Microcontroller based Groundnut Seed Sowing and Harvesting System

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Abstract - *Generally cultivation of any crop involves various steps like seed selection, field preparation, fertilizing, sowing, irrigation, germination, thinning and filling, weed removal, vegetative stage, flowering stage, pesticide spraying, fruit or pod formation stage, harvesting and threshing. Farmer has to use various agricultural equipment sand labors for caring out those steps, our purpose is to combine all the individual tools to provide farmers with multipurpose equipment which implements all the scientific farming techniques and specifications and suitable for all type of seed to seed cultivation with as minimum cost as possible. This project work is focused on the design and fabrication of multipurpose equipment which is used for land preparation, sowing, fertilizing, leveling and weed removal process.*

Key Words: Microcontroller 8051; Bluetooth module controller; Automated Sowing and Harvesting System; Autonomous agricultural robot.

1. INTRODUCTION

In this digitalized world, many technological innovations are trying to reform and create new techniques based upon automation which performs in a highly efficient manner and less time-consuming. Now the approach of this project is to develop trainable-automatic equipment which will do the things which are taught to that by gesture control with high precision. The application of robots has become more widespread.

Now a days Robots have been widely in substitute human workers to perform high precision and hazardous works. The aim of this project is to develop a base vehicle and controlling setup with the use of most developed Sensors.

Now a days the availability labours for the work in agricultural fields are reducing day to day and also demands of food products are also increasing due to increase in populations hence we are in the hard situation to overcome this situation. The need for the production of agricultural products is increasing and in the world market Competition is getting elapsed with new technological instruments and devices which are used by the other countries for the agricultural activities, hence the Indian farmers should able the use the new instruments to sustain their self in the market.

On the other hand, days are changing the people's view on their health increasing hence they are seeking natural products to maintain their good health. Hence the products should be chemical fertilizers free as much as possible. In this project, a wireless trainable-automated agricultural rover, for clearing the unnecessary plants with a plucked like arrangement is being developed.

Robot technology is one such which can be used in different works of farming like seed sowing, ploughing and other tasks as well and reduce the necessity for human labour. Hence we chose to build a prototype for seed sowing work in agricultural land which has the ability to detect number of seed sowing points and complete the path of seed sowing automatically. The prototype built uses different mechanisms for different works it does in the farming. Prototype uses rack and pinion mechanism for digging the land and wheel mechanism for seed dropping.

1.1 Related Work

Agriculture has been playing a key role in the development of human life. Numerous technologies, including robotics, sensor and image processing have been investigated to be employed in agriculture. For the past decade, significant research has been done in robot based agriculture. Now a days the availability labours for the work in agricultural fields are reducing day to day and also demands of food products are also increasing due to increase in populations hence we are in the hard situation to overcome this situation. The need for the production of agricultural products is increasing and in the world market Competition is getting elapsed with new technological instruments and devices which are used by the other countries for the agricultural activities, hence the Indian farmers should able the use the new instruments to sustain their self in the market.

Agricultural production must double via 2050 that allows you to meet the anticipated food call for because of population increase. Precision agriculture is the important thing to enhance productiveness and efficiency within the use of assets, as a result supporting to reap this intention underneath the numerous demanding situations currently faced by using agriculture in particular because of climate changes, land degradation, availability of farmable land, labour pressure shortage, and growing cost. Here we have proposed a modern technology for groundnut harvesting.

Algorithm to minimize the synchronization errors that results in wheel slip. In recent days life technology has been developed and people are interested to do everything in shortcut. The growing technology introduces many advances in day to day life. It reduces the manpower and time consumption. In this project paper, we are going to plug the ground nut crop and separate the ground nut from the crop using blades and the separated ground nut is collected in tray. This process is carried out by motors and relays and the whole system is controlled by Atmega8 microcontroller. It performed the harvesting operation with a total pod loss of 8.01% and digging efficiency 92 per cent. With this digger, the cost of operation was Rs.168.30/ha for groundnut harvesting. The objective of the present work is to design and fabricate a powered groundnut harvester for small and medium size farms in our State.
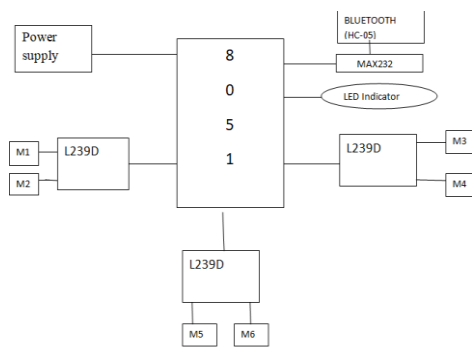

Fig -1: Block Diagram

2. PROPOSED METHODOLOGY

In precision agriculture, the optimum utilization of resources like land and seed is a challenging task. There is a need for a robotic solution for sowing the seed at optimal depths and to ensure that only one seed at one place. Designing a seed sowing agrirobot to perform precision agriculture is our intention. Sensors, GPS and machine vision technologies are collectively used in our research to attain optimal results.
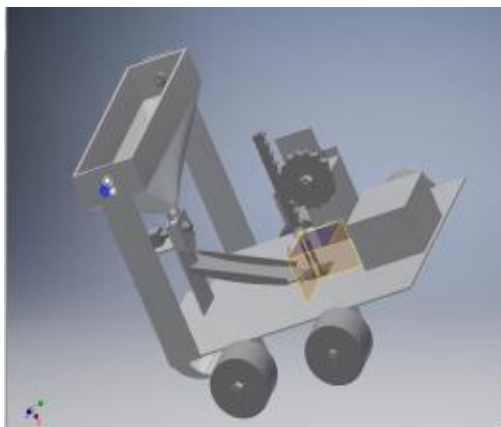

Fig -2: CAD Design

2.1 Working of system

Sowing is the most important process in farming. Here we propose the design and fabrication of a fully automatic seed sowing robot that automates this task. The proposed robot uses six motors for running it in desired directions. We use a small bucket for pouring seeds. The robot consists of a funnel like arrangement in order to pour seeds into a lower container. The front of the robot can be further fitted with a bent plate that drags on the soil to make a slot ahead of the machine before seeds are poured in it. The back portion of the robot can be fitted with a tail like bent rod that is again used to pour soil on seeds sowed thus covering them with soil. Thus the system completely automated the seed sowing process using a smartly designed mechanical robotic system. There we use a shaft with gear like bucket teeth to pick up limited quantity of seeds and pour them on the ground in a steady manner in proper quantity.

2.2 System Design

Step 1:

Selection of components- The components required for project are microcontroller 8051, Bluetooth model HC05, L293D, motors, power supply, max232 etc.

Step 2:

Design of mechanical structure-The assembly of system will be robotic structure which is operated on software.

Step 3:

Design of PCB & assembly-

The PCBs required for entire assembly is designed thorough PROTEUS.

Step 4:

Programming-The project is based on embedded C programming which will work for microcontroller and all hardware devices.

Step 5:

Testing & Result Check-In this final stage we will check all modules are working correctly or not. At final stage we will check all results.
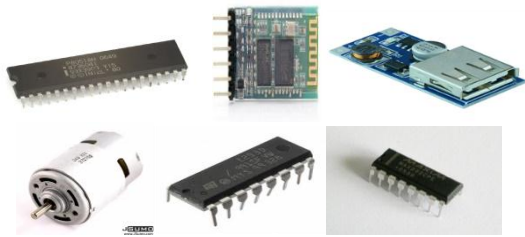
2.3 Components Used

Fig -3: Microcontroller 8085, HC-05, Max 232, DC motor, L239D, 12V power supply.

2.4 Mechanical Assembly

Fig -4: Seed storage funnel, Fly wheel, Jaw, Flip panel, Wheels.

2.5 Model Analysis

We are using Bluetooth controller mobile app for sending the input command to microcontroller through bluetooth module. As we send command to motor driver through controller motor will start action. By using jaw particular section will be rootle. Simulteneously, the groundnut seeds which are collected at funnel are one by one dropped in soil when the hole of fly wheel and funnel tube hole is getting matched.

Now side by side, by mechanism of flap pannel the rootled farm will get flatten. After when Groundnut will be ready to Harvest, jaw mechanism will removed then at that place connect the another mechanism of Harvesting.

2.6 Mechanical Working

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3. CONCLUSIONS

The system completely automated the seed sowing process using designed mechanical robotic system.In this system, a robot is made that can harvest the groundnut plant. The whole system is controlled by the microcontroller Atmel controller. The system operates independently. It automatically harvest the crop. We can adjust the height of the cutter.It performed the harvesting operation with a total pod loss of 8.01% and digging efficiency 92 percent.The objective of the present work is to design and fabricate a powered groundnut harvester for small and medium size farms in our State.In this paper, we have proposed a agrirobot for sowing and harvesting. The proposed robot was successfully designed and fabricated Audio unit could be introduced. Water dripping unit could be included. Fertilizer unit can be added.Voice controlled agribot can be introduced.Instead of using power supply solar panel based robot can be introduced.By increasing the equipment strength and quality to its peak, we can have multipurpose agricultural equipment for life time usage.By providing hydraulics, gear arrangements and some minor adjustments the equipment can also be made as tractor powered equipment.

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