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Design and Implementation of Automatic Seed Sowing Robot

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***Abstract*—In modern world, automation is used in many of the fields such as defense, surveillance, medical field, industries and so on. This project represents solutions towards the lack of resources, lack of knowledge in the process of agriculture faced by the farmers. The main aim of this project is save the time and energy required for performing repetitive farming tasks. This paper presents the agricultural robot which is based on ATMEGA328p micro-controller and it perform the agricultural tasks like sowing seeds and obstacle detection without human interference. This project works on line follower concept which provides low cost solution to various agricultural tasks.**

Index Terms—Atmega328p, Automatic seeding, Line follower, Obstacle detection

I. Introduction

In modern globalization, many researchers are trying to develop automation domain works very rapidly, effectively and within a very short period of time. Conservative research in agricultural field is an important task due to rise in demand on quality of agricultural products and reducing the labor availability in rural areas. The proposed system is a seed sowing and fertilizing robot that uses micro controller. The purpose of this system is to sow seeds and fertilize the farm. Along with development in automation scientists are also trying to develop robot navigation system. Robots are playing an essential role in agricultural field for farming process. Robotics is a stream which fulfils and accomplishes the given task as per the given instructions by using an electromechanical system called as robot.

The system considers the problem of seed sowing and provides a solution by using microcontroller. The system uses a servo motor is loaded with a driller that is used to engrave holes and sows the seed using a simple wheel mechanism. Atmega328p is used to control the servo action and monitors the motion of the robot by using a pair of DC motors. A field for sowing seeds is prepared and the seeds are sowed accordingly.

II. Proposed System

A. Existing vs. Proposed System

The Existing system requires more man power. While the proposed system uses automatic seed sowing mechanism and relatively less expensive sensors which reduces the cost parameter of the system. Additional disadvantages of the existing system are:

- Sensor immunity towards environmental conditions.
- High cost.

The proposed system thus reduces the disadvantages with following merits.

- Automated system requires less number of sensors.
- Man power required are less.
- Sensors are liable to environmental conditions.

B. Block Diagram

Fig. 1. System block diagram

1. Battery

The power supply consists of a 12V battery and a voltage regulator. This regulator help to maintain the constant voltage level. A voltage regulator is designed to automatically maintain a constant voltage level. It may use an electromechanical mechanism, or electronic components. Depending on the design, it may be used to regulate one or more AC or DC voltages.

2. Path Control Unit

For the controlling of the path line follower concept is used. The LDR sensor detects the white line and trace out the path by robot. It runs automatically. When there is no black line then it stops. Proportional-Integral-Derivative i.e. PID control is the simple and the most common control algorithm used in industry and has been worldwide accepted. The PID controller attributes are partly to their driving experiment in a wide range of operating conditions and partly to their functionality simple, allowing engineers to conduct controllers in an easy way. As we know, PID system includes of three basic controllers: proportional, integral and derivative. These controllers are

required to achieve an optimal system response.

3. Seeding Unit

As the line trace by the robot it starts to move. When the node detect by the robot then it stop. At the end of the lane it turns by clockwise or anticlockwise direction by detecting the node.

4. Avoidance Detector

For the avoidance detection the Sharp IR sensor is used. When the obstacles come above the robot then it stop. By removing it again the robot starts. Range is depends on which sensor is used.

5. DC Motor

Two DC motors each of 12v, 50 rpm are used to control the wheels. In order to control the DC motors driver IC L293D is used. A single IC L293D is having 16-pin capable of controlling a fix of two motors (DC) moving in instantaneously any direction. Driver IC mainly present between pi and motor. L293D is having two H-bridge. H-bridge is the simple circuit and it is used to maintain a low current rated motor and allows voltage to be applied across a load in any direction.

6. Analog to digital Converter

The Atmega328p visage a 10 bit successive approximation ADC. The ADC is normally connected to 8 channel. Analog multiplexer allows inputs 8 single ended voltage constructed from the pins of Port A. This single ended voltage inputs referring 0 i.e. ground. The ADC includes a hold and sample circuit which convince that the I/P voltage kept constant level during conversion. It has an AVCC another analog voltage supply. The ADC is having a separate pin supply i.e. AVCC which is analog. AVCC must not differ more than ±0.3V from VCC. Nominally 2.56V or AVCC are usually provided On-chip as internal reference voltages. Capacitor decoupled externally by voltage reference at the AREF pin for the better noise performance.

7. Servo Motor

Servo motor implies to reduce the error of the system sensing by the feedback control of that system. And this requires the sophisticated controller for use with the servomotors for dedicated module to design particularly. Servo motor provides precise angular position. They are actually DC motors whose speed is slowed down by the gears. The servo motors usually have a revolution cut off from 90° to 180°. A few servo motors also have revolution cut off of 360° or more. Servomotor is having limited rotation in between the fixed angles and it do not rotate constantly.

8. PWM

Pulse Width Modulation is mainly used to control the motion of the wheels. This is done to achieve motion control and immediate braking. By adjusting the duty cycle of the pulses the motion or speed of wheels is achieved.

C. Methodology

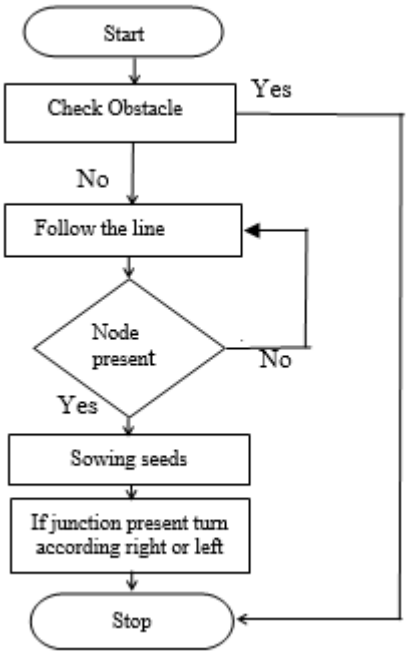

Fig. 2. Flowchart

III. Conclusion

Agricultural robot has significant saving in terms of time, efficiency and reduced utilization of manpower. The proposed system is a seed sowing robot which automatically sows the seeds based on the servo motor rotation.

Key points:

1. It reduces the burden on farmer.
2. Robot will put the seed in to appropriate field accurately without human effort.

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