AGRIBOT – An Agricultural Robot

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Abstract- *Agribot is a new system which can be implemented in Agricultural process. This Proposed system provides effective Agriculture and going to employed for labour intensive and perform tiresome tasks pertaining to agriculture. The Agribot performs Automatic drilling of sand at uniform interval of distance, sowing of seed, watering the plants. The uniformity of distance is achieved by programming specific time gap for every hole drilling. It also measure timely Moisture and Temperature of the soil that introduce automatic irrigation system. This robot is autonomous and provides the facility for optimal switching of seed plantation. Cost effective Agribots are deemed to be the future of the agricultural industry for they have been widely portrayed as having the potential to decrease an farmer work and solve issues daunting farmers.PIC16F877A is used and coding performed in MPLAB.*

Keywords:- Labour intensive , tiresome tasks, automatic seeding , optimal switching, MPLAB

I. INTRODUCTION

Many countries in Asia including India are agrarian economies and most their rural populations depend on Agriculture to earn their livelihood. Aimed to reduce the labour work , this robot is designed to execute basic functions required to carried out in farms. Agribot is a robot designed for agricultural purpose. It is designed to minimize the labour of farmers in addition to increase of speed and accuracy.

On the ploughed filed, the Robot starts its function by drilling the hole. The motor operated drilling machine is used to dig the hole up to appropriated depth. All the major functions are correspondence with time interval thus after drilling a hole for particular depth the seeds are sown. Seeds of constant size or various size can be used. Thus time interval for dropping one seed in a time is programmed with the help of microcontroller . Once the seeds are sown the information sends to microcontroller as a signal and the robot starts to move. The sloping metal sheet arrangement touching the ground covers the sown seed with soil when robot moves forward.

MPLAB is used as a platform for programming. DrillBit of depth 5cm and width 3mm is used. Apart from the above process Irrigation plays an important role in crop growth. Thus the proposed system contributes to automatic irrigation system in order to control soil moisture. When the drilling and seed sowing process completed , the final measurement of moisture and temperature was measured. For the measured value , the microcontroller sends the signal to a control valve (solenoid valve). The solenoid valve produce magnetic field when measured value goes beyond the level. Thus the temperature and moisture maintained at the constant level which helps in better growth of the crop.

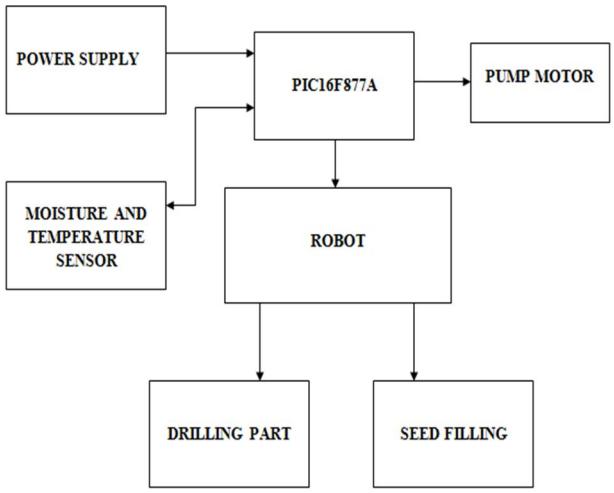
II. METHODOLOGY

Agribot is a robot designed for agricultural purpose. It is designed to minimize the labor of farmers in addition to increasing the speed and accuracy of the work. It performs the elementary function involved in farming i.e., drilling and sowing the seed and covering the seed with soil and irrigation. Drilling plays an important role in Agriculture. Developing a automatic drilling robot for cultivation purpose helps farmer in increasing the productivity by time consumption. The drilling is accurate and efficient and thus the quality of agriculture is improved. For the better growth of plant irrigation also needed. In addition to drilling and seed sowing technique it also includes automatic irrigation system by measuring temperature and moisture of the soil. The drilling and sowing process continued by automatic irrigation system .

A. CONSTRUCTION

The chassis of the robot was placed over the four wheel arrangement. Two 60rpm motors are used to drive the robotic wheel. On the bottom portion of the robot the motor operated drilling machine is assembled. 12Volt DC motor is used to drive the drilling bit. Near to the drilling port seed filling assembly is present. Microcontroller is provided with 5 volt supply. 12 volt 4 Amps battery is used for motor driving unit. L293 is used to as an interfacing unit. Si7005 is used as an moisture sensor and LM35 is used as an temperature sensor. Solenoid valve is kept far from the farm which opens when the temperature and moisture level goes beyond the limit. The valve operated based on the measured command of the microcontroller.

B. BLOCK DIAGRAM



III. PROJECT DESCRIPTION

The two units plays an important role

1) Drilling unit
2) Seed dispensing unit

1. Initially on moving certain distance the drill bit performs its action of drilling up to 5cm depth and 5mm width. Motor operated drilling machine is used for faster and accurate hole drilling.12 volt DC motor is used for driving drilling machine. When the robot moved to certain distance for the programmed time interval it sends signal to the microcontroller and in turn microcontroller sends instructions to driller to perform the task. As soon as the drilling machine obtained its depth the next process of seed filling starts.

2. The second unit is seed filling unit. Based on the opening and closing time of seed filling tubes the seed dropped into the drilled hole. The crop can be selected based on the requirement. Once seed filling is done closing of pits is followed.

3. The pits are closed by an sloping metal sheet attached to the backside of drilling bits which touches the sand.

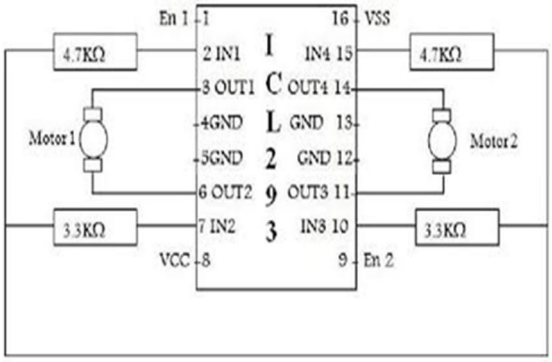
4. Once the pits are closed the moisture and temperature of the soil were measured and if the measured value is above or below the limit, control valve is released.

A. IMPLEMENTATION OF L293D

A DC Motor (depends) cannot drive directly with a Microcontroller, as DC Motors requires high current and high voltage than a Microcontroller can handle. Microcontrollers usually operates at +5 or +3.3V supply and it I/O pin can provide only up to 25mA current. Commonly used DC Motors requires 12V supply and 300mA current, moreover interfacing DC Motors directly with Microcontrollers may affect the working of Microcontroller due to the Back EMF of the DC Motor. Thus it is clear that, it not a good idea to interface DC Motor directly with Microcontrollers.

B. MOTOR DRIVING CIRCUIT L293D

L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors.L293D contains two inbuilt H-bridge driver circuits. In its common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse direction. The motor operations of two motors can be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic 00 or 11 will stop the corresponding motor. Logic 01 and 10 will rotate it in clockwise and anticlockwise directions, respectively. Enable pins 1 and 9 (corresponding to the two motors) must be high for motors to start operating. When an enable input is high, the associated driver gets enabled. As a result, the outputs become active and work in phase with their inputs. Similarly, when the enable input is low, that driver is disabled, and their outputs are off and in the high-impedance state.



C. MOTOR OPERATED DRILLING MACHINE

Drilling process can be done by motor opearted drilling machine with the drillbit size of 50*3mm. 12V DC motor is used to opearte drill machine. The length and breath of the drillbit choosed based on the crop choosed for cultivation. The drill bit should drill the sand greater than the width of the seed to be sown, so that it can perfectly settles in the ground. Crop choosen here is “GREEN GRAM” the width of the gram is estimated to be 4mm thus 5mm width is prescribed. The drillmachine starts and stops its work for the programmed time.

D. GREEN GRAM

Crop is choosed based on the requirements. The seasonal crop is decided to get better growth. Green Gram is taken as a crop for proposed system. The reason for choosing green gram is only in consideration of its size. The seed is filled in seed tank which opens and closes for particular time interval. The coding for opening and closing of seed tank takes place only for millisecond which is essential to drop one seed at time. This prevents the multiple seeds dropping. Thus seeds are uniformly sown which reduces seed wastage.

IV. COMPARISION WITH SEED SOWING METHODS

PARAMETERS	MANUAL	TRACTOR	DIGGING AND SEED PLANTATION TECHNIQUE
MANPOWER	MORE	LESS	NO
TIME REQUIREMENT	MORE	MORE	LESS
DIGGING AND SOWING TECHNIQUE	MANUAL	MANUAL	AUTOMATIC
SEED WASTAGE	LESS	MORE	NO
ADJUSTABLE SEED DISTANCE	NO	NO	YES
ENERGY NEEDED	HIGH	VERY HIGH	LESS
POLLUTION	NO	MORE	NO
ALARM AND DISPLAY	NO	NO	YES

V. CONCLUSION

There is an urgent need for a system that makes the agricultural process easier and burden free from the farmer's side. The goal of Agribot is not only to apply robotics technology to agricultural industry but also to use the agricultural challenges to develop new techniques and systems. The system is beneficial to the farmers for the basic seed sowing operation. The mode of operation of this machine is very simple even to the lay man. Low germination percentage leading to wastage of seeds can be reduced by the use of this system. Creation of gap due to non germination of seeds can be avoided. Total yield percentage can be increased effectively by automatic irrigation system. Labour problem can be reduced. As compared to the manual and tractor based sowing time, energy required for this robotic machine is less. Also wastage of seed is less. So this system will be a better option for the farmers who want to perform the seed sowing operation in a well-organized manner. The robot will assist the farmers in improving the efficiency of operations in their farms. The proposed system will meet the requirements and progress made towards achieving a future precision autonomous farming system.

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