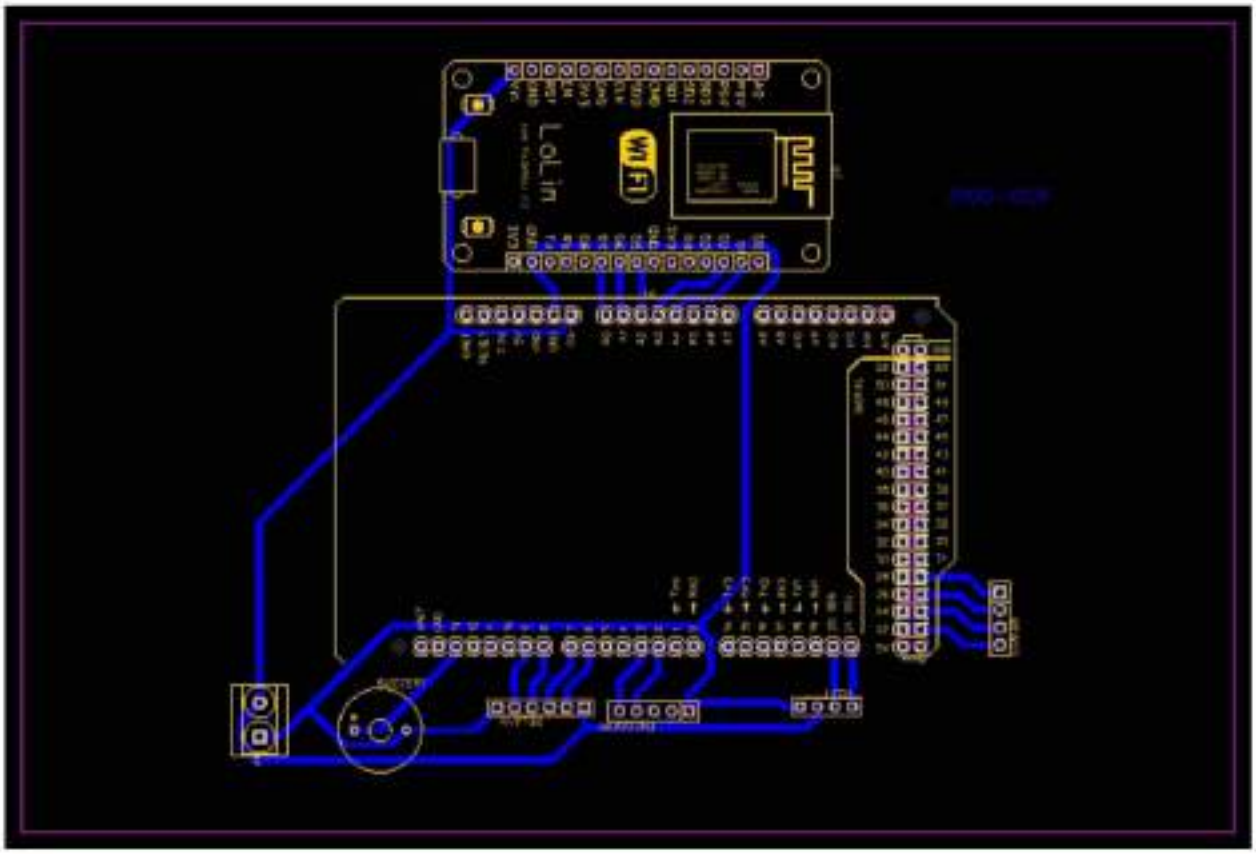


Figure 20: PCB fabrication

CHAPTER 7

RESULT AND DISCUSSION

The proposed AGROBOT is expected to solve the problems faced by farmers by providing them with an IOT based voice control system for farmers to automate majority of the tasks in the field. It also provides farmers with the facility to control the Robot over google voice, which makes it feasible to control the robot in the field remotely just by giving voice commands from the android enabled mobilefrom any corner of the world. It is also solar powered which makes it green and eco-friendly. It can be used for tilling, sowing, spraying, urea dispending etc., thereby making it a powerful agricultural machine.

Fig 21: Solar Panel Unit of AGROBOT

Figure 22:Working model of an IoT AGROBOT

CHAPTER 8

ADVANTAGES, DISADVANTAGES AND APPLICATIONS

8.1 Advantages

1. The machine is completely solar powered hence ecofriendly as well as cost free for farmers to operate.
2. The machine can do almost all the agricultural operations with ease.
3. The machine is easy to operate.
4. The machine can be controlled over voice commands from google assistant, thus farmer can easily control the machine just throwing the voice commands to the machine.
5. The google assistant provides smart technology by google which is reliable and can be detect the commands given by the farmer with high accuracy.
6. The machine can also be controlled over internet by farmers sitting in home or any partof the world.
7. Seed sowing can be done with constant pitch maintaining proper spacing in between the seeds.

8.2 Disadvantages

1. Requires Internet to work properly.
2. Some Initial investment required.

8.3 Applications

1) The machine is powerful to run in actual agricultural fields.
2) The machine is self-sustained and does not require any additional support such as tractor.
3) The machine is economical for farmers to afford.
4) The machine can be used for tilling, sowing, spraying, urea dispensing etc., thereby making it a powerful agricultural machine.

CHAPTER 9

CONLUSION AND FUTURE SCOPE

9.1 Conclusion:

The proposed project is mainly based to solve the problems faced by farmers by providing them with an IOT based voice control system to automate majority of the tasks in the field. It can autonomously perform different operations such as seed sowing, spraying, cutting etc. in the field by receiving commands from farmer from any corner of the world. This will not only help the farmers to effectively use the technology for agriculture related tasks but also help them to autonomously and remotely perform the operations in the field. Thus the proposed paper is expected not only help farmers, in current pandemic times when the whole world is in critical situation even then farmers will be able to keep their work in progress without any hindrance to perform agricultural operations remotely over IOT but also provide them with cost effective and free to operate solution as the system is solar powered.

9.1 Future scope

The project deals with the development of Google Kisan. The proposed project has wide scope for future modifications. The project used voice commands to command the robotic vehicle remotely and autonomously using IOT. In future deep learning algorithms can be implemented in the project to perform multiple operations remotely and autonomously. Computer vision techniques can be used for selective spraying using deep learning. The project can also be implemented with sensor based monitoring system over IOT so that farmers can remotely visualize the data over IOT application.

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AN AUTONOMOUS IOT-AGROBOT CONTROLLED OVER A GOOGLE ASSISSTANT WITH SOLAR POWERED AGRICULTURE MACHINE

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[2]UG student, Department of Electronics and Communication Engineering, RYMEC, Ballari, INDIA

Abstract—Agriculture is the strength of our nation. India being a land of agriculture, wide range of population in India still follow agriculture as their prime occupation. However due to shortage of labour and mechanized equipment's, Indian agricultural still follows obsolete & conventional methods which profoundly affect productivity of agricultural crop. With technological advancements in many other fields, agriculture is still followed by age old obsolete methods, as majority of the farmers are not literate to operated highly complicated technological devices. Thus this paper simplifies the technology for farmers using Google Voice Assistant. This paper focuses on development of completely autonomous agricultural machines which can be used for different applications such as spraying, sowing, and irrigation using voice commands over IOT where farmers can operate the machine in the farm from any corner of the world using google voice assistant. The machine is capable of performing multiple operations such as sowing, spraying, cutting and much more. The machine is voice activated, so the farmers can easily control the machine as it involves just voice commands. Further the machine operates over IOT and is autonomous which facilitates the farmer to control the machine from anywhere in the world. Thus this paper provides an completely cost-effective solution to problems faced by farmers and also helps in improving productivity by means of automated agricultural operations.

Keywords— Google Assistant, IOT, AGROBOT, Solar Power, Agriculture.

I. INTRODUCTION

The significant control of most of towns in India is agriculture. About 70% of individuals are reliant upon agriculture. Farming has been the foundation of the Indian economy and it will keep on excess so for quite a while. Indian horticulture is portrayed by agro-biological varieties in soil, precipitation, temperature, and trimming frameworks.

Agriculture needs to help very approximately 17% of the total populace from 2.3 percent of the world topographical territory and 4.2 percent of the world's water assets. The monetary changes, started in the country during the mid-1990s, have put the economy on a higher development direction. The yearly development rate in gross domestic product has speed up from under 6% during the underlying long periods of changes to in excess of 8% lately.

The profitability of homesteads relies incredibly upon the accessibility and reasonable utilization of ranch power by the ranchers, agricultural machines, incremental efficiency of land and work by meeting the practicality of ranch tasks and expanding work out-put per unit time. Other than its fundamental promise to the numerous trimming and enhancement of agribusiness, automation likewise empowers proficient use of data sources like seeds, composts and water system water.

Most of the farming tasks are as yet following out dated strategies. The Innovation and Man-made reasoning extension are dramatically growing step by step. The proposed project manages the advancement of "RAITHA BHANDAVA"- A self-sufficient IOT-agrobot constrained by Google help with sun oriented/Solar controlled farming machines. The proposed task could be controlled from any region of the world utilizing voice orders by ranchers. The proposed venture can perceive the order the farmer provides for a Google right hand and can begin playing out that specific activity in the field.

II. LITERATURE SURVEY

A) This paper proposes the smart agricultural IOT implementation which gives a better performance for producing a crop agricultural field and cloud based agricultral system can gives a performance and store the data for future use. This hybrid method may be actualized through reducing time and manual power.

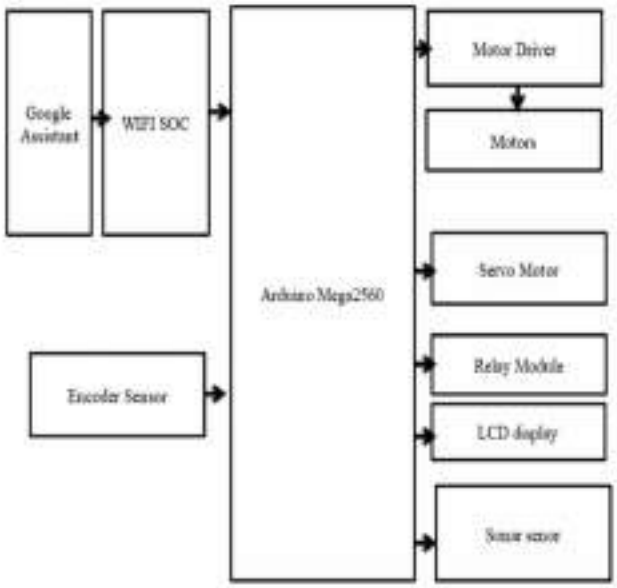
B) IOT based smart agriculture gives information about irrigation having facilities like smart control and making intelligent decision depending upon real time data from fields. All these operations will be controlled through any smart device placed remotely and the interfacing sensors are used to

perform operations along with Wi-Fi, actuators and other hardware devices.

C) The whole system was developed using infield sensors which collects data from farm and using GPS data is sent to base station where necessary action is determined to control irrigation according to base available with the system. It takes its own decisions and control the installed devices and user can control the operations of the system using android app or commands in auto and manual mode respectively.

III. METHODOLOGY

A. BLOCK DIAGRAM



a. ESP8266SOC Wi-Fi:
It is a very useful, cost effective Wi-Fi module for controlling the devices over the internet.

b. Arduino Mega 2560:
It is a low power, 8-bit AVR RISC-based microcontroller that executes powerful Instructions in a single clock cycle.

c. Encoder Sensor:
A rotary encoder/shaft encoder, is an electro-mechanical device that converts the angular position or motion of shaft to an analog or digital code.

d. Sonar Sensor:
It is a technique that uses sound propagation to navigate, communicate with or detect object under the surface of water, this project uses ultrasonic sensor for sensing the obstacles in the path

e, Battery:
This supplies required power to the entire system. Battery chosen for project is 12v 1.2AH battery.

f. Solar Panel:
Used to convert into electricity or heat by absorbing the sun's rays.

g. Display (LCD) I2C:
The LCD display is used to give the visualization to the farmer regarding the data entered.

h. Servo Motor:
It is an actuator that allows for precise control of angular or linear position, velocity and acceleration.

i. Relay Module:
It is used for remote device switching. It is an electrical switch operated by electromagnet.

j. DC geared Motors:
It uses a Geared DC motors which has a gear assembly attached to motors.

B. STEPS FOR FABRICATION OF AGROBOT:

i) Fabrication of the Robot and mechanical structure of the project:

The first phase in the project's progress is the creation of the Robotic agricultural vehicle, which will execute all of the operations in the region. The welding of the frame, the implementation of the drive train, and the assembly of the solar panel are all part of this process. This entails preparing the robotic vehicle for the implementation and incorporation of other mechanisms.

ii) Developmemt of Seed sowing, Cutting and spraying mechanisms:

Following the completion of the robotic vehicle, the next phase is the construction of mechanisms for various operations such as seed sowing,

spraying, and cutting. This includes the construction of a constant pitch seed sowing process that will sow seeds at a constant pitch, as well as spraying and cutting systems to be used in the field.

iii) The Google Voice control system:

During this point, Google Voice is connected to the agrobot through the internet. This entails the development of both hardware and software to link the computer to the internet. Farmers will use their phones' Google Assistant to issue the computer voice commands.

iv) The Internet Control system:

The voice commands given by farmers using google assistant are sent to internet. In this phase the internet control system is developed to make the machine solar powered and automated. This provides the facility for farmers to control the machine remotely from anywhere in the world.

v) Hardware development and programming:

In this phase the hardware for the project is developed. The PCB is designed and fabricated and the programming of the entire system is done to complete the project.

vi) Assembly and Testing:

The components fabricated in the above phases are assembled to fom a complete machine in this phase. The testing is carrried out in this phase and optimizations if any are done.

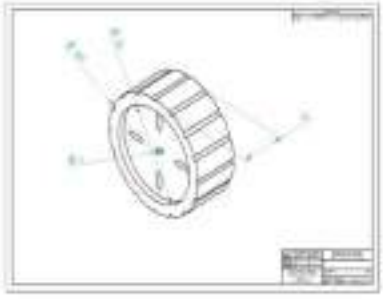


Fig1: Wheeling Drawing.

Fig2: Seedhopper Drawing.

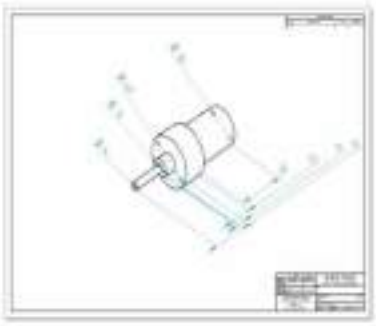


Fig3: Motor Drawing.

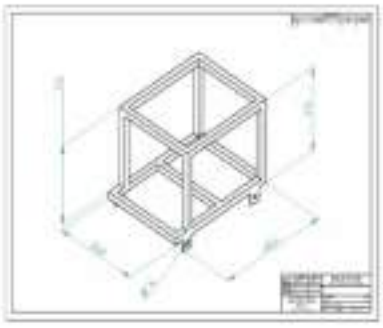


Fig 4: Chassis Drawing.

C. WORKING PRINCIPLE OF AGROBOT

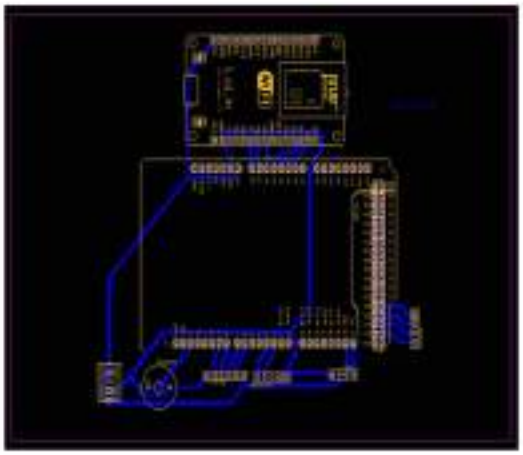
The illustrative diagram below shows the working principle of the project. As shown in the illustrative diagram, the system consists of google kisan- a google assistant controlled agriculture vehicle. The Google Kisan is an AGROBOT which will reside in the farm waiting for farmer's commands. When the farmer gives voice commands using the google assistant present in farmer's phone, the system starts working. The farmer's voice is detected and google assistant finds out which particular command farmer has given. The command is recognized and sent to the cloud server which will then command the machine to perform those operations. The machine is also totally autonomous and does not require any manual intervention. The solar energy provides all the energy to the machine to operate.

Fig 5 Solar Panel Unit of AGROBOT

Fig 6 Working Model of AGROBOT

IV. FABRICATION OF PCB

The hardware is designed using an EDA software and PCB for the same is fabricated. The figure below shows the PCB. The Routed PCB is taken for fabrication on PCB fabrication CNC machine



V. OUTCOME OF PROPOSED WORK

- The proposed AGROBOT is expected to solve the problems faced by farmers by providing them with an IOT based voice control system for farmers to automate majority of the tasks in the field.
- It is expected to provide farmers with relief from physical stress and burden by development of IOT based voice control autonomous robots for agriculture.
- It can autonomously perform different operations such as seed sowing, spraying etc. in the filed autonomously by receiving commands from farmers from any corner of the world.
- It also provides farmers with the facility to control the Robot over google voice, which makes it feasible to control the robot in the field remotely just by giving voice commands from the android enabled mobile from any corner of the world.
- It is also solar powered which makes it green and eco-friendly.

USES OF AGRICULTURAL ROBOT'S [RAITHA BHANDAVA]

- The AGROBOT is powerful to run in actual agricultural fields.
- It is self-sustained and does not require any additional support such as tractor.
- It is economical for farmers to afford.
- It is easy to operate.
- It can be used for tilling, sowing, spraying, urea dispending etc., thereby making it a powerful agricultural machine.

CONCLUSION

The proposed paper is mainly based to solve the problems faced by farmers by providing them with an IOT based voice control system to automate majority of the tasks in the field. It can autonomously perform different operations such as seed sowing, spraying, cutting etc. in the field by receiving commands from farmer from any corner of the world. This will not only help the farmers to effectively use the technology for agriculture related tasks but also help them to autonomously and remotely perform the operations in the field. Thus the proposed paper is expected not only help farmers, in current pandemic times when the whole world is in critical situation even then farmers will be able to keep their work in progress without any hindrance to perform agricultural operations remotely over IOT but also provide them with cost effective and free to operate solution as the system is solar powered

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Rao bahadur Y mahabaleshwarappa engineering college presented his/her research

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Department of Electronics & Communication Engineering

BEST PROJECT AWARD

This is to Certify that CHETANA GUMASTE DESAI Bearing USN 3VC17EC015 From RYM Engineering College, Ballari Awarded as BEST PROJECT in "PROJECT EXHIBITION & COMPETITION 2021" Organised by Department of Electronics & Communication Engineering, RYMEC, Ballari on 3rd August 2021.

DR. T. HANUMANTHA REDDY	DR. SAVITA SONOLI	MR. L VIRUPAKSHAPPA	DR. S PRABHAVATHI	MR. T NAGARAJU
Principal	Vice Principal & HOD-ECE	VAsst. General Manager(Retired) BSNL, Ballari	Professor Dept. of ECE	Asst. General Manager, Airport Authority of India, Ballari

V.V.Sangha's
Rao Bahadur Y. Mahabaleswarappa
Engineering College, Ballari.

Department of Electronics & Communication Engineering

BEST PROJECT AWARD

This is to Certify that MANASA B Bearing USN 3VC17EC031 From RYMEC Awarded as BEST PROJECT in "PROJECT EXHIBITION & COMPETITION 2021" Organised by Department of Electronics & Communication Engineering, RYMEC, Ballari on 3rd August 2021.

DR. T. HANUMANTHA REDDY	DR. SAVITA SONOLI	MR. L VIRUPAKSHAPPA	DR. S PRABHAVATHI	MR. T NAGARAJU
Principal	Vice Principal & HOD-ECE	VAsst. General Manager(Retired) BSNL, Ballari	Professor Dept. of ECE	Asst. General Manager, Airport Authority of India, Ballari

V.V.Sangha's
Rao Bahadur Y. Mahabaleswarappa
Engineering College, Ballari.

Department of Electronics & Communication Engineering

BEST PROJECT AWARD

This is to Certify that N.sowbhagyashree Bearing USN 3VC17EC036 From Rao bahadur Y mahabaleshwarappa engineering college Awarded as BEST PROJECT in "PROJECT EXHIBITION & COMPETITION 2021" Organised by Department of Electronics & Communication Engineering, RYMEC, Ballari on 3rd August 2021.

DR. T. HANUMANTHA REDDY	DR. SAVITA SONOLI	MR. L VIRUPAKSHAPPA	DR. S PRABHAVATHI	MR. T NAGARAJU
Principal	Vice Principal & HOD-ECE	VAsst. General Manager(Retired) BSNL, Ballari	Professor Dept. of ECE	Asst. General Manager, Airport Authority of India, Ballari

V.V.Sangha's
Rao Bahadur Y. Mahabaleswarappa
Engineering College, Ballari.

Department of Electronics & Communication Engineering

BEST PROJECT AWARD

This is to Certify that Anjum km Bearing USN 3VC17EC004 From RYM Engineering College, ballari Awarded as BEST PROJECT in "PROJECT EXHIBITION & COMPETITION 2021" Organised by Department of Electronics & Communication Engineering, RYMEC, Ballari on 3rd August 2021.

DR. T. HANUMANTHA REDDY	DR. SAVITA SONOLI	MR. L VIRUPAKSHAPPA	DR. S PRABHAVATHI	MR. T NAGARAJU
Principal	Vice Principal & HOD-ECE	VAsst. General Manager(Retired) BSNL, Ballari	Professor Dept. of ECE	Asst. General Manager, Airport Authority of India, Ballari

V.V.Sangha's
Rao Bahadur Y. Mahabaleswarappa
Engineering College, Ballari.

Department of Electronics & Communication Engineering

CERTIFICATE OF PARTICIPATION

This is to Certify that CHETANA GUMASTE DESAI Bearing USN 3VC17EC015 From RYMEC Has Participated in "PROJECT EXHIBITION & COMPETITION 2021" Organised by Department of Electronics & Communication Engineering, RYMEC, Ballari on 3rd August 2021.

DR. T. HANUMANTHA REDDY	DR. SAVITA SONOLI	MR. L VIRUPAKSHAPPA	DR. S PRABHAVATHI	MR. T NAGARAJU
Principal	Vice Principal & HOD-ECE	VAsst. General Manager(Retired) BSNL, Ballari	Professor Dept. of ECE	Asst. General Manager, Airport Authority of India, Ballari

V.V.Sangha's
Rao Bahadur Y. Mahabaleswarappa
Engineering College, Ballari.

Department of Electronics & Communication Engineering

CERTIFICATE OF PARTICIPATION

This is to Certify that MANASA B Bearing USN 3VC17EC031 From RYMEC Has Participated in "PROJECT EXHIBITION & COMPETITION 2021" Organised by Department of Electronics & Communication Engineering, RYMEC, Ballari on 3rd August 2021.

DR. T. HANUMANTHA REDDY	DR. SAVITA SONOLI	MR. L VIRUPAKSHAPPA	DR. S PRABHAVATHI	MR. T NAGARAJU
Principal	Vice Principal & HOD-ECE	VAsst. General Manager(Retired) BSNL, Ballari	Professor Dept. of ECE	Asst. General Manager, Airport Authority of India, Ballari

V.V.Sangha's
Rao Bahadur Y. Mahabaleswarappa
Engineering College, Ballari.

Department of Electronics & Communication Engineering

CERTIFICATE OF PARTICIPATION

This is to Certify that N.sowbhagyashree Bearing USN 3VC17EC036 From Rao bahadur Y mahabaleshwarappa engineering college Has Participated in "PROJECT EXHIBITION & COMPETITION 2021" Organised by Department of Electronics & Communication Engineering, RYMEC, Ballari on 3rd August 2021.

DR. T. HANUMANTHA REDDY	DR. SAVITA SONOLI	MR. L VIRUPAKSHAPPA	DR. S PRABHAVATHI	MR. T NAGARAJU
Principal	Vice Principal & HOD-ECE	VAsst. General Manager(Retired) BSNL, Ballari	Professor Dept. of ECE	Asst. General Manager, Airport Authority of India, Ballari

V.V.Sangha's
Rao Bahadur Y. Mahabaleswarappa
Engineering College, Ballari.

Department of Electronics & Communication Engineering

CERTIFICATE OF PARTICIPATION

This is to Certify that Anjum km Bearing USN 3VC17EC004 From RYMEC Has Participated in "PROJECT EXHIBITION & COMPETITION 2021" Organised by Department of Electronics & Communication Engineering, RYMEC, Ballari on 3rd August 2021.

DR. T. HANUMANTHA REDDY	DR. SAVITA SONOLI	MR. L VIRUPAKSHAPPA	DR. S PRABHAVATHI	MR. T NAGARAJU
Principal	Vice Principal & HOD-ECE	VAsst. General Manager(Retired) BSNL, Ballari	Professor Dept. of ECE	Asst. General Manager, Airport Authority of India, Ballari

RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI
DEPARTMENT OF ELECTRONICS AND COMMUNICATION

VISION, MISSION, PROGRAM EDUCATIONAL OBJECTIVES and PROGRAM SPECIFIC OUTCOMES (PSO)

VISION OF THE INSTITUTION

To Produce Professionally Excellent, Knowledgeable, Globally Competitive and Socially Responsible Engineers and Entrepreneurs.

MISSION OF THE INSTITUTION

M1	To provide quality education in Engineering and Management.
M2	To establish a continuous industry-institute interaction, participation and collaboration to contribute skilled Engineers.
M3	To develop human values, social values, entrepreneurship skills and professional ethics among the technocrats.
M4	To focus on innovation and development of technologies by engaging in cutting edge research areas.

VISION OF THE DEPARTMENT

To Produce Professionally Excellent, Knowledgeable, Globally Competitive, Socially Responsible Electronics and Communication Engineers and Entrepreneurs.

MISSION OF THE DEPARTMENT

M1	To provide quality education in Electronics and Communication Engineering.
M2	To establish a continuous industry-institute interaction, participation and collaboration to contribute skilled Electronics and Communication Engineers.
M3	To develop human values, social values, entrepreneurship skills and professional ethics among the technocrats.
M4	To focus on innovation and development of technologies by engaging in Electronics and Communication Research areas.

Criteria 1 coordinator | NBA coordinator | HOD, ECE

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1	Graduates of Electronics & Communication Engineering course will have successful professional career.
PEO2	Graduates of Electronics & Communication Engineering course will pursue higher education or to become an Entrepreneur.
PEO3	Graduates of Electronics & Communication Engineering course will have ability for lifelong learning and to serve the society.

PROGRAM SPECIFIC OUTCOMES (PSO)

PSO 1	Ability to Design, Develop and Test the Electronics Circuits & Communication Systems.
PSO 2	Ability to Develop Excellent Programming and Problem Solving skills in the field of Embedded System.

Criteria 1 coordinator

NBA coordinator

HOD, ECE

PROGRAM OUTCOMES (POS)

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complexengineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **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.
4. **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.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **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.
7. **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.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate 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 presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

PROJECT WORK 2020-21

COURSE OUTCOMES (CO's) Of PROJECT TITLED:

CO	PROJECT OUTCOMES
C413.1	Identify and Analyze Problem through Literature Survey in the Field of Engineering and Technology.
C413.2	Design and Develop Prototype for Identified Problem using Modern Tools.
C413.3	Analyze, Interpret Data to Asses Social, Health & Safety Issues to Provide Valid Conclusion.
C413.4	Develop Communication, Documentation, Presentation Skills and Demonstrate it as a Team.
C413.5	Apply for Project Funding, Exhibition, Paper Presentation in Conference and Publishing in Journals for lifelong learning.

CO-PO/PSO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
413.1	2	2					3							
413.2			3		3							3	3	3
413.3				3		3							3	
413.4							3	3	3	3	3	3		
413.5								2	2	2	2	3		
AVG	2	2	3	3	3	3	3	2.5	2.5	2.5	2.5	3	3	3

PERSONAL DETAILS

MANASA B

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PROJECT EVALUATION RUBRICS-2020-21

RUBRICS: Rubrics are scoring or grading tools used to measure a student's performance and learning across a set of criteria and objectives.

Component	Marks[M]	Criteria	Exceptionally Well Executed [M>90%]	Good with room for improvement [70%<M<90%]	Meets minimum requirement [M<70%]	Course Outcome Mapping	PO Mapping	BTL Mapping
Literature Survey &Problem Identification	20	Refer	Refer more number of standard research papers & understand the technology.	Refer more number of research papers & understand the technology.	Refer research papers & understand the technology.	CO1	1,2,7	L2,L4
		Sustainability	Identify a problem integrating and balancing economic, environmental and social factors.	Identify a problem in which one factor out of three is missing.	Identify a problem in which more than two factors out of three are missing.			
		Ethics	Identify a unique problem.	Identify an existing problem to be extended.	Identify a very poor existing problem.			
Synopsis	20	Synopsis	Synopsis submitted with well and clearly identified problem and very good literature survey.	Synopsis with a problem identified and a literature survey	Synopsis with poor problem and literature survey of few papers.	CO2	7,8,9,10,11 12	L3, L5
Objective & Methodology	20	Goal	Well defined Objective to meet the problem Identified.	Defined Objective nearly meets the problem Identified.	Objectives are poorly defined to meet the problem Identified.	CO1	1,2,7	L2, L4
		Functionality	Problem is broken into well thought out elements with good length, reusability and efficiency.	Problem is broken into elements. Length, reusability and efficiency need to be taken care.	Problem elements exist, no reusability and efficiency.			
		Use of Modern Technologies	Most recent and efficient technologies are used.	New technologies but not efficient technologies are used.	Old technologies and platform are used.			
Seminar on Synopsis	40	Demonstration	Team members were very well balanced and had clear articulation and power point presentation was excellent.	Team members are audible and fluent Presentation was good.	Team members were inaudible but fluent. Poor presentation.	CO2	7,8,9,10,11 , 12	L3,L5

P.A.C.

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B.V.V.S. Engineering College,
(Formerly Vijayanagar Engg. College)
BELLARY-583 104.

Component	Marks[M]	Criteria	Exceptionally Well Executed [M>90%]	Good with room for improvement [70%<M<90%]	Meets minimum requirement [M<70%]	Course Outcome Mapping	PO Mapping	BTL Mapping
Experimental observation	30	Validation	Hardware Program handles erroneous or unexpected input. Meets all requirements.	All error conditions are checked. May not meet all the requirements.	Some error conditions are checked does not meet all specified requirements.	CO2,CO3	3,5,12,PSO 1, PSO2	L3,L4, L5,L6
		Testing	Hardware Program / Testing is complete without being redundant..	All key items are tested, but testing may be redundant.	Testing was done, but is not sufficiently complete.			
Documentation	20	Thesis	The thesis is clearly stated with good flow and adequate content.	The thesis is clearly stated with adequate content. Flow was little difficult to follow.	The thesis is not clearly stated with inadequate content. Flow was little difficult to follow	CO4	7,8,9,10,11 , 12	L3,L5
Demonstration Presentation & Discussion	30	Demonstration	Team members were very well balanced and had clear articulation and power point presentation was excellent.	Team members are audible and fluent. Presentation was good.	Team members were inaudible but fluent. Poor presentation.	CO4	7,8,9,10,11 , 12	L3,L5
Paper Presentation/ Project Exhibition	10	Paper Presentation/ Project Exhibition	Paper was presented in a very good conference or journal with good impact factor / Participated in project Exhibition and won prizes	Paper was presented in a conference / Participated in project Exhibition and not won prizes	Paper was presented in conference with no relevant data / Not Participated in project Exhibition	CO5	8,9,10,11, 12	L4
Team Work	10	Time Management	No adjustments of deadlines. Ensured timely productions. Routinely met the guide.	Usually uses time well. Had to adjust deadlines.	Rarely gets things done by deadlines Rarely meet the guide	CO4, CO5	7,8,9,10,11 , 12	L3,L4, L5
		Team Work	Team worked with unity and mutual respect Each member contributed well	Team worked well with unity most of the times. Each member contributed to the project.	Team did not work well with unity and mutual respect. Contribution from few of the members was lacking.			

P.A.C.

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R.Y.M. Engineering College,
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BELLARY-583 104.

Rao Bahadur Y Mahabaleswarappa Engineering College,Ballari
Dept. of Electronics & Communication Engineering
Project Evalation sheet -2020-21 Phase2

Sem:8 Sec:A &B

Batch	Names	USN	DOMAINS	TITTLE	Experimental Observation (30M)	Documentation (20M)	Demonstration, E-Presentation & Discussion (30M)	Paper Presentation / Project Exhibition (10M)	Team Work (10M)	Total (100M)	GUIDE
1	Seema P	3VC17EC062	EMBEDDED / COMMUNICATION	Design And Fabrication Of Low Cost Mems Based Smart Electronic Listening Device For Hearing Impairment People	30	20	29	10	10	99	Dr Savita Sonol
	Triveni	3VC17EC078			30	20	28	10	10	98	
	K Swetha	3VC17EC025			30	20	29	10	10	99	
	Sonia S	3VC17EC088			30	20	28	10	10	98	
2	B Manasa	3VC17EC031	IOT / COMMUNICATION	Raitha Bandava-An Autonomous Iot Agrobot Controlled Over A Google Assistam With Solar Powered Agricultural Machine	29	20	30	10	10	99	Rakesh Rao
	Chetana Gumaste Desai	3VC17EC015			29	20	30	10	10	99	
	K M Anjum	3VC17EC004			29	20	29	10	10	98	
	N Sowbhagya Shree	3VC17EC036			29	20	29	10	10	98	
3	Balaj B	3VC17EC008	IOT / COMMUNICATION	Tol Stereopticon for Rural E-Learning Education System	30	20	30	10	9	99	Prashanth Reni
	C Ruchitha	3VC17EC011			30	20	30	9	10	99	
	G.S.Taruja	3VC17EC017			30	20	29	10	10	99	
4	Vidyashree	3VC17EC080	IOT / COMMUNICATION	Smart vehicle with voice and gesture controlled for physically challenged integrated with home automation	30	20	30	10	9	99	Dr Prabhavathi S
	Sreelakshmi Desai	3VC17EC072			30	20	30	9	9	98	
	Asi Ayodhi	3VC17EC005			30	20	30	9	9	98	
	Anisha	3VC17EC003			30	20	30	9	9	98	

co-ordinator

HOD

Rao Bahadur Y Mahabaleswarappa Engineering College,Ballari
Dept. of Electronics & Communication Engineering
Project Evalation sheet -2020-21 Phase1

Sem:7 Sec:A &B

Sl.no	Names	USN	DOMAINS	TITTLE	Literature Survey &Problem Identification(20M)	Objective &Methodology(20M)	Synopsis(20M)	Seminar on Synopsis(40M)	Total	GUIDE
1	Seema P	3VC17EC062	EMBEDDED / COMMUNICATION	Design And Fabrication Of Low Cost Mems Based Smart Electronic Listening Device For Hearing Impairment People	20	20	20	39	99	Dr Savita Sonoli
	Triveni	3VC17EC078			20	20	20	37	97	
	K Swetha	3VC17EC025			20	20	20	37	97	
	Sonia S	3VC17EC069			20	20	20	37	97	
2	B Manasa	3VC17EC031	IOT / COMMUNICATION	Raitha Bandava-An Autonomous Iot Agrobot Controlled Over A Google Assistant With Solar Powered Agricultural Machine	20	20	20	39	99	Rakhee Patil
	Chetana Gurrasta Desai	3VC17EC015			20	20	20	39	99	
	K M Anjum	3VC17EC004			20	20	20	39	99	
	N Sowbhagya Shree	3VC17EC036			20	20	20	39	99	
3	Balaji.B	3VC17EC008	IOT / COMMUNICATION	Tol Stereopticon for Rural E-Learning Education System	19	20	20	40	99	Prashanth kanı
	C Ruchitha	3VC17EC011			19	20	20	40	99	
	G S Tanuja	3VC17EC017			19	20	20	40	99	
4	Vidyashree	3VC17EC080	IOT / COMMUNICATION	Smart vehicle with voice and gesture controlled for physically challenged integrated with home automation	20	20	20	37	97	Dr Prabhavathi S
	Sreelakshmi Desai	3VC17EC072			20	20	20	39	99	
	Asif Ayodhi	3VC17EC005			20	20	20	39	99	
	Anisha	3VC17EC003			20	20	20	36	96	

co-ordinator

HOD