M.E.S. Pillai College of Engineering, New Panvel
Department of Electronics Engineering

Automatic Seed Sowing Machine

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(EX -3)

Introduction

Agriculture is the main occupation in India. While the world is moving towards automation and machinery, it is very important to bring automation in the field of agriculture as well in order to lift our economy.
To stress this need of the hour, we have chosen our topic as automatic seed sowing robot.
It will not only reduce the human efforts but will also improve the efficiency of work.

Literature Review

1. Different papers were taken into account while making the project in order to give us a better idea about the prevailing projects and scope of development in them.
2. Though all the projects consist of the same functions in them, there were different approach taken for their implementation.
3. Given below is a table of all the projects taken into account.

Sr. no	Reference papers	Features	Advantages	Disadvantages
1	Fabrication and automation of seed sowing machine using IOT	The seed sowing machine has been designed and fabricated and the process of seed sowing is automated using IoT in order to minimize the human effort.	1.wireless connectivity between machine and the controller. 2. The cultivators tilts the soil as machine moves forward and the seeds are dropped at regular intervals into the soil.	1. No turning Mechanism 2. Continuous internet access is required.
2	Design and fabrication of seed sowing machine.	A device to plant seed with a storing capacity. Seed sowing disc for sowing different sizes of seed.	1. User Interface 2. Collision avoidance sensor 3. Plough	1. No turning Mechanism 2. Lack of proper User Interface
3	Design and development of manually operated seed planter machine	Trolley kind-off mechanism which sows the seed in soil from the nozzle in a straight line.	1. Seed sowing at equal Interval 2. Lever fulcrum Mechanism	1. Requires Human labour to move the device.
4	Solar operated Multigrain seed sowing and Fertilizing Machine	It sows seed of different sizes with fertilizer in a specific pattern and covers the seed with soil	1. Seed covering mechanism 2. Solar Plate 3. Cultivator	1. Can sow seed at fixed Interval only 2. High cost
5	Design and implementation of multi seed sowing machine	The seed is sown along with the fertiliser and the device is driven with external help from humans/animals.	1. Precise implanting of seeds can be obtained. 2. The depth of seed and fertiliser can be controlled. 3. Low maintenance	1. Requires human efforts 2. Lack of user interface

Methodology

1. Designing a fully automated machine.
2. ESP32 Module acts as the heart of our entire machine.
3. Use of advance technology such as internet,GSM and bluetooth to establish the connection.
4. Using rotary encoder for precise measurements.

Features:

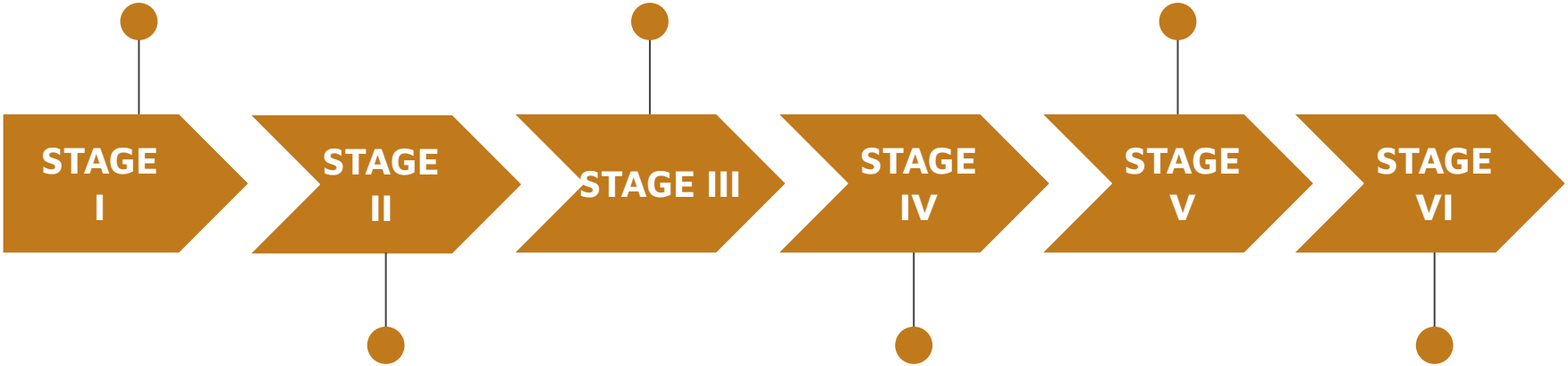
- Automatic turning.
- Drilling mechanism.
- Seed filing mechanism.
- Collision avoidance sensor/low seed alert.
- Predefined information on the user interface.
- User input facility.

Implementation Plan

Finalising the model of the project

Working on the software part as well as pre-decided drilling mechanism

Assembling and calibration

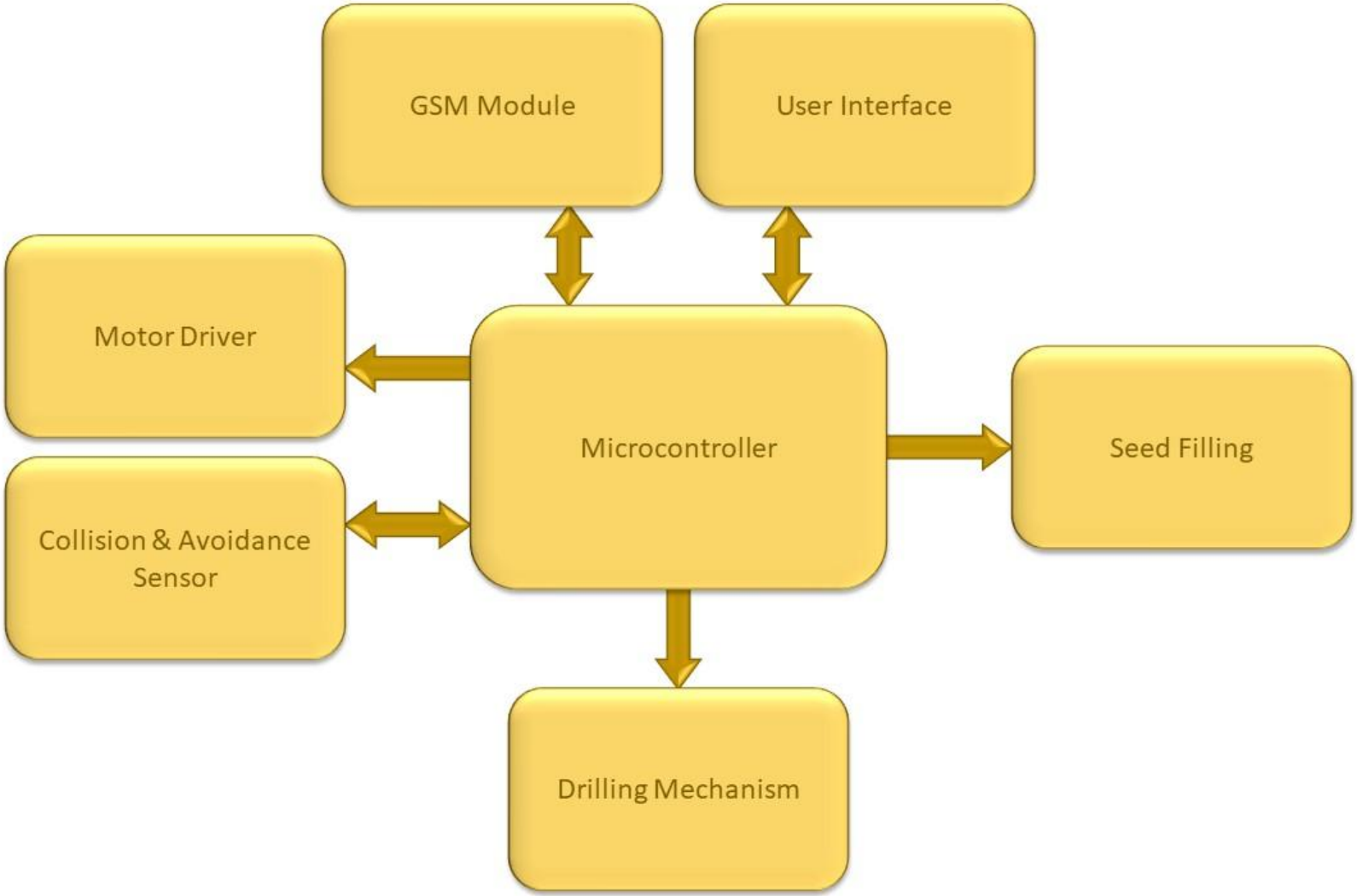


Selection of DC motors

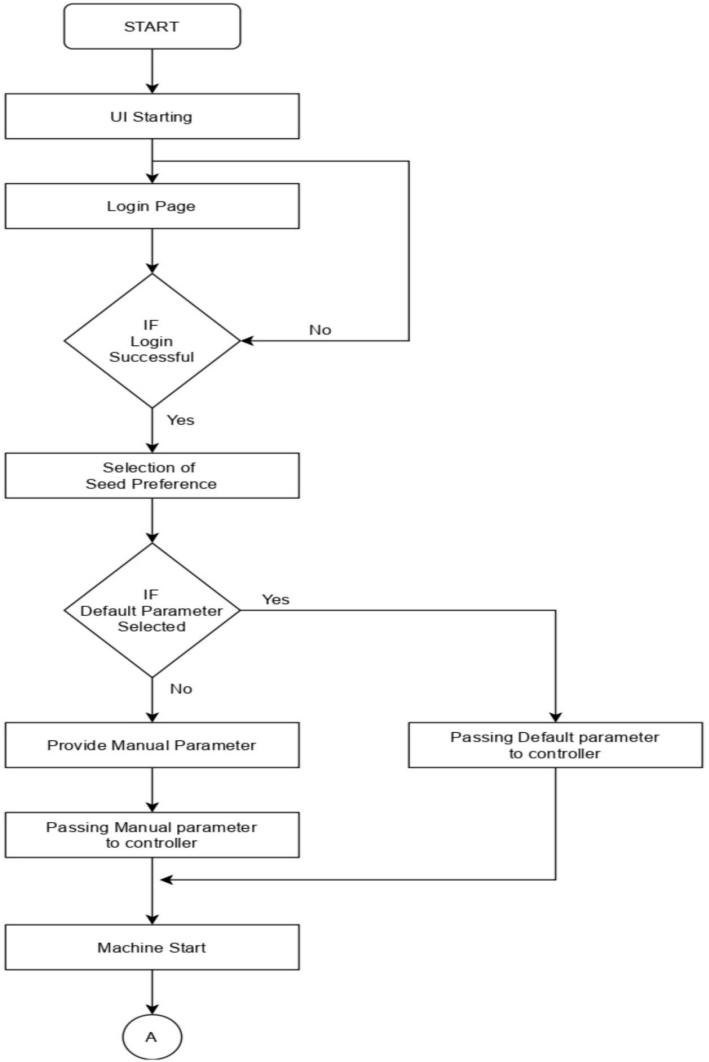
Seed filing mechanism

Final testing

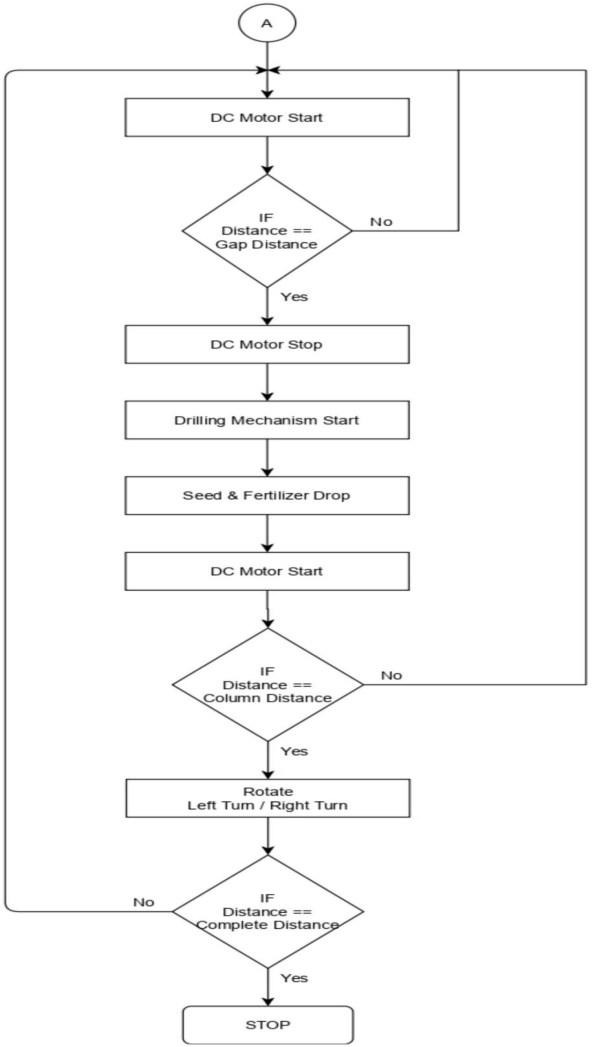
Block Diagram / Flowchart


GSM Module
User Interface
Motor Driver
Microcontroller
Seed Filling
Collision & Avoidance Sensor
Drilling Mechanism

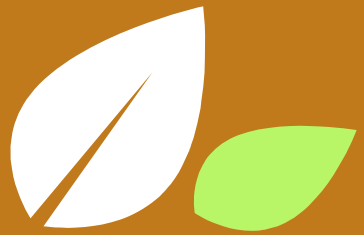
Software Flowchart

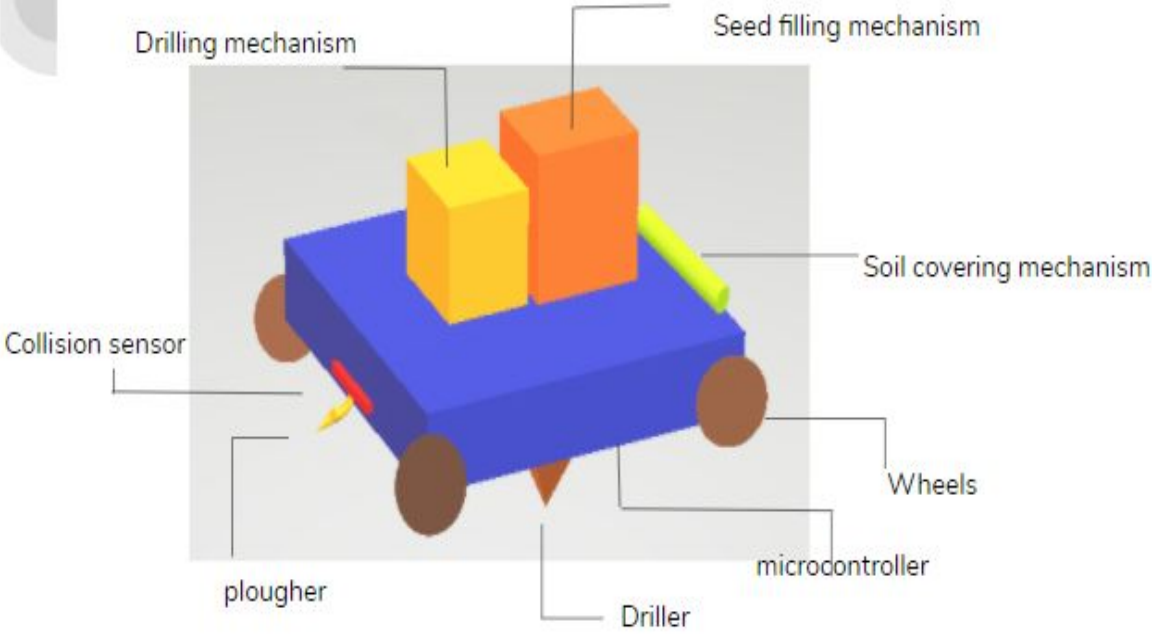


Hardware Flowchart



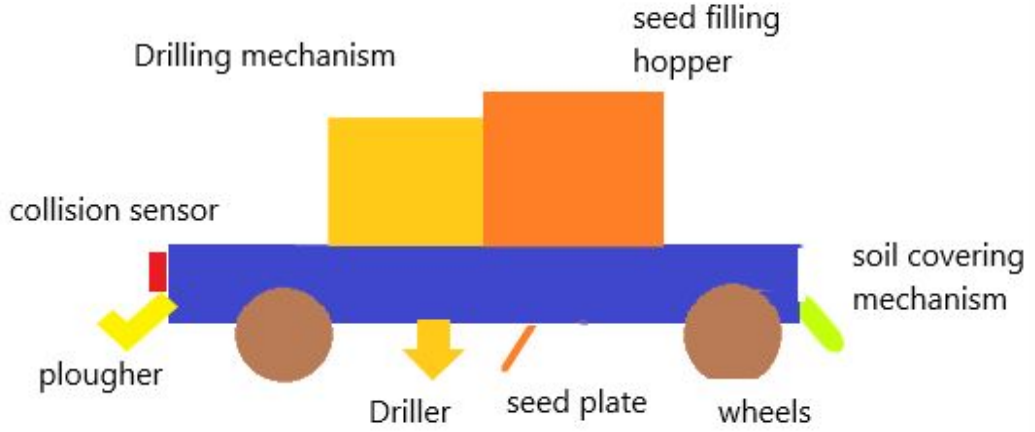
Model



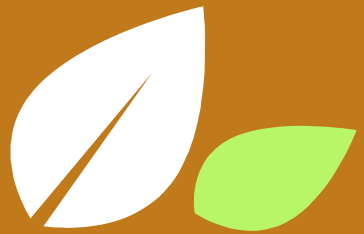


3D Model

2D Model



Input/ Output Specification



INPUT:

With the help of user interface (Website/Matrix Keypad) -

1. Type of seed, depth of the drill
2. Distance the robot will cover (Width and Height of Field)
3. Distance between the two consecutive seeds.

OUTPUT:

1. Furrow opening
2. Seed sowing
3. Seed metering
4. Seed covering

Hardware & Software Details

Microcontroller-ESP32

- Main processor: Tensilica Xtensa 32-bit LX6 microprocessor
- Clock frequency: up to 240 MHz
- Wireless connectivity:
  - Wi-Fi: 802.11 b/g/n
  - Bluetooth: v4.2 BR/EDR
- Memory:
  - ROM: 448 KiB
  - SRAM: 520 KiB
- Communication: SPI(4), I2C(2), I2S(2), CAN, UART(3)

GSM Module SIM900A

- Dimensions: 24x24x3mm
- Weight: 3.4g
- Supply voltage range : 3.4V to 4.5V
- Operation temperature: -40°C to +85 °C
- Power supply : 9 to 12V DC
- Low power consumption: 1.5mA (sleep mode)
- Dual-Band 900/ 1800 MHz

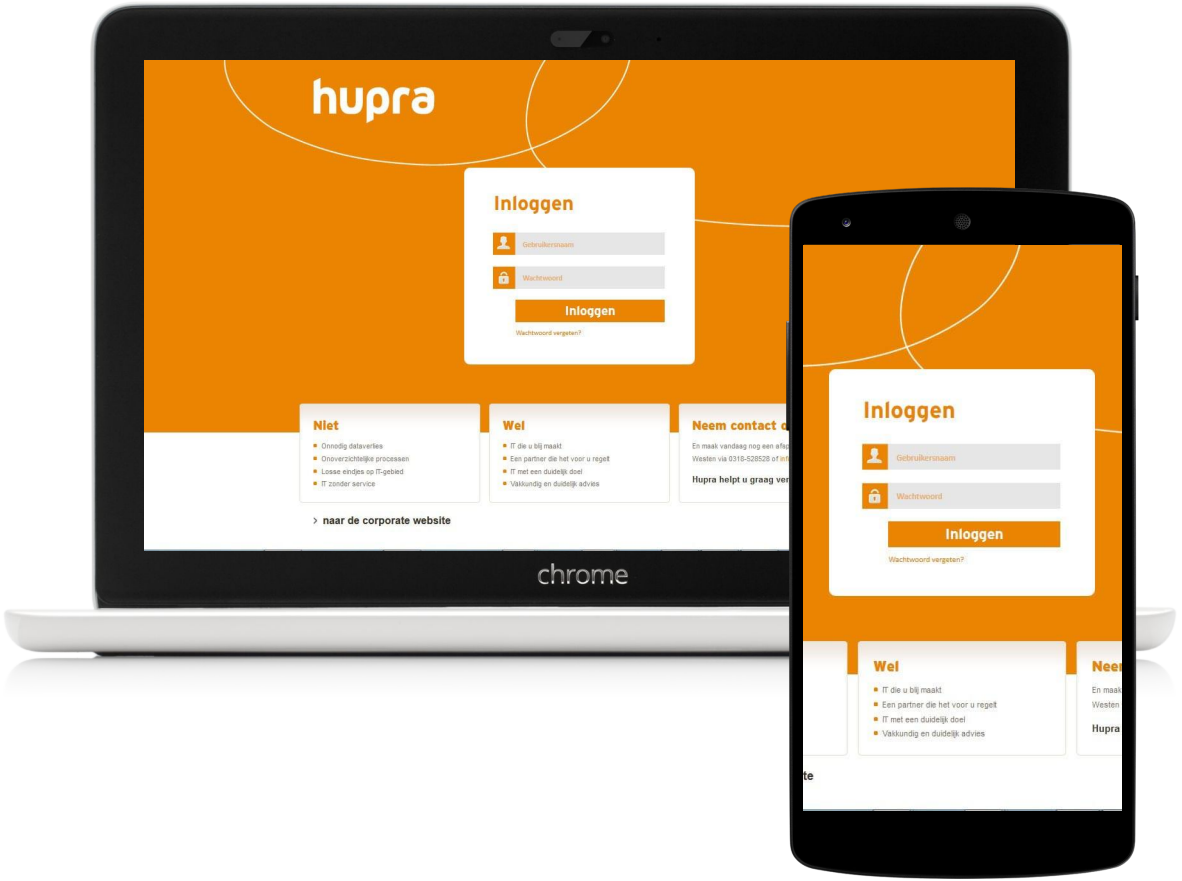
Rotary Encoder-PEC11R

- Encoder Type: Mechanical
- Encoder Resolution: 24PPR
- Rotational Speed Max: 60rpm
- No. of Channels: 2 Channels
- Shaft Type: Flatted End
- Shaft Length: 15mm
- Shaft Diameter: 6mm
- Operating Temperature: -30°C to +70°C
- Mechanical Angle: 360° Continuous
- Power Rating: 10 mA at 5 V DC

Ultrasonic Sensor-HC-SR04

- Input Voltage: 5V
- Current Draw: 20mA (Max)
- Digital Output: 5V
- Digital Output: 0V (Low)
- Working Temperature: -15°C to 70°C
- Sensing Angle: 30° Cone
- Angle of Effect: 15° Cone
- Ultrasonic Frequency: 40kHz
- Range: 2 cm - 400 cm

User Interface using HTML, CSS, Javascript, PHP, MySQL



Applications

With the help of automatic seed sowing robot, following applications can be obtained:

- Customization of distance,type of seed, depth.
- Precise Farming
- User friendly
- Completely automatic

Reference

Reference Paper for Literature review

Fabrication and automation of seed sowing machine using IOT(IJMET)

Link

Design and fabrication of seed sowing machine.(IRJET)

Link

Solar Operated Multigrain Seed Sowing and Fertilizing Machine(IJRIST)

Link

Design and Development of manually operated seed planter machine (AIMTDR)

Link

Design and Implementation of Multi Seed sowing (IJMERR)

Link

- *Senthilnathan N, Shivangi Gupta, Keshav Pureha and Shreya Verma*-'Fabrication and Automation of seed sowing machine using IOT'-International Journal of Mechanical Engineering and Technology (IJMET)Volume 9, Issue 4, April 2018, pp. 903–912, Article ID: IJMET_09_04_103
- *Thorat Swapnil , Madhu L. Kasturi, Patil Girish, Patil Rajkumar N4*-'Design and Fabrication of Seed Sowing Machine'-International Research Journal of Engineering and Technology (IRJET)|Volume: 04 Issue: 09 | Sep -2017
- *Swetha S. and Shreeharsha G.H.*-Solar Operated Automatic Seed Sowing Machine -International Journal of Advanced Agricultural Sciences and Technology |2015, Volume 4, Issue 1, pp. 67-71, Article ID Sci-223 |ISSN: 2320 – 026X
- *Er. Monica Nikhil Deoghare*-'Solar Operated Multigrain Seed Sowing and Fertilizing Machine' –International Journal for Innovative Research in Science & Technology| Volume 6 | Issue 3 | August 2019

- *Roshan V Marode, Gajanan P Tayade and Swapnil Agrawal*-'Design and Implementation of Multi Seed Sowing Machine'-|Vol. 2, No. 4, October 2013|ISSN 2278 – 0149|
- *D.Ramesh, H.P. Girishkumar*-'Agriculture Seed Sowing Equipments: A Review'-International Journal of Science, Engineering and Technology Research (IJSETR), Volume 3, Issue 7, July 2014|
- *Amol B. Rohokale, Pavan D. Shewale, Sumit B.Pokharkar, Keshav K. Sanap*-'A Review on Multi-Seed Sowing Machine'-|ISSN 0976 – 6340 (Print)ISSN 0976 – 6359 (Online)|Volume 5, Issue 2, February (2014), pp. 180-186
- *Hariharr C Punjabi, Sanket Agarwal, Vivek Khithani and Venkatesh Muddaliar*- 'Smart Farming Using IOT'-International Journal of Electronics and Communication Engineering and Technology (IJECET)|Volume 8, Issue 1, January - February 2017, pp. 58–66, Article ID: IJECET_08_01_007

- *Shrinivas R. Zanwar, R. D. Kokate*-'Advanced Agriculture System'-|International Journal of Robotics and Automation (IJRA)Vol. 1, No. 2, June 2012, pp. 107~112|ISSN: 2089-4856|
- *Dr. K A SUNITHA ,G S Suraj ,CH P N Sowrya ,G Atchyut Sriram ,D Shreyas and T Srinivas*-Agricultural robot designed for seeding mechanism IOP Publishing IOP Conf. Series: Materials Science and Engineering 197 (2017) 012043 doi:10.1088/1757-899X/197/1/012043 International Conference on Recent Trends in Physics 2016 (ICRTP2016)

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Thank You