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Solar Powered Agricultural Robot

Harsh Tandel, Abha Samant,Vivek Mulye, Nikhil Patil
[1.]*EXTCVidyalankar Institute of EngineeringName of organization: VIT,WadalaMumbai, India.*
[2.]*Project Guide:- Prof. Rakshak SoodEXTC Vidyalankar Institute of EngineeringName of organization: VIT, WadalaMumbai, India.*

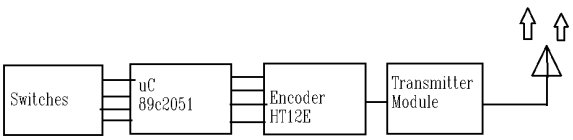
Abstract: **-** Conventional resources of energy are limited & are non-renewable & looking at today's rate of consumption these resources are going to get exhausted in some years. This possibility of exhaustion is called energy crisis. The world is clearly running out of oil and gas, yet most people ignore the coming crisis. Food production and distribution in the industrialized world have become so dependent on petroleum use it's hard to imagine how Agriculture will function without this fuel. Solar energy could supply all the present and future energy needs of the world on a continuing basis. This makes it one of the most promising of the unconventional energy sources. Hence a Solar powered robot for agriculture means simple eco-friendly Agricultural Robot.

Keywords: - *AT89c51, Tracking &Trapping,L293D, Wireless, Trace & Retrace, sensors, DC motors.*

I. INTRODUCTION

In the modern drip irrigation systems, the most significant advantage is that water is supplied near the root zone of the plants drip by drip due to which a large quantity of water is saved.
Irrigation system uses valves to turn irrigation ON and OFF. These valves may be easily automated by using controllers and solenoids. Automating farm or nursery irrigation allows farmers to apply the right amount of water at the right time, regardless of the availability of labor to turn valves on and off. In addition, farmers using automation equipment are able to reduce runoff from over watering saturated soils, avoid irrigating at the wrong time of day, which will improve crop performance by ensuring adequate water and nutrients when needed. Automatic Drip Irrigation is a valuable tool for accurate soil moisture control in highly specialized greenhouse vegetable production and it is a simple, precise method for irrigation. It also helps in time saving, removal of human error in adjusting available soil moisture levels and to maximize their net profits.
The entire automation work can be divided in two sections, first is to study the basic components of irrigation system thoroughly and then to design and implement the control circuitry.

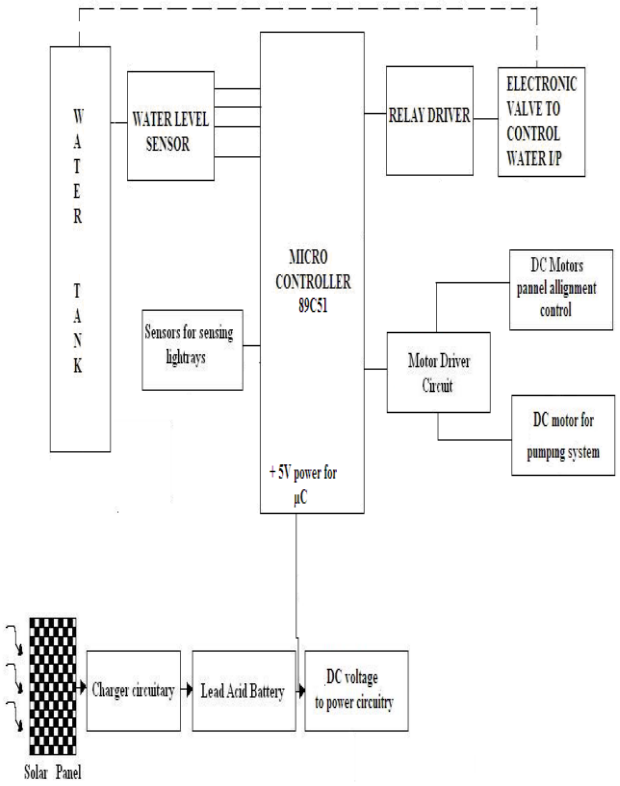
A. Motivation



The continuous increasing demand of the food requires the rapid improvement in food production technology. In a country like India, where the economy is mainly based on agriculture and the climatic conditions are isotropic, still we are not able to make full use of agricultural resources. The main reason is the lack of rains & scarcity of land reservoir water. The continuous extraction of water from earth is reducing the water level due to which lot of land is coming slowly in the zones of un-irrigated land. Another very important reason of this is due to unplanned use of water due to which a significant amount of water goes waste. This has motivated us in implementation of an automated irrigation system using GSM for better flexibility.

B. Existing Problems

At the present era, the farmers have been using irrigation technique in India through the manual control in which the farmers irrigate the land at the regular intervals. This process sometimes consumes more water or sometimes the water reaches late due to which the crops get dried. Water deficiency can be detrimental to plants before visible wilting occurs. Slowed growth rate, lighter weight fruit follows slight water deficiency. This problem can be perfectly rectified if we use automatic micro controller based drip irrigation system in which the irrigation will take place only when there will be intense requirement of water.



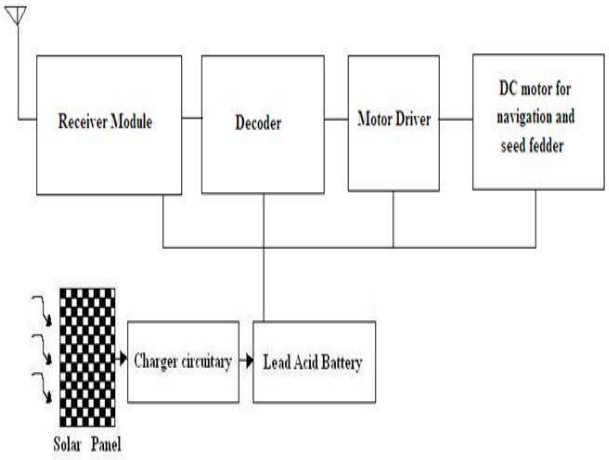
II. AIM OF THE PROJECT WORK

- To provide an efficient solution for automatic control of irrigation motor for illiterates.
- To help farmers use adequate and appropriate irrigation as according to their crops and time.

III. OVERVIEW OF THE BLOCK DIAGRAM

1.1 RF TRANSMITTER-

Input to the circuit is given via switch which consists of Forward, Backward, Trace, Retrace function. Microcontroller 89c2051 controls the input from the switch and output to be given to further circuits. Encoder HT12E accepts input via 4 data lines and the output is available at Dout pin of encoder. It is responsible for parallel to serial conversion of data.



1.2 RF RECEIVER-

This will receive the signals from the transmitter. It works on the same frequency as transmitter i.e. 434MHz & same process 00ASK. The data will only be received by the transmitter if the address line combination is same. For indication the received data is ours there is an LED. If the LED lights means correct

data is ours. The decoder IC is much similar to the encoder IC HT12D. HT stands for Holtek, 12 stands for 8 address lines & 4 data lines, D stands for Decoder. HT12D converts parallel data to 4 serial outputs. The serial input is givenfrom receiver to Din. The 5KOhm resistor decides which serial input is to be transmitted first through D3-D0. This is the same 20 pin µC which is used in the transmitter circuit. This µC plays an important role in controlling of further circuits. This L298 IC will be used to drive the motors going to be used in the tractor. A single L298 can control two motors simultaneously.

1.3 WATER LEVEL CONTROLLER AND PUMPING SYSTEM-

There will be two sources of water in the water level system which are Normal Water and Bore Well Water. The electrode in the tank will determine the water level. When the water in the first supply goes below a certain mark it will give a signal to turn off first supply water and start using bore well water for irrigation. This signal is given to the microcontroller which gives it to the Relay Driver Circuit to control the pump action.

A. Embedded System(AT89C51)

Now the key component is the AT89c51 microcontroller. We are working with embedded systems and it does the following operations:

An Embedded System is a special-purpose computer system designed to perform one or a few dedicated functions often with real-time computing constraints. It is usually *embedded* as part of a complete device including hardware and mechanical parts.

Embedded system controls many of the common devices. Physically, embedded systems range from portable devices such as digital watches and MP4 players. Now it ranges to large stationary installations like traffic lights, factory controllers, or the systems controlling nuclear power plants. Complexity varies from low, with a single microcontroller chip, to very high with multiple units, peripherals and networks mounted inside a large chassis or enclosure.

Embedded processors can be broken into two broad categories: ordinary microprocessors (µP) and microcontrollers (µC), which have many more peripherals on chip, reducing cost and size.Embedded systems are designed to do some specific task, rather than be a general-purpose computer for multiple tasks. Some also have real-time performance constraints that must be met, for reason such as safety and usability; others may have low or no performance requirements, allowing the system hardware to be simplified to reduce costs.

IV. ADVANTAGES

The robot is fitted with a battery that can be charged by the energy harvested from the solar panels fitted on the robot, making the use of fuel frugal or non-existent.

No external charging of battery is required as charging is done by the solar panel placed on the robot.

Use of solar energy makes the agricultural robot eco-friendly and also cost effective.

V. LIMITATIONS

Availability of solar energy depends on the change of seasons, weather, night & day. Thus we have to find an alternate source of power during this period.

The availability of the water in cannot be taken for granted in the water level sensing module. The design n weights of the sensors have to be adjusted depending upon the climatic changes of the region where the robot is operating.

VI. CONCLUSION

In agriculture, the opportunities for robot-enhanced productivity are immense – and the robots are appearing on farms in various guises and in increasing numbers. The other problems associated with autonomous farm equipment can probably be overcome with technology. This equipment may be in our future, but there are important reasons for thinking that it may not be just replacing the human driver with a computer. It may mean a rethinking of how crop production is done. Crop production may be done better and cheaper with a swarm of small machines than with a few large ones.

One of the advantages of the smaller machines is that they may be more acceptable to the non-farm community. The jobs in agriculture are a drag, dangerous, require intelligence and quick, though highly repetitive decisions hence robots can be rightly substituted with human operator. The higher quality products can be sensed by machines (colour, firmness, weight, density, ripeness, size, shape) accurately. Robots can improve the quality of our lives but there are downsides.

If it proves affordable and can survive the elements, there may be a day in the not-too-distant future when you can spot solar powered agricultural robot buzzing through croplands, doing their autonomous damnedest to help feed the nine billion people that will soon populate the planet.

VII. FUTURE SCOPE

1. The robot is not limited to Agricultural uses.
2. Mars exploration robot was autonomous solar powered robot.
3. An automated solar powered has many applications in industries. It would replace taxing manual labour.
4. The automated botcan be used in day to day life in cars and automobiles.
5. The solar tracking & trapping module can also be used in industries & homes.
6. The trace-retrace module can be adapted and programmed to do repetitive work.

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