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

Smart Seed Sowing Vehicle

Harshada Naik[1],Durga Nikam[2], Rohit Mahamuni[3], Prasad Bhangare[4], Kanchan Pujari[5]

Department of E&TC, SKNCOE, SPPU, Pune

[1]harshada2645@gmail.com, [2]kapujari.skncoe@sinhgad.edu

[3]rcmahamuni7@gmail.com[4]prasadbhangare121@gmail.com[5]durga.nikam_skncoe@sinhgad.edu

***Abstract*—In agriculture, there is a need for a technology that is more easily understood, implemented,and used by the farmers. Equipment that requires less human effort and time with less cost ofimplementation is much required for success in the agricultural industry. Hence, we designed a Seedsowing robot that can be controlled with the help of IoT and it helps in the sowing of seeds in thedesiredpositionhence assisting thefarmersinsaving timeandmoney.This machineperformsthe operations like ploughing, sowing, and levelling which are used for small-scale farming. Seed sowing isone of the main processes of farming activities. It requires a substantial amount of human effort and alsotime-consuming. Thisprojectaimstodesignandfabricateaseedsowingrobotforthementionedtask. This robot requires less maintenanceand is portable.**

***Keywords*—IOT, Sensors, Robot, Ploughing, Sowing, Implementation.**

I. INTRODUCTION

Seed sowing vehicle is a device that helps in the sowing of seeds in the desired position hence assisting the farmers in saving time and money. Seed sowing is one of the main processes of farming activities. It requires a substantial number of human efforts and also time-consuming.

Agriculture has been the backbone of the Indian economy and it will continue to remain so for a long time. It has to support almost 17 percent of the world population from 2.3 percent of the world's geographical area and 4.2 percent of the world's water resources. The net sown area is 142 million hectares. The basic objective of the sowing operation is to put the seed and fertilizer in rows at desired depth and spacing, cover the seeds with soil and provide proper compaction over the seed. The recommended row to row spacing, seed rate, seed to seed spacing, and depth of seed placement vary from crop to crop and for different agricultural and climatic conditions toachieve optimum yields and an efficient sowing machine should attempt to fulfil these requirements. Also, saving in cost of the operation time, labour and energy are other advantages to be derived from the use of improved machinery for such operations.

II. LITRETURE SURVEY

Tejminder Kaur and Dilip Kumar et al. they implemented a vehicle which identifies the obstacle and perform the cleaning without interrupting human activity [1]. For this purpose, they used Infrared sensor to detect obstacles and the whole process executed using PIC controller. they implemented automatic seed sowing machine operated by a solar panel. The purpose of project was to develop the machine. In this paper the solar energy is converted into electrical energy which is used to charge 12volt battery, which is the requirement to drive DC motor used in the project. By using this DC motor, the wheels of the vehicle are driven. Author implemented a robotic agricultural machine.

Roshan V. Marode and Gajanan P. Tayade et al. proposed model which uses solar powered DC motors placed in the wheels of the vehicle [2]. The fall of seeds from the seed drum and seed sowing process takes place without any wastage of seeds. It also has an ultrasonic sensor fixed in the front for proper navigation of the vehicle over the field. After completion of each row the vehicle must turn, and it has to start the seed sowing in the second row. This is done with the help of the sensor which detects the end of the row. In the conventional method the sowing takes place in only one row then it must be shifted manually to second row.

Kyada A. R. et al. discuss in this paper initially, various dimensions of the smart seed sowing vehicle are assumed based on the different dimensional constraints of the vehicles [3]. After considering various design aspects of the vehicle, then different parts of the seed sowing vehicle are designed using CAD package PTC CREO 3.0.1. The appearance of the fabricated smart seed sowing machine was given utmost importance for more convincing and attractive. The design of this smart seed sowing vehicle is based on the different modules which include sensing device, actuator, seed handling unit, microprocessor, stepper motors, servomotors, communication, and data processing unit.

Rashmi A Pandhare et al. the conventional method for seeding is manual one but manually seed filling method suffers from various problems [4]. Conventional techniques depend on human power and old techniques; it requires more time and more efforts. Humans need rest, they may not be able to work in hazardous environments also large sized wheels required in muddy soil it may be compact the soil. In agriculture we require skilled man power. Need of man power can be accomplished by automating the process of soil loosening and sowing seed by vehicle. So conventional system suffers from various problems. The main aim of our project is to reduce the human effort, time requirement and to increase accuracy of the seed sowing project design.

III. SYSTEM ARCHITECTURE

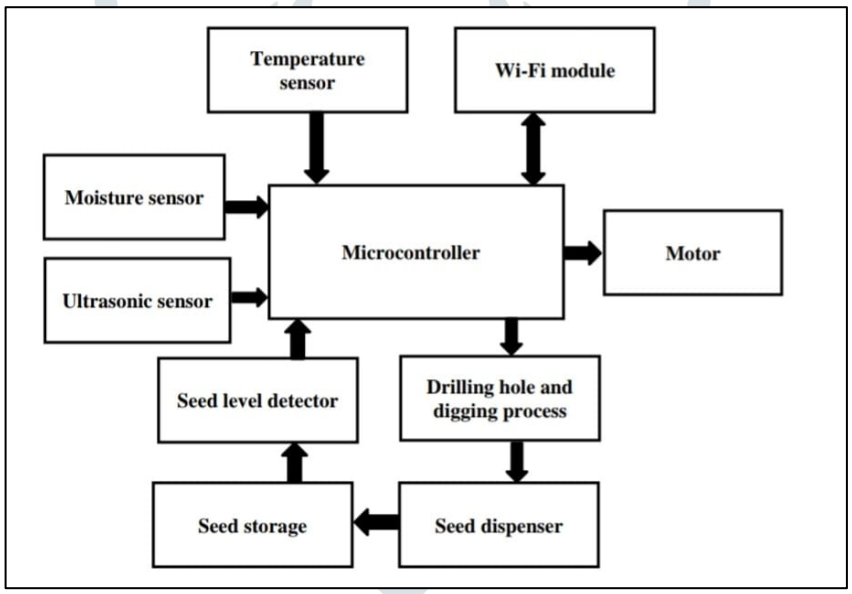

Fig 1: Block Diagram of Seed Sowing Vehicle

IV. IMPLEMENTATION

Here Microcontroller is the main block which is the controller for the whole assembly. It is getting power from a 5V power supply. This microcontroller is operated upon a valve Controller and sensors as shown in Fig 1. Because seeds are stored here, the valve should open when ever needed and when the Robot is taking a turn it should close. Sensor is present to sense the quantity of seeds in the Valve. When the seeds go below minimum level there will be an indicator in the system to refill the seeds. So both ultrasonic and Infrared Sensors are used. Motor driver circuit is operated by a 9V supply to operate the wheels and also the shafts of Dig string and levellersLevelling is the first step in preparing the field followed by digging, sowing and then closing it. So the three important mechanisms in the process is – (i)Turning ON/OFF the Motor through IR Sensors for removing unwanted grasses. (ii)Turning ON/OFF the Motor through moisture Sensors for detecting moistness in soil. (iii)Programming the Motor to Turn OFF when the Robot takes turn and moves to next row. Bluetooth /RF is used to communicate with the farmer regarding the operation performed by robot. The X-Y coordinate system of the field is fed by the farmer to control the movement of robot. A small dongle is maintained between Arduino and Bluetooth device for connecting the interface. Using the Android App all the data is stored.

PIC Microcontroller (16F877A) - The PIC microcontroller PIC16F877A is one of the most renowned microcontrollers in the industry. This controller is very convenient to use, the coding or programming of this controller is also easier. One of the main advantages is that it can be write-erase as many times as possible because it uses FLASH memory technology. It has a total number of 40 pins and there are 33 pins for input and output. PIC16F877A is used in many pic microcontroller projects. PIC16F877A also have many applications in digitalelectronics circuits.PIC16F877A finds its applications in a huge number of devices. It is used in remote sensors, security and safety devices, home automation and in many industrial instruments. An EPROM is also featured in it which makes it possible to store some of the information permanently like transmitter codes and receiver frequencies and some other related data. The cost of this controller is low and its handling is also easy.

Hopper-It is used to store the seeds and their delivery for the further use. The capacity of the Hopper is 1 to 1.5 kg. Here, in our design the hopper is semi-circular in shape in order to prevent the wastage of the seeds.

Seedshower-The mechanism of a seed drill distributor which delivers seeds from the hopper at selected rates is called seed metering mechanism.

Valve controller-The seeds are stored in a small container and it is controlled with the help of valve through the Arduino and motors. We call this motor as servomotor The motor is capable of rotating to 180 degrees. Meanwhile, when the servomotor is at 180 degrees, it automatically opens the valves and hence the seeds are sown in the field.

Ultrasonicsensor-Ultrasonic ranging module HC- SR04 provides 2cm–40m. The ranging accuracy can reach to 3mm. The modules include ultrasonic transmitter, receiver and control circuit. Ultrasonic transmitter emitted an ultrasonic wave in one direction, and started timing when it launched. Ultrasonic spread in the air, and would return immediately when it encountered obstacles on the way. At last, the ultrasonic receiver would stop timing when it received the reflected wave. As Ultrasonic spread velocity is 340m/s in the air.

Temperaturesensor-The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly proportional to the Centigrade temperature. The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling. The LM35 device does not require any external calibration or trimming to provide typical accuracies.

Moisturesensor-This sensor measures the volumetric content of water inside the soil and gives us the moisture level as output. The sensor is equipped with both analogue and digital output, so it can be used in both analogue and digital mode. The soil moisture sensor consists of two probs which are used to measure the volumetric content of water. The two probs allow the current to pass through the soil and then it gets the resistance value to measure the moisture value.

V. RESULT

Proposed project is constructed as a 4-wheel robot using microcontroller, Sensors, motor drivers and Bluetooth. This system gives a well design with low power cost effective and efficient output. Results of seed placement depends on the type of land which is tracked using sensors.

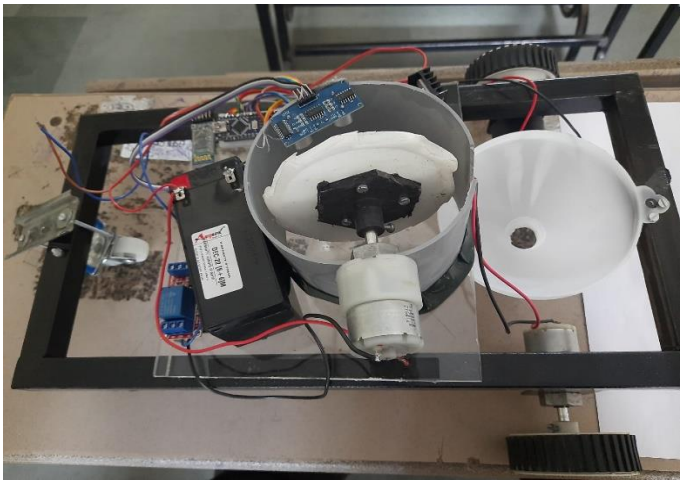

Fig 2: System implementation

VI. CONCLUSION

IoT-based Seed sowing vehicle will design and fabricate to perform ploughing, seed sowing, and levelling Operations. The advantages of the seed sowing vehicle are reducing human intervention, reduces the sowing, ploughing, and levelling time, improves efficiency in sowing and Uniformity will be maintained while placing the seeds in a row with specified distance. This vehicle is majorly used for the sowing of seeds. In the future, we try to improve the vehicle and will design a completely autonomous vehicle without the requirement of human interaction.

VII. FUTURE SCOPE

- Introduction of Cutter in place of drill can be used as grass cutter equipment.
- Addition of multi-hopper can be attached side by side for sowing of large farm.
- Water dripping unit could be included in seed sowing machine.

VIII. REFERENCES

[1] Tejminder Kaur and Dilip Kumar *"Design and development of calibration unit for precision planter",* International Journal of Computer Science, Engineering and Applications (IJCSEA) Vol.3, No.3, June 2014

[2] Roshan an V Marode and Gajanan P Tayade, *"Design and implementation of multi seed sowing machine",* International Journal of mechanical engineering and robotics research, Vol. 2, No. 4, October 2014.

[3] Kyada, A. R. Lecturer, LDRP Institute of Technology and Research, *"Design and development of manually operated seed planter machine"*, 2015 5th International 26th All India Manufacturing Technology

[4] Rashmi A Pandhare and Tejas Padathare, *"Design and development of automatic operated seed sowing machine",* International Journal of Recent and Innovation Trend in Computing and Communication, Vol. 5, No. 2, 2017

[5] K. Amit Kumar and Vishal Parit, *"Design and development of template row planter",* Transnational Journal of Science and Technology, Vol. 3, No. 7, 2016

[6] Swati D. Sambre and S.S. Belasare, *"Use of Robotics technology for seed sowing in Agriculture",* International Journal of Electrical and Data Communication, Vol. 2, No.1, 2016

[7] Simon Blackmore, Bill Stout, Maohua Wang, " Robotic agriculture : The future of agriculture mechanisation", 5th European Conference on Precision Agriculture. Ed. J. Stafford, V. The Netherlands, 2017, Wageningen Academic Publishers. Pp.621-628