

GRASSCUTTER, FERTILIZER DISPENSER, AND INSECT REPELLANT USING E-YANTRA

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Abstract: Many countries in Asia including India are agrarian economic and most of their rural populations depend on agriculture to earn their livelihood. Aimed at increasing the productivity and reducing the labor involved this robot is designed to execute the basic functions required to be carried out in farms. Our aim is to create a multitasking agriculture robot which will focus on the work of plantation.

A general concept for a field crops robotic machine is to selectively fertilize and easily weeds the desired prototype. First, introduce the solar panel into this system to generate the power in battery it can be used to drive the drone system. The main functions of the system are that to cut the grass, to dispense the fertilizer and to repel the insect. The project represents a smart gadget to avert the calamitous effects of pest bugs in the farming land as well as in household commodities. The development and performance analysis of smart ultrasonic insect repellent device has been demonstrated. The device is able to generate different types of frequencies which are very helpful to repel different types of insects.

Keywords: E-Yantra, agriculture, robot, Zigbee, Microcontroller, Solar power.

I. INTRODUCTION

Now a day's most of the countries do not have sufficient human factor in the agricultural sector and it affects the growth of developing countries. So it's time to automate the sector to overcome this problem. In India, 70% of people depends on agriculture. So we need to study the agricultural alternatives.[1]

Our idea is to have an autonomous robot for applying fertilizers and weed control for the huge farm fields. A goal of autonomous robotic systems is to execute tedious or dangerous tasks, increase productivity, decrease production costs and preserve the environment. Robots are able to execute tedious work which would bore a human quickly with a steady performance. On the whole, our robot is to solve the farm fields' problems that include manpower and involves high cost. The weed control and the fertilizer spraying were done by the manpower in the older days. The combination of human and machine is able to incorporate the strengths of both sides and therefore increase the robustness of a system, decrease the development costs and offer the possibility that one can learn from the other.[2]

In case of gas, powered lawn mover's due to the emission of the gases it is responsible for pollution. Also, the cost of the fuel is increasing. Hence it is not efficient. So, the solar-powered autonomous lawn cutters are introduced. Solar powered lawn mover can be described as the application of solar energy to power an electric motor which in turn rotates a blade which does the moving of a lawn.

Pest bugs may possess harmful as well as disastrous influences on farming production and the organic atmosphere. Infestation pestilence might result in issues through destroying harvest and also nutrients manufacturing that may well lead to health and fitness risk to human beings. Noise is being used to get rid of pests with loud claps and yells for a very long time in agriculture system. A substantial Kansas State University research verified that ultrasonic noise performs insect repellent impact and also a decrease in the pairing as well as a reproduction of numerous pests. The Federal Trade Commission and the American Mosquito Control Association have both informed individuals that scientific questions into the performance of ultrasonic pest control gadgets have a perfect, provisional and fleeting influence on pest populations.[4]

II. OBJECTIVES OF THE PROPOSED TOPIC

- Our Project simplifies the farmer hard work.
- Less time required as compared to the traditional way.
- Used by farmers to dispense solid fertilizers evenly in the field easily.
- To make the machine Solar Powered which makes it portable as well as eco-friendly to operate
- To make it economical
- To ensure fertilizer gets spread evenly
- To make the machine easier for farmers to operate

1. Block Diagram:

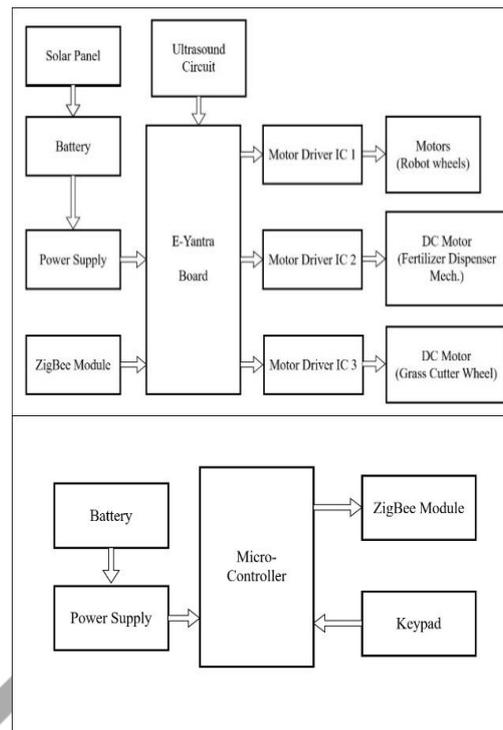


Figure 1: a block diagram of the system

In above figure 3.1 shows the basic block diagram of the E-Tantra based robot. In the proposed system there is two section one is transmitter section and another one is receiver section. In transmitter side keypad use for driving robot using ZigBee as a communication media to operate the robotic system. The user sends the commands from the keypad. The ZigBee transmitter and a receiver module for communication. The control unit will process those commands and operate the motors of the robot and the grass cutting also fertilizer dispensing mechanism through driving circuits. The user can perform three control operations on the system, Robot Motion Control, fertilizer dispensing and grass cutting. User controls the robot motion in four directions: front, back, left and right. The fertilizer dispensing mechanism operated by the user. For Grass cutting Grasscutter attached at the bottom which is controlled by the user. Ultrasound generator kit which is used for insect repellent. All the controlling option is based on E-yantra board. It is the brain of the system. System work on solar energy. It uses solar energy to operate. First, the solar energy is absorbed by the solar panel. This solar energy is then converted into electrical energy by the photovoltaic cell. Here buck and boost converter is used to supply a required voltage from solar panel to the battery. To spray the pesticides a 12v, 2.1amp DC motor is required. DC motor is driven by the 12v 8AH battery. [2]

4.2 Hardware Details:

4.2.1 DC motor:

A **DC motor** relies on the fact that like magnetic poles repel and unlike magnetic poles attract each other. A coil of wire with a current running through it generates an electromagnetic field aligned with the center of the coil. By switching the current on or off in a coil its magnetic field can be switched on or off or by switching the direction of the current in the coil the direction of the generated magnetic field can be switched 180°. A simple DC motor typically has a stationary set of magnets in the stator and an armature with a series of two or more windings of wire wrapped in insulated stack slots around iron pole pieces (called stack teeth) with the ends of the wires terminating on a commutator

4.2.2 Ultrasonic generator:

Ultrasonic generator selection should be based on the specific cleaning requirements of the application so that the best results can be achieved.

The proper frequency is essential for effective ultrasonic cleaning. Low frequencies result in a cleaning solution with large, active cavitation bubbles. Since the cleaning action produced by low frequencies is more powerful, this method is best for sturdy components that will not be damaged with hard surfaces that are not susceptible to pitting. Mid-range frequencies produce smaller cavitation bubbles resulting in a gentler cleaning action. The highest frequency ranges are used for extremely delicate components such as medical components and electronic components.

4.2.3 Solar panel:

A **solar cell**, or **photovoltaic cell**, is an electrical device that converts the energy of light directly into electricity by the photovoltaic effect, which is a physical and chemical phenomenon.[1] It is a form of photoelectric cell, defined as a device whose electrical

characteristics, such as current, voltage, or resistance, vary when exposed to light. Solar cells are the building blocks of photovoltaic modules, otherwise known as solar panels.

4.2.5 ZigBee module:

Zigbee is a low-cost, low-power, wireless mesh network standard targeted at battery-powered devices in wireless control and monitoring applications. Zigbee delivers low-latency communication. Zigbee chips are typically integrated with radios and with microcontrollers. Zigbee builds on the physical layer and media access control defined in IEEE standard 802.15.4 for low-rate wireless personal area networks (WPANs). Another defining feature of Zigbee is facilities for carrying out secure communications, protecting the establishment and transport of cryptographic keys, cyphering frames, and controlling device. It builds on the basic security framework defined in IEEE 802.15.4.

4.2.6 Relay:

A relay switch can be divided into two parts: input and output. The input section has a coil which generates a magnetic field when a small voltage from an electronic circuit is applied to it. This voltage is called the operating voltage. Commonly used relays are available in a different configuration of operating voltages like 6V, 9V, 12V, 24V etc.

4.2.7 Atmega 328 Microcontroller:

The Atmel 8-bit AVR RISC-based microcontroller combines 32 KB ISPflash memory with read-while-write capabilities, 1 KB EEPROM, 2 KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter (8-channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. The device achieves throughputs approaching 1 MIPS per Mhz

4.2.8 Motor Driver (L293D)

L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors.

4.2.9 Battery:

A battery converts chemical energy into electrical energy by a chemical reaction. Usually, the chemicals are kept inside the battery. It is used in a circuit to power other components. A battery produces direct current (DC) electricity (electricity that flows in one direction and does not switch back and forth).

4.1 Software Details

4.1.1 PCB Artist:

PCB Artist is just one of many PCB layout software tools available to use, but an understanding of one layout tool can easily transfer to any PCB design tool. PCB Artist is a free software tool and can be downloaded for free at www.4pcb.com. The only restriction is that PCB Artist will not output a Gerber (.grb) file for general use to be fabricated anywhere, but a .fab file that must be fabricated through Advanced Circuits.

4.1.2 Atmel Studio: Release 6.0:

Atmel Studio is the new integrated development environment from Atmel. It provides you with a modern and powerful environment for doing AVR and ARM development. Get started by exploring the included example projects. Run your solution on a starter or evaluation kit. Program and debug your project with the included simulator, or use one of the powerful on-chip debugging and programming tools from Atmel.

4.1.3 SinaProg Hex Downloader Software

SinaProg is a Hex downloader application with AVR Dude and Fuse Bit Calculator. This is used to download code/program and to set fuse bits of all AVR based microcontrollers.

VI. CONCLUSIONS

The proposed device model has been implemented for the agricultural system, this can be suitable for other domestic purposes. With this machine, we can reduce human efforts, increase continuous work capacity, increase efficiency than the conventional system. The main aim of this project is to make solar power grass cutting, fertilizer dispenser and insect repellent robot which will help the farmer with lesser effort.

REFERENCES

- [1] Agriculture-Based Robot (AGRIBOT) Suraj Chavan¹, Anilkumar Dongare², Pooja Arabale³, Usha suryanwanshi⁴, Sheetal Nirve⁵¹²³⁴ Student, Dept of E&TC, MIT, Maharashtra, India⁵ Professor, Dept of E&TC, MIT, Maharashtra, India. **International Journal of Innovative Research in Computer and Communication Engineering** (A High Impact Factor, Monthly, Peer Reviewed Journal) Website: www.ijircce.com Vol. 6, Issue 3, March 2018 Copyright to IIRC DOI: 10.15680/IJIRCCE.2018.0603023 1905 **Solar Powered Autonomous Grass Cutting Robot** Professor Rohini P. Onkare¹, Pradnyadevi Jagannath Pawar², Ketaki Kiran Hulgeri³, Sanket Dasharath Gurav⁴ Asst. Professor, Department of E&TC, P.V.P.I.T. College of Engineering, Budhgaon, Sangli, Maharashtra, India¹ B. E Student, Department of E&TC, P.V.P.I.T. Budhgaon, Sangli, Maharashtra, India^{2,3,4}
- [2] **International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering** (An ISO 3297: 2007 Certified Organization) Vol. 5, Issue 11, November 2016 Copyright to IJAREEIE DOI:10.15662/IJAREEIE.2016.0511059 8727 **Highly Precise Autonomous Operated Agriculture Robotic Machine to Fertilize Plants Selectively Controlled By Using PLC**
- [3] Solar Powered Smart Ultrasonic Insects Repellent with DTMF and Manual Control for Agriculture Humayun Rashid¹, Iftekhar Uddin Ahmed¹, S M Taslim Reza¹, M. A. Islam² Electrical and Electronic Engineering (EEE), International Islamic University Chittagong (IIUC), Chittagong-4314, Bangladesh² Nara Institute of Science and Technology, 8916-5 Ikoma, Nara, Japan

