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FARMER FRIENDLY BOT

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Abstract: *Robotics is one of the trending technologies in the world now. Autonomous Robots are used in various fields such as Industries, Bionics, Medicine, Military, Agriculture, Surveillance etc. Our Project aims to provide a prototype for using robotics in agriculture. The main goal of this project in agriculture field is to increase the productivity rate, reduce man power and save time. The most prominent use of robots in agriculture field is during the phase of crop production. Our project* ***"FARMER FRIENDLY BOT****" performs the work required crop production like ploughing the field, seed sowing, mud levelling and irrigation. The main component used is AVR At mega micro controller which supervises the entire process. The robot operates on automated mode in the agricultural field and manual mode while off the field.*

Index Terms - Robotics, land ploughing, seed sowing, mud levelling, Irrigation, AVR At mega micro controller

I. INTRODUCTION

Agriculture practice is the main occupation of the people in India. Indus Valley Civilization marks the beginning of Agriculture in India. Around 70% individuals are dependent on farming and agricultural produce. It shares 1/3rd of economy of the country. Since the origin agriculture is one of the common production method for human consumption. India stands second in the worldwide in terms of farm output. Over the years, the population in India is increasing rapidly and the demand to produce quality food is increasing. The farmers use heavy machines and cost of buying these machines is relatively high.The man power needed to satisfy this demand is large. Indian Agriculture is posed with many problems such as limited water resources, crop monitoring, unskilled laborers, cost of production etc. These problems can be overcome by automating the process using Robotics.

A Robot is a mechanical device resembling a human being and performs the activities programmed by the computer automatically. Robots consists of Sensors, Controllers, Arms, Actuators, Effectors. There are several types of robots in the world like

1. Mobile Robots
2. Stationary Robots
3. Autonomous Robots
4. Remote controlled Robots
5. Virtual Robots

Sensors

Arms

Effectors

Controller

Figure 1 Robotic components

Agricultural robots are used for harvesting, Fruit picking, weed controlling etc. Our project is an autonomous vehicle performing the activities like land ploughing, sowing of seeds, mud levelling and irrigation. These robots reduce the man power and produce crops in a efficient way.

II. PROBLEM STATEMENT

To Design and develop an agricultural robot which can performs the activities of crop production pcarried out in agricultural field. The control of this agri system should be wireless and can be able to show above operations. Fabricate the model of the same operated by wireless control which will be able to show operations like land ploughing, seed sowing, mud levelling and irrigation.

Also design and analyze a prototype model for this robot to give a solution and propose a model which can be used in real time field.

III. OBJECTIVES

i. To study about robot usage and benefits of using robotics in agriculture.
ii. To reduce effort of farmers in the agricultural field with the use of small machine.
iii. To perform all 4 operations at single time, hence increases production and saves time.
iv. To complete large amount of work in less time.
v. The usage of solar can be utilized for Battery charging. As the Machine works in the field, the rays of the sun can be used for solar power generation.

IV. DEVELOPMENT METHODOLOGY

The aim of the project is to develop a multipurpose autonomous robot which is used for digging the soil, seed sowing, and leveler to close the mud and water sprayer to provide water for the crops. This whole system of the robot operates on battery and the solar power.

The chassis of the robot is attached with 4 wheels and wheels are driven using dc motor. One end of the frame, ploughing tool is fitted which is also driven by dc motor and design is made to dig the soil. Funnel to store the seeds is made out of sheet metal and the seeds flow through the drilled hole of the funnel on to the shaft into digged soil. On the other end leveler is fitted to close the soil and water pump sprayer to spray the water. Solar panel is placed on top of the robot and is connected to the battery for charging. Thus the max efficiency from the sun is utilized by the solar panel and the battery The whole robot requires the 12v battery to operate the system IR transmitter and IR receiver is used to control the operation of the vehicle.

To practically implement above features, the arrangements of various components in our system is as shown in the following block diagram.

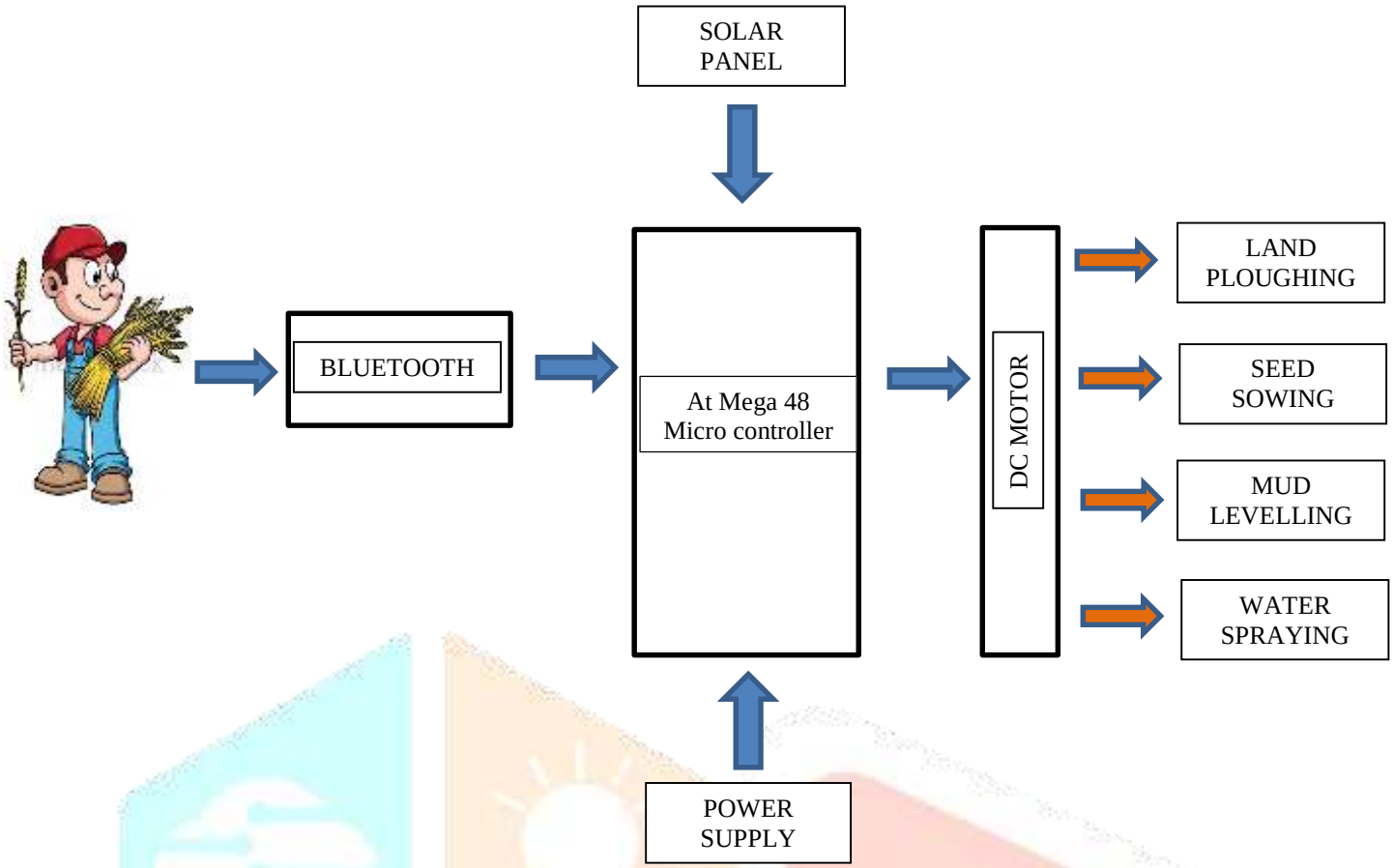

Figure 2 Block Diagram

4.1 At Mega 48 Microcontroller:

Inputs: IR Sensor for Obstacle detection, Bluetooth data communication for monitoring and controlling, power supply for operating.

Outputs: output signals to relays(Dc motor driver) to switch on and of the Harvester, Seed sowing, Water pump and control the motors for movement

Figure 3 At mega 48

Functions: microcontroller is the main unit in this module which used to read data from IR sensor using ADC and act accordingly. Microcontroller acts as brain for controlling the peripherals using the embedded c code burnt in to it.

4.2 RF Transmitter:

Depending on the input key pressed the micro controller encodes the data to the RF transmitter where the data will be modulated and sent to the module. The RF transmitter is a 3 pin module in which the first is the input that is connected to the microcontroller and the next two pins are VCC and ground respectively. This is an inbuilt module which is available in the market.

4.3 RF Receiver:

RF receiver will be demodulating the received signal. The demodulated output will be the actual data signal that is obtained from the transmitter. The RF receiver consist of three pins namely ground pin, output pin which is connected to the microcontroller and the VCC pin.

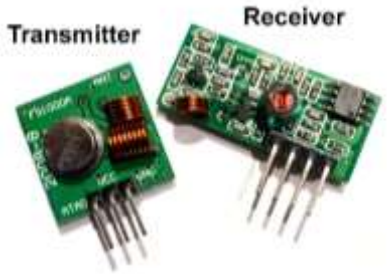

Figure 4 RF Transmitter and Receiver

4.4 IR Sensor:

This is a most commonly used sensor for obstacle detection using infrared signal. The electronic spectrum is divided into two regions far infrared and near infrared.

Inputs: IR rays to detect obstacle

Outputs: Analog voltage signal

Figure 5 IR sensor

Functions: Changes its output voltage depending on the detection of obstacle or absence .

4.5 Bluetooth module:

These modules use the IEEE 802.15.4 networking protocol for fast point-to-multipoint or peer-to-peer networking. They are designed for high-throughput applications requiring low latency and predictable communication timing.

Inputs: UART data from the microcontroller and RF data from Android phone.

Outputs: UART data to the microcontroller and RF data to Android phone.

Figure 6 Bluetooth module

Functions: It is a wireless communication media between agrobot and android phone .

4.6 Android phone:

Inputs: RF data from Bluetooth in agrobot.

Outputs: RF data to bluetooth in agrobot.

Figure 7 Android phone

Functions: It provides easy user interface to agrobot with android application .

4.7 Battery:

The battery used is a lead acid battery of 12v .These are rechargeable.

Inputs: 12v Charging through Electricity.

Outputs: 12v 1.2AH .

Figure 8 12V Battery

Functions: it provides power to whole system.

4.8 Solar Panel:

Inputs: Sunlight.

Outputs: 12v 100mah.

Figure 9 solar panel

List of Functions: it provides charging to battery.

4.9 DC motor driver:

Permanent magnet dc motor responds according to voltage and current. The steady state voltage across a motor determines the motor's running speed and the current through is armature winding determines the torque. On applying a voltage the motor will start running in one direction; reversing the polarity and the direction will also be reversed.

Inputs: 5v form microcontroller.

Outputs: 12v to motors and pump.

Figure 10 5V DC Motor

Functions: it provides 12v to motors and pump which is not directly possible from microcontroller since it can only supply 5v.

4.10 Ploughing, Seed sowing, Water pump and motors:

Inputs: 12v.

Outputs: Actions like ploughing, Seed sowing, Water pumping and Agrobot movements.

Functions: It is performs Actions like ploughing , Seed sowing, Water pumping and Agrobot movements.

V. RESULTS AND CONCLUSIONS

This system introduces the multi-purpose agricultural robot using the solar energy. It mainly consist of seeding, ploughing and mud levelling operation. By executing this framework in the field of agriculture it can help the agriculturist in the underlying phase of farming that is during the seeding , ploughing and irrigation. This system is extremely valuable for the farmers who are interested to do agriculture, but facing the labour problem. It can used towards investigating the utilization of little and lightweight machines in the other agricultural operations.

This project introduces wireless technology in the field of agriculture.

1. Exploits features of Android platform to help Farmers Significantly.
2. Provides a flexible user interface to farmer to control the machine effectively.
3. It reduces manual labour requirement which is a boon to the farmers as finding laborers is a very difficult job today.
4. The Agribot can work in any sort of climatic condition as well as can work nonstop unlike humans.
5. The time required to carry out the five functionalities reduces considerably in comparison with carrying out the same activities manually.
6. It is a onetime investment which reduces the overall farming cost considerably.
7. This Agribot acts as a gateway to automated smart farming.

Figure 11 Snapshot of overall agricultural robot

VI. FUTURE ENHANCEMENTS

The following modifications can be made to present circuit , which lead to still smarter project.

1. The module can be equipped with a faster and more capable microcontroller to integrate control of many more devices at the same time.
2. Another further intended development is to introduce time controlled devices for use in commercial spaces. This, for example could be the control of a large display in a showroom between two different intervals of time, without the intervention of any user or technician.
3. If the numbers of relays are increased from the current relays, the number of devices that can be controlled can also be increased.
4. The module can be equipped with other sensing equipment such as light and heat sensors, accelerometers, strain gauges etc to monitor other real world physical quantities.
5. Advanced AVR microcontrollers with bigger flash memories can be used to create an increased number of functions and programs for better functionality and for a user-friendly interface.
6. According to the range of communication constraint we can implement GSM Modem to our module.

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