Farmer Friendly Agriculture Robot with Shovel Control System Using Automatic Seed Dispensing

Devendra Patil[1], Pratibha Rathod[2], Ashwini Karemore[3], Dr.A.A.Kalage[4]

UG Student, Department of Electrical Engineering, Sinhgad Institute of Technology (SIT), Lonavala, Maharashtra, India[1,2,3]

HOD, Department of Electrical Engineering, Sinhgad Institute of Technology (SIT), Lonavala, Maharashtra, India[4]

ABSTRACT: Many advances in technology have made the agriculture business a much less labor intensive industry to be a part of. If we think back even only 50 years, farmers were just beginning to incorporate technologies into their farming techniques .It has been said that individual that are involved in the farming industry are some of the least susceptible to change. They are very set in the ways of those came before them. When we take a look at the farming industry now, we can see that this is rapidly changing. Farmers are looking for new ways to implement techn0logy to cut costs and reduce laborhours. One of the ways that farmers are beginning to explore new technologies in farming come from the autonomous factor. The Bluetooth based tractor is something that is very new to the agriculture industry, but is quickly gaining popularity from agriculture research companies around the United States. These tractors are described by farm industry news as a tractor that drives it's solve with a computer in control. Although still in the research phase of development, autonomous tractors are rapidly becoming more of a reality than an idea.

KEYWORDS: Weed control, Spraying, Rotted left rotted rightplanting seeds Soil analysis

I. INTRODUCTION

Nowaday's world is moving towards automation and sophistication. It is equally important to have development and automation in agricultural equipment. Earlier, farmers were mostly depending on traditional farming equipment, which were depending on bullock, camels etc. Animal for their uses on fieldwe are interested to have some innovative development in agriculture to move India to sit in the so why, we are wishing to have automation, sophistication in agriculture with seed sowing issue? This project is basically having microcontroller as a main device it is easily available device for controller and driving of various devices like DC Motors etc. This robot will definitely help in development of agriculture in India. This is fort and time saving and energy saving project. This may require much more cost at two primary basic but, if we have mass production in future it will definitely got in smaller prize. There will not more job remain rather than only filling the seed container, giving distance sets and publishing start button of robot. It will work automatically till end of seed chamber only regular attention should have to user on seed chamber. Agricultural robots are the fastest growing technology developed to perform various complex tasks that are difficult for humans to achieve. Recent news claims that the Japanese government has taken an initiative to use robotic operators in lands swamped by March 2011 tsunami. This "Dream project" was planned to involve unmanned tractors working in the farm on the disaster site. The robotic farmers are capable of cultivating vegetables, fruits, soybeans, wheat and rice, which are then packed in boxes and shipped across the country by this robotic technology. This process is accompanied by recycling of carbon dioxide using machinery in an attempt to reduce the use of fertilizers.

A single solution to implement precision agriculture is the development of a single gantry robot that can perform several precision agriculture related operations. The main objective of this system is to implement soil monitoring and precision irrigation on each crop, perform de-weeding and design a cultivated field using accurate robotic crop planning. The idea of robotic agriculture (agricultural environments serviced by smart machines) isn't a new one. Many engineers have developed driverless tractors in the past but they have not been successful as they did not have the ability to embrace the complexity of the real world. Most of them assumed an industrial style of farming where everything was known before hand and the machines could work entirely in predefined ways – much like a production line. The approach is now to develop smarter machines that are intelligent enough to work in an unmodified or semi natural environment. These machines do not have to be intelligent in the way we see people as intelligent but must exhibit sensible behavior in recognized contexts. In this way they should have enough intelligence embedded within

them to behave sensibly for long periods of time, unattended, in a semi-natural environment, whilst carrying out a useful task. One way of understanding the complexity has been to identify what people do in certain situations and decompose the actions into machine control. This is called behavioral robotics and a draft method for applying this approach to agriculture is given in Blackmore.

The approach of treating crop and soil selectively according to their needs by small autonomous machines is the natural next step in the development of Precision Farming (PF) as it reduces the field scale right down to the individual plant or Phytotechnology(Shibusawa 1996). One simple definition of PF is doing the right thing in the right place at the right time with the right amount. This definition not only applies to robotic agriculture (RA) and Phytotechnology but it also implies a level of automation inherent in the machines. Automatic sensing and control (on-the-go) for each task is also important and many research papers have shown that these systems are feasible but most are too slow, and hence not economically viable, to be operated on a manned tractor. Once these systems are mounted on an autonomous vehicle, they may well suddenly become commercially viable.

II. GOALS AND OBJECTIVES

Theaimof this project is to present the status of existing trends and achievement of agriculture and horticultural robotic vehicles and self-governing system and outline the potential for future application. Dissimilar applications of autonomous vehicles in agriculture have been examined and compared with conventional systems,where three main group of field application have been identified to be the first potential practical applications crop establishment,plant care and selective harvesting.Moreover we will give examples of economic potential of applying autonomous robotic vehicles compared to conventional system. To present the status of existing trends and technologies.

Objective of project:
1.To avoid the farmer being exposed to toxic pesticide vapours produced during spraying.
2. Reduce the workload on the farmer.

III. LITERATURE SURVEY

As a source of livelihood, agriculture (including forestry and fishing) remains the largest sector of Indian Economy. While its output share fell from 28.3% in 1993-94 to 14.4% in 2011- 12, employment share declined from 64.8% to 48.9% over the same period. Therefore, almost half of the workforce in India still remains dependent on agriculture. Given the low share of this workforce in the GDP, on average, it earns much lower income poorer than its counterpart in industry and services.

Therefore, progress in agriculture has a bearing on the fate of the largest proportion of the low income population in India. The paper identifies five important aspects of agriculture that need immediate attention to bring economic advantages to millions of farm families. First, output per hectare, which is a common measure of agricultural productivity, remains low for many crops when compared to many other countries. There are also large regional variations within the country. Reasons include low and faulty input uses, poor access to modern technology and no real technological breakthrough in recent times. Second, on average, farmers do not realize remunerative prices due to limited reach of the minimum support prices (MSP) and an agricultural marketing system that delivers only a small fraction of the final price to the actual farmer. Third, the farm size of the majority of the household has declined to unviable levels inducing farmers to leave land and look for better job opportunities elsewhere. Because land leasing laws make it risky to lease land, increasingly, productive land is being left uncultivated. Changes in the land leasing laws may bring consolidation of land holding at operational level and attract better investment along with access to credit and relief to tenants. Fourth, relief measures in the event of natural disasters are inadequate and suffer from procedural inefficiencies and delays. The risk adaptation measures are poorly executed and have not worked effectively.

This situation needs to be rectified with at least minimum quick relief to farmers for crop loss in case of natural calamities. Finally the potential of the eastern region needs to be harnessed with suitable interventions. This region is unique for its suitability to the production of certain commodities. However, taking advantage of this potential would require institutional support and investment in technological innovations. The paper offers ideas on how these problems can be addressed so as to accelerate agricultural growth and bring remunerative prices to farmers.

IV.METHODOLOGY

To make agriculture project we follow this steps
- **Step 1:**To go to the farmers and findthe problems faced by them.
- **Step 2**:To choose a problem..
- **Step 3:**Toanalyse the problem their solution.
- **Step 4:**The selection of design of gear for proper seed distance.
- **Step 5**: Find which mechanism is to suitable in lowest cost.
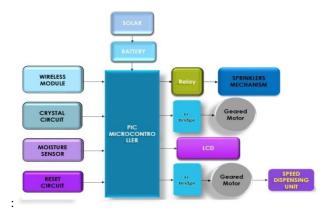- **Step 6**: To find all components we require in proper dimension.

Fig.1 Block Diagram

Motor Driver: - A gear reducer, also called a speed reducer or gear box, consists of a set of gears, shafts and bearings that are factory-mounted in an enclosed, lubricated housing. Gear reducers are available in a broad range of sizes, capacities and speed ratios. Their job is to convert the input provided by a "prime mover" into output of lower RPM and correspondingly higher torque. In industry, the prime mover is most often an electric motor, though internal combustion engines or hydraulic motors may also be used There are many types of gear reducers using various gear types to meet application requirements as diverse as low first cost, extended life, limited envelope size, quietness, maximum operating efficiency, and a host of other factors. The discussion that follows is intended only as a brief outline of the most common industrial gea reducer types, their characteristics and uses.

Fig.2 Motor Drive

Power Supply-For our all IC we require 5V D.C. supply which can be generated by step downtransformer, full wave bridge rectifier, filter condenser & voltage regulator IC7805. The powersupply is mainly used to give the regulated 5V output to all the components. But due to interference between ground and output there is glitch in the output. So we have used capacitor to decouple them and hence the power supply gives the 5V regulated output. Current and battery discharge time with and no load. Table 1 shows Current consumed by DC motor and ARM7 controller, servo motor and Relay from that we can calculate the discharging time for battery with load and without load. Formula to calculate

to time for no load is, Discharge Time = mAH current of battery / Total current consumed by circuit in mA.
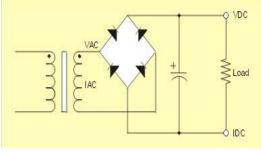

Fig.3 Power Supply

The input to the circuit is applied from the regulated power supply. The a.c. input i.e., 230V from the mains supply is step down by the transformer to 12V and is fed to a rectifier. The output obtained from the rectifier is a pulsating d.c voltage. So in order to get a pure d.c voltage, the output voltage from the rectifier is fed to a filter to remove any a.c components present even after rectification. Now, this voltage is given to a voltage regulator to obtain a pure constant dc voltage.

Transformer:-Usually, DC voltages are required to operate various electronic equipment and these voltages are 5V, 9V or 12V. But these voltages cannot be obtained directly. Thus the a.c input available at the mains supply i.e., 230V is to be brought down to the required voltage level. This is done by a transformer. Thus, a step down transformer is employed to decrease the voltage to a required level.

Rectifier:-The output from the transformer is fed to the rectifier. It converts A.C. into pulsating D.C. The rectifier may be a half wave or a full wave rectifier. In this project, a bridge rectifier is used because of its merits like good stability and full wave rectification.

The Bridge rectifier is a circuit, which converts an ac voltage to dc voltage using both half cycles of the input ac voltage. The Bridge rectifier circuit is shown in the figure. The circuit has four diodes connected to form a bridge. The ac input voltage is applied to the diagonally opposite ends of the bridge. The load resistance is connected between the other two ends of the bridge.

For the positive half cycle of the input ac voltage, diodes D1 and D3 conduct, whereas diodes D2 and D4 remain in the OFF state. The conducting diodes will be in series with the load resistance R_L and hence the load current flows through R_L.
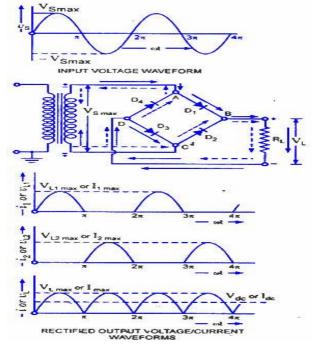

Fig.4 Bridge Rectifier

For the negative half cycle of the input ac voltage, diodes D2 and D4 conduct whereas, D1 and D3 remain OFF. The conducting diodes D2 and D4 will be in series with the load resistance R_L and hence the current flows through R_L in the same directionas in the previous half cycle. Thus a bi-directional wave is converted into a unidirectional wave.

Filter:-Capacitive filter is used in this project. It removes the ripples from the output of rectifier and smoothens the D.C. Output   received from this filter is constant until the mains voltage and load is maintained constant. However, if either of the two is varied, D.C. voltage received at this point changes. Therefore a regulator is applied at the output stage.

Voltage regulator: -As the name itself implies, it regulates the input applied to it. A voltage regulator is an electrical regulator designed to automatically maintain a constant voltage level. In this project, power supply of 5V and 12V are required. In order to obtain these voltage levels, 7805 and 7812 voltage regulators are to be used. The first number 78 represents positive supply and the numbers 05, 12 represent the required output voltage levels. The L78xx series of three-terminal positive regulators is available in TO-220, TO-220FP, TO-3, D2PAK and DPAK packages and several fixed output voltages, making it useful in a wide range of applications. These regulators can provide local on-card regulation, eliminating the distribution problems associated with single point regulation. Each type employs internal current limiting, thermal shut-down and safe area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1 A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltage and currents.

Seed Sowing /weeding Motor: -This motor is use as a time interruption purpose because one by one side wills down to earth side and vehicle move forward direction at same time. Knowing the position and severity of the weeds there are many methods that can kill, remove or retard these unwanted plants .Different physical methods can be used that rely on physical interaction with the weeds. A classic example is to break the soil and root interface by tillage and promote wilting of the weed plants. This can be achieved in the inter row area easily by using classical spring or duck foot tines. Intra row weeding is more difficult as it requires the position of the crop plant to be known so that the end effectors can be steered away. Within the close-to-crop area, tillage cannot be used as any disturbance to the soil is likely to damage the interface between the crop and the soil.

SPRINKLER:-High Pressure Water Pump Built in thermal protector fully automatic demand pumps can be used as a portable sprinkler pump High pressure diaphragm pump Small size, Light weight and Stable performance. Special valve for liquid input and output; Ant vibration pad, easy installation with stable function. Self-priming, Automatic Pressure Switch. Automatic Pressure Protection.

Fig.5 Water Sprinkler

Low Noise, with excellent resistant to chemical corrosion; Functions Water purification, filter machine, chemical metering and fluid supply. Highpressure pumps used in sprayers and sprayfixtures for high plants. Food, Beverage filling and liquid transfer.

Modulator-This stage modulates the input signal. Here frequency modulator is used because of its feature of less noise.
Motor L: - This is the left tuning motor which use to turn vehicle at left side.
Motor R: -This is the right tuning motor which use to turn vehicle at right side.
ARM 7 controllers Board:-ARM architecture has become the most pervasive 32-bitarchitecture in the world, with wide range of ICs available from various IC manufacturers. ARM processors are embedded in products ranging from

cell/mobile phones to automotive braking systems. A worldwide community of ARM partners and third-party vendors has developed among semiconductor and product. Design companies, including hardware engineers, system designers, and software developers.

ARM7 controller: -The ARM7 controller is mainly used for controlling and performing the action of relay driver. But due to wrong selection of crystal oscillator and decoupling. The controller time cycle is disturbed. So by using capacitor to decouple these problems are solved.

PIC Microcontroller: A microcontroller is a small computer on a single integrated circuit consisting internally of a relatively simple CPU, clock, timers, I/O ports, and memory. Microcontrollers are used in automatically controlled products and devices. Microcontrollers are designed for small or dedicated applications. By reducing the size and cost compared to a design that uses a separate microprocessor, memory, and input/output devices, microcontrollers make it economical to digitally control even more devices and processes.

The pulses coming as output from electricity meters on each increase in unit are applied to the microcontroller as input. Microcontroller reads the inputs & as soon as input pulse is received, it increases the count of units of electricity. Also, it reduces the unit prize amount from the balance amount. The count of units and the balance amount is displayed on LCD display. The updated values are now stored in EPROM**.**
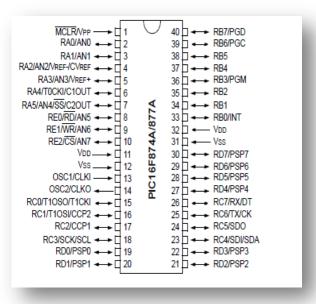

Fig.6.Pin Diagram

CRYSTAL CIRCUIT:-This circuit gives the required clock pulses to the microcontroller to give it the sense of the reference time
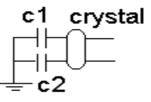

Fig.7 Crystal Circuit

RESET CIRCUIT: -
 This circuit gives the microcontroller the starting pulse required to start the operation from the start. Unless this pulse is given, the microcontroller doesn't start functioning.
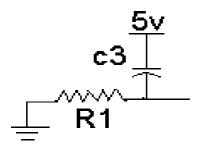
Fig.8 Reset Circuit

Pull Up Resistors: The pull-up resistors are required to source the required current to the 7-segment display, which the microcontroller alone is not capable of. The microcontroller pins cannot be connected to the LCD directly   because the microcontroller cannot supply all the required current. So the required remaining current is provided through the pull-up resisto

HC-05MODULE:- HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed fortransparent wireless serial connection setup. Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Blue core 04-External single chip Bluetooth system with CMOS technology and with AFH(Adaptive Frequency Hopping Feature). It has the footprint as small as 12.7mmx27mm. Hope it will simplify your overall design/development cycle.

Fig.9 HC-05 Module

Specifications
- Typical -80dBm sensitivity
- Up to +4dBm RF transmit power
- Low Power 1.8V Operation ,1.8 to 3.6V I/O
- PIO control
- UART interface with programmable baud rate
- With integrated antenna
- With edge connector

LCD:-LCD's are very simple to interface with the controller as well as are cost effective. The LCD requires 3 control lines (RS, R/W & EN) & 8 (or 4) data lines. The number on data lines depends on the mode of operation. If operated in 8-bit morethan 8 data lines + 3 control lines i.e. total 11 lines are required. And if operated in 4-bit morethan 4 data lines + 3 control lines i.e. 7 lines are required. How do we decide which mode to use? It's simple if you have sufficient data lines you can go for 8 bit mode & if there is a time constrain i.e. display should be faster than we have to use 8-bit

mode because basically 4-bit mode twice as more time as compared to 8-bit mode
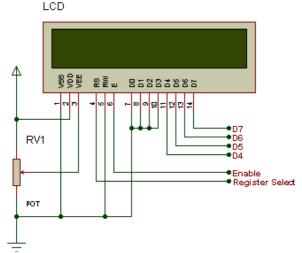

Fig.10 LCD Pin Diagram

BATTERY: - Batteries store energy being produced by given generating source and when this source is unavailable this energy can be used by loads. The inclusion of storage in any energy generating system will increase the availability of the energy. Battery (electricity), an array of electrochemical cells for electricity storage, either individually linked or individually linked and housed in a single unit. An electrical battery is a combination of one or more electrochemical cells, used to convert stored chemical energy into electrical energy.

IV. ADVANTAGES

- Sophisticated security
- Monitors all hazards and threats
- It saves time
- It reduces labour work.
- It's easy to use
- Not light sensitive
- Not as sensitive to weather/environmental conditions

V. APPLICATIONS

- It uses in many agricultural application
- Security purpose
- Remote monitoring
- Commercial wireless application
- Communication system

VI. FUTURE SCOPE

- In this project we use Bluetooth module which is used for short distance communication.
- So in future we can use GSM module in place of RF module which can be used for long distance.

VII. CONCLUSIONS

The main task nowis to promote this technology and have available to farmers at an affordable price. Newly developed system is also effective as compared systems available in the market. New trans-planter having simple construction and less number of parts which minimizes the cost of development for it.
Total cost required to develop the system is also less. New spraying machine is more flexible than machines available in the market at starting cost. This is our first step in making all the process involved in agriculture automatic.

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