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Remote Controlled Agriculture Robot

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ABSTRACT

Agribot is a robot designed for agricultural purposes. As one of the trends of development on automation and intelligence of agricultural machinery in the 21st century, all kinds of agricultural robots have been researched and developed to implement a number of agricultural production in many countries. The proposed system presents a system with high speed of operation for an advanced agriculture process which includes cultivation based on robotic platform. The farm is cultivated by the machine and the machine can be controlled remotely. Here This proposed robot can performs basic elementary functions like seeding, watering and fertilizer spreading.

INTRODUCTION

In current generation most of the countries do not have sufficient human factor in agricultural sector and it affects the growth of developing countries [1] [2].so it's time to automate the sector to overcome this problem. In India, there are 70% people dependent on agriculture. So we need to study the agriculture. Innovative idea of our project is to automate the process of sowing crops such as groundnut, sunflower, baby corn and so on [1]. The farming system like ploughing, cultivating, weeding, harvesting, etc is the different process. All the processes are advance to modifying the mechanism in farming which works automatically without the man power requirement. The small machine would be assembled from existing mass produced components without the need of specialized design and tooling. Also energy require to this machine is less as compared with tractors or any agricultural instrument. Seeding preparation is our day to day life we use tractor in farms. But it requires more time and the man shortage is faced continuously.

SR.NO	PARAMETER	MANUAL	TRACTOR	SEEDING MACHINE
1.	Man power	More	Moderate	No
2.	Time required	More	Moderate	Less
3.	Seeding technique	Manually	Manually	Automatically
4.	Required energy	High	Very high	Less
5.	Labor cost	High	High	Initial cost only
6.	Pollution	no	More	No

Table-1 : Comparison between the seed sowing Method

LITERATURE SURVEY

Designing an Autonomous Soil Monitoring Robot(IEEE - 2015)

Patrick M. Piper and Jacob S. Vogel et al designed an autonomous soil monitoring rover to expedite data collection. The rover will be able to autonomously navigate through a field and avoid obstacles. It will gather data on soil moisture and temperatures at a set of given points and relay the information back to the farm manager. The vehicle is equipped with a stevens hydra probe II used to sense the soil moisture and temperature. GPS is used to navigate through the field.

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Application of Computer Vision Technique on Sorting and Grading of Fruits and Vegetables (JFPT-2012)

Mahendran R and Jayashree GC et alpresented an idea of sorting and grading of fruits by image analysis. Computer Vision technique is used to evaluate the quality of the fruits. This paper presents the application of image analysis and computer vision system to evaluate the quality of products in the field of agriculture. Computer vision is a novel technology for acquiring and analysing an image by using computers to control machines or to process it. It includes capturing, processing and analysing images to facilitate the quality characteristics in agricultural and food products. The techniques used in image analysis include image acquisition, image pre-processing and image interpretation, leading to quantification and classification of images and objects of interest within images. Images are acquired with a physical image sensor and dedicated computing hardware and software are used to analyse the images with the objective of performing a predefined visual task.

Robots for Precision Agriculture (National Conference on Mechanisms and Machines-2007)

Satish Kumar KN, Sudeep CS et al presented a multi-purpose agricultural robot to implement precision irrigation, fertilizer addition and de-weeding apart from continuous monitoring of crop and soil conditions.

This will involve efficient utilization of water resources, intensive plant and soil monitoring, condition based use of fertilizers and the ability to work in unstructured environments. Precision agriculture involves the adequate and optimum usage of resources based on various parameters governing crop yield. The Handbook of Precision Agriculture defines that the critical factors that affect the yield are identified and the variability in soil, crop in the agricultural field are determined. The gantry robots perform various operations and helps the farmers to reduce the input costs and the usage of water resources.

OVERVIEW OF SYSTEM

Methodology In this project, it is presenting that the farm cultivation process in autonomous agriculture system which is controlled by microcontroller assembly. The technique of seed preparation in ploughed land is based on row per column depending on the types of cultivation. The main part of the robot technique is remote r part. The remote controls the completion of farm for end of the land and then turn the position of robot either in left or right or forward direction. The block diagram of robotic system in autonomous agriculture system is shown in figure 1. The system includes; motor and whole parts are controlled by microcontroller. The heart of the system is microcontroller. It is the main control block and other control blocks are interfaced with the controller. The power supply goes to the microcontroller with the help of voltage regulator by convert the constant power.

REMOTE SECTION

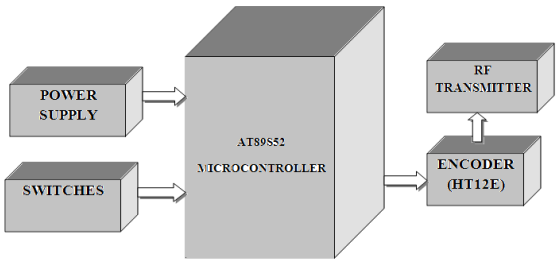

Figure-1 : Remote Section Block Diagram

ROBOT SECTION

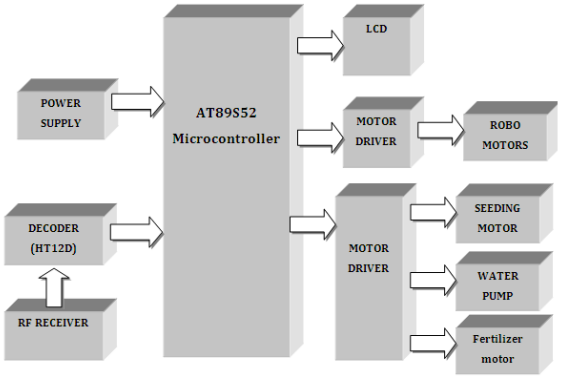

Figure-2 : Robot Section Block Diagram

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The operation of dc motor is based on electromagnetic, to give the energy to the robot vehicle. The driver circuit is used for giving the constant voltage to the DC motor and the motor will turn in both the forward and reverse direction. When the DC motor is start's, vehicle moves along the particular column of ploughed land for seeding, closing the pits and side by side sprinkling the water and another motor will spared the fertilizers.

HARDWARE SYSTEM DESIGN

ARMLPC2148MICROCONTROLLER

ARM LPC2148 is a 64 pin Micro Controller which comes under ARM 7 version of ARM processors. It comes under the processor core architecture ARM7TDMI-S.It is a 32 bit Micro Controller .This is intended for high end applications involving complex computations. It follows the enhanced RISC architecture. It has high performance and very low power consumption. It has serial communications interfaces ranging from a USB 2.0 Full Speed device, multiple UARTS, SPI, and I2Cs. Various 32-bit timers, dual 10-bit ADC(s), single 10-bit DAC, PWM channels and 45 fast GPIO lines with 9 interrupt pins.

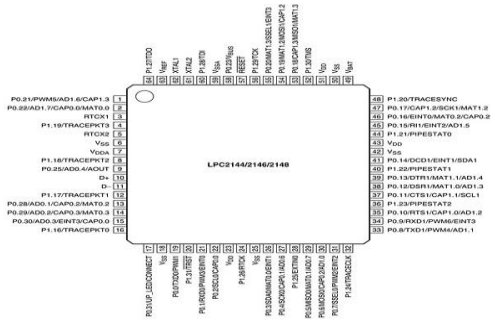

Figure-3 : Pin diagram of ARM LPC-2148 microcontroller.

LCD (Liquid Cristal Display)

Introduction:

A liquid crystal display (LCD) is a thin, flat display device made up of any number of color or monochrome pixels arrayed in front of a light source or reflector. Each pixel consists of a column of liquid crystal molecules suspended between two transparent electrodes, and two polarizing filters, the axes of polarity of which are perpendicular to each other. Without the liquid crystals between them, light passing through one would be blocked by the other. The liquid crystal twists the polarization of light entering one filter to allow it to pass through the other.

DC WATER PUMP

Figure-4 : DC Water Pump

Specifications

DC Voltage: 2.5-6V
Maximum lift: 40-110cm/15.75"-43.4"
Flow rate: 80-120L/H
Outside diameter of water outlet: 7.5mm/0.3"
Inside diameter of water outlet: 4.7mm/0.18"

RADIO FREQUENCY:

Radio frequency (RF) is a frequency or rate of oscillation within the range of about 3 Hz to 300 GHz. This range corresponds to frequency of alternating current electrical signals used to produce and detect radio waves. Since most of this range is beyond the vibration rate that most mechanical systems can respond to, RF usually refers to oscillations in electrical circuits or electromagnetic radiation.

- RF Transmitter
- RF Receiver
- Encoder and Decoder

The data is received by the RF receiver from the antenna pin and this data is available on the data pins. Two Data pins are provided in the receiver module. Thus, this data can be used for further applications.

Figure-5 : RF Transmitter & Receiver

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FACTORS INFLUENCED TO CHOOSE STT-433MHz

- The STT-433 is ideal for remote control applications where low cost and longer range is required.
- The transmitter operates from a1.5-12V supply, making it ideal for battery-powered applications.
- The transmitter employs a SAW-stabilized oscillator, ensuring accurate frequency control for best range performance.
- The manufacturing-friendly SIP style package and low-cost make the STT-433 suitable for high volume applications.

DC MOTOR

A DC motor is designed to run on DC electric power. Two examples of pure DC designs are Michael Faraday's homopolar motor (which is uncommon), and the ball bearin motor, which is (so far) a novelty. By far the most common DC motor types are the brushed and brushless types, which use internal and external commutation respectively to create an oscillating AC current from the DC source -- so they are not purely DC machines in a strict sense.

Figure-6 : DC Gear Motors

SCHEMATI DIAGRAM

Remote Section

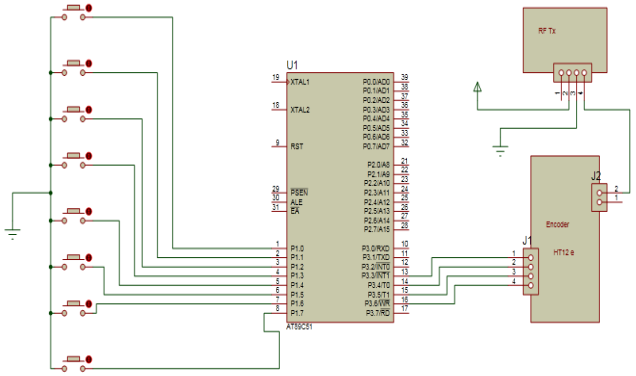

Figure-7 : Schematic Diagram of Remote Section

Robot section

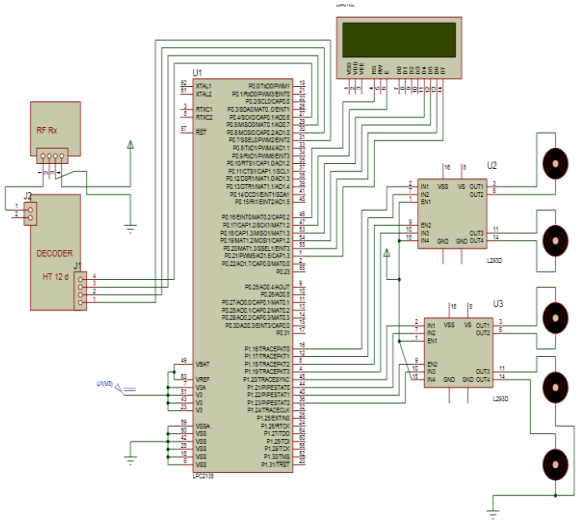

Figure-8 : Schematic Diagram of Robot Section

Software Components

- Keil
- Proteus
- Flash magic
- Embedded C

RESULTS AND DISSCUSSIONS

The proposed system was fully developed and tested to demonstrate its feasibility and effectiveness. The screenshots of the agriculture robot developed has been presented in Figure below.

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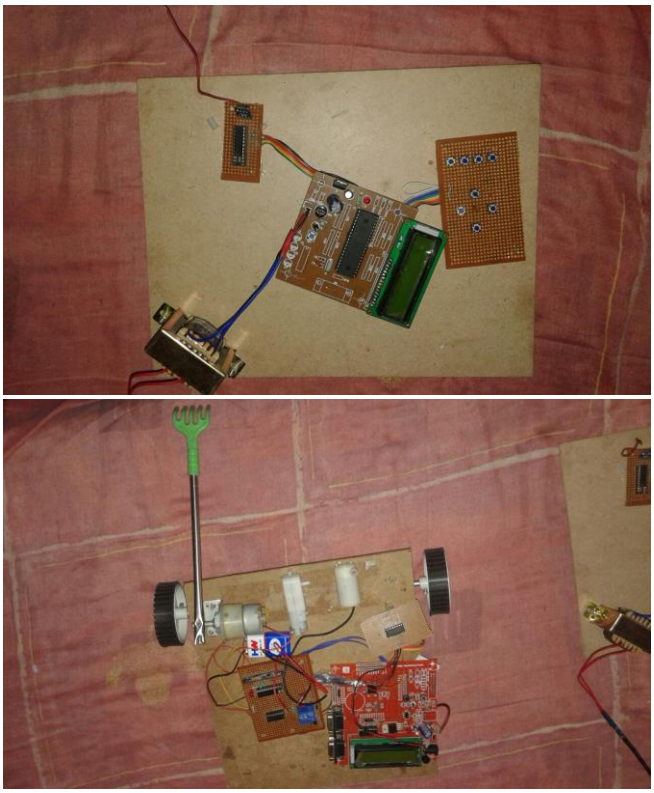

Figure-9 : Project Snapshots

CONCLUSION AND FUTURE SCOPE

This project is mainly based on minimizing man power and cost of the equipment, which can be affordable to all farmers. Most of the present successful agri-robot models represent use of powerful fuel based IC engines and heavy machineries, which require skilled technician and causes unnecessary environmental pollution and also reduction in fossil fuel. In order to solve this problem, the use of automation unmanned agri-robot is implemented by this work. This project is developed to automatically cultivating the land. The project has consisted two mechanisms. The first mechanism contain to navigate the assembly of the robot vehicle, where as second mechanism is preparing the plough the land, seeding and watering it. This project can be very useful for farmers

The solar panel can be replace battery power supply for reduce the recharge cost. And one or more system can be monitoring through the GSM system. Then it also includes the weeding and harvesting in this system.

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