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Automatic Solar Powered Pesticides Sprayer

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***Abstract*: A star operated chemical sprayer could be a pump running on electricity generated by electrical phenomenon panels or the thermal energy on the market from collected daylight as critical grid electricity or diesel run water pumps. The operation of star steam-powered pumps is additional economical in the main thanks to the lower operation and maintenance prices and has less environmental impact than pumps steam-powered by an interior combustion engine (ICE). Solar pumps area unit helpful wherever grid electricity is untouchable and different sources (in explicit wind) don't give ample energy. The solar panels make up most (up to 80%) of the systems cost. The size of the PV-system is directly dependent on the size of the pump, the amount of water that is required (m^3/d) and the solar irradiance available. The solar sprayer has many advantages. Besides reducing the cost of spraying, there is a saving on fuel/petrol. Also, the transportation cost for buying petrol is saved. The solar sprayer maintenance is simple. There is less vibration as compared to the petrol sprayer. The farmer can do the spraying operation by himself without engaging labour, thus increasing spraying efficiently. For agriculture based country like India control of pest in filed is an important factor. In order to increase the efficiency and effectiveness and to reduce the manual involvement of spraying mechanism, an automated sprayer is needed. Considering the unavailability of electricity in remote areas of agricultural field this paper proposes a remotely controlled pesticides sprayer which utilizes solar energy as source.**

***Keywords*: Pest Control, Photovoltaic Cell (PV), Predefined Path, Solar Panels, Solar Pump**

1. Introduction

System is presented to guide a robot platform which is designed independently to drive through the crops in a field according to the design concept of open architecture. Then, the offset and heading angle of the golem platform are detected in real time to guide the platform on the premise of recognition of a crop exploitation inaudible device. This paper is basically developed to implement an agricultural production. This type of system is very useful in agriculture field where need to spray the pesticide to different crops. This System automatically sense crop of both sides by using ultrasonic sensor. If it senses the crops, then it will automatically start to spray. If it detects both sides it starts to spray both sides. This system is using embedded chip LPC2148 to control the operation of the system. System use small tank in that addition of pesticide and motor place. Whenever the sensors detect the plant, the signal is given to embedded chip and it will turn on the motor and start to spray. By making some modification we can use for other applications also. A small 4-wheel kart or vehicle that is electronically operated by a wireless remote that runs on power supply as a DC battery. One vertical arm is attached at center of vehicle and one horizontal arm at top of the vertical arm. Nozzle is fitted to those arms so it will spray pesticides each the edges. As additional no of nozzle is there hence spraying is completed chop-chop and time and cash is saved. An ARM based system is designed which detects the presence of crop and sprays pesticide Embedded Chip ARM 7LPC2148 is heart of this work and the system and KEIL C software is used to code the algorithm.

A. Introduction to solar pesticides sprayer

In this mechanism the potential energy of the pesticide stored in the tank and additional spring force is used for generating the required velocity during spraying so that to remove the pest and get a better yield. Most of the rise within the space of irrigated land within the world has been through the increasing use of engine-driven pumps. However, the increasing worth of oil-based fuel has reduced the margin to be gained by farmers from irrigation, since food prices have generally been prevented from rising in line with energy costs. Despite gift short-run fluctuations in oil costs, conventional oil-based engine-driven power sources and mains electricity are expected to continue to increase in the longer term. If the dependence on the imported oil is decrease, then there is need to find methods for energizing irrigation pumps that are independent of imported oil or centralized electricity. Solar radiation as a source of energy is of course, the epitome of the clean. Sustainable energy technology except for residues possibly arising out of the manufacture of solar component (e.g. semiconductors), solar technology has very low environmental impacts. The environmental impacts of solar system in operation are very low and the source is also always available except night. In agriculture, a sprayer is a piece of equipment that is used to apply herbicides, pesticides, and fertilizers on agricultural crops. Sprayers range in size from man portable units (typically backpacks with spray guns) to trailed sprayers that are connected to a tractor, to self-propelled units similar to tractors, with boom mounts of 60–151 feet in length. Timely application of herbicides pesticides and fungicides at peak periods plays a vital role in ensuring better yields from a crop. The main components used to fabricate the model are:

- Solar panel

- Pump
- DC motor
- Battery
- Tank
- Nozzle

1) Solar panel

A sunlight based board (additionally sun powered module, photovoltaic module or photovoltaic board) is a bundled, associated get together of photovoltaic cells. The sun oriented board can be utilized as a part of a bigger photovoltaic framework to produce and supply power in business and private applications. Each board is evaluated by its DC yield control under standard test conditions, and regularly extends from 100 to 320 watts. The productivity of a board decides the zone of a board given the equivalent evaluated yield - an 8% effective 230-watt panel will have double the region of a 16% proficient 230-watt board. Since a solitary sunlight based board can create just a constrained measure of intensity, most establishments contain numerous boards. A photovoltaic framework regularly incorporates a variety of sun oriented boards, an inverter, and now and then a battery as well as sun based tracker and interconnection wiring.

2) Pump

For individuals living in remote zones, sun based water siphons are typically the main arrangement as there is no entrance to diesel. On the off chance that there is diesel, Solar Water Pumps are the main arrangement or a superb option for diesel as the expense of running electrical cables or diesel siphoning might be excessively incredible. A sun powered controlled water siphon contrasts from an ordinary water siphon just in that it utilizes the sun's vitality to supply power for the siphon. The sun oriented boards retain the sun's vitality and convert it to electrical vitality for the siphon to work. All the siphoned water is put away in a water tank so that there is consistent supply even in awful climate conditions and amid evening where there is lacking capacity to produce the sun based water siphons. Sun based fueled water siphons speak to a higher beginning venture, notwithstanding, over a time of 5 years they speak to a money saving advantage because of negligible support costs contrasted with AC siphons keep running with a generator.

3) DC Motor

A DC engine is kind of rotating electrical machines that changes over direct flow electrical vitality into mechanical vitality. About a wide range of DC engines have some inward component, either electromechanical or electronic, to intermittently alter the course of current stream in part of the engine. DC engines were the main kind generally utilized, since it could be controlled from existing direct-current lighting power dispersion frameworks. A DC engine's speed are often controlled over a large vary, utilizing either a variable supply voltage or by changing the quality of current in its field windings. Little DC engines are utilized in apparatuses, toys, and machines. The all-inclusive engine can work on direct present yet it is a light weight engine utilized for versatile power instruments and machines. Bigger DC engines are utilized in impetus of electric vehicles, lift and raises, or in drives for steel moving factories.

4) Battery

The electric battery is a gadget comprising of at least one electrochemical cells with outer associations gave to control electrical gadgets, for example, spotlights, advanced mobile phones, and electric vehicles. At the point when a battery is providing electric power, its positive terminal is cathode and its negative terminal is the anode. The contrarily stamped terminal is wellspring of electrons that when associated with an outer circuit will stream and convey vitality to an outside gadget. At the point when a battery is associated with an outside circuit, electrolytes can move as particles inside, enabling the concoction responses to be finished at the different terminals thus convey vitality to the outer circuit. It is the event of these particles within the battery that allows current to stream out of the battery to perform work.

5) Tank

Capacity tanks are compartments that hold fluids, compacted gases or mediums utilized for the short or long haul stockpiling of liquids or gases. The term can be utilized for repositories. Capacity tanks are accessible in numerous shapes, for example, vertical and level tube shaped open best and shut best level base, cone base, incline base and dish base. Vast tanks will in general be vertical tube shaped, or to have adjusted corners progress from vertical side divider to base profile, to less demanding withstand water powered hydrostatically instigated weight of contained fluid. The greater part of the holder tanks for taking care of fluids amid transportation are intended to deal with shifting degrees of weight.

6) Nozzle

A spout is a gadget intended to control the heading or attributes of a liquid stream (uncommonly to build speed) as it exits (or enters) an encased chamber or pipe. A spout is frequently a pipe or container of differing cross sectional territory and it very well may be utilized to coordinate or alter the stream of a liquid (fluid or gas). Spouts are much of the time used to control the rate of stream, speed, course, mass, shape, and additionally the weight of the stream that rises up out of them. In a spout, the speed of liquid increments to the detriment of its weight vitality.

2. The hardware system

A general block diagram of the system is shown in Fig. 1. The hardware system consists of various components. The functions of each components of the system are described as follows.

The blocks are explained below:

- ZigBee transmitter
- ZigBee receiver
- Sprayer
- Motor

- Oscillator

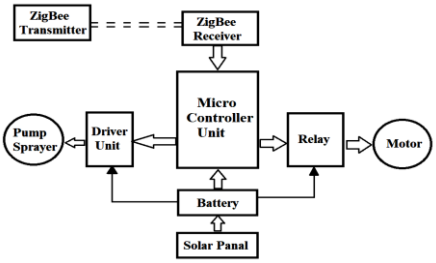

Fig. 1. Block diagram

A. ZigBee Transmitter

ZigBee transmitter module is as appeared in Fig. 2. The transmitter comprises of key-cushion; encoder portrayal is given in following subsections.

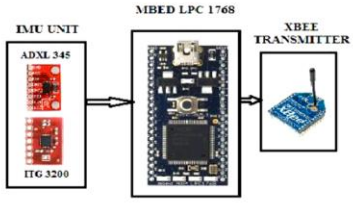

Fig. 2. Zig bee transmitter

B. Keypad

Keypad is much the same as a remote which produces signs to control the heading of a moving robot. Keypad has 4 keys; each key is intended to drive the robot one specific way. In this way the transmitter has a 4 catches specifically F [Forward], R [Reverse], L [Left], R [Right] and there are 4 comparing yields at the beneficiary. Each key is intended to drive the robot one specific way.

C. Encoder

The 212 encoders are a progression of CMOS LS is for remote control framework applications. They are equipped for encoding data which comprises of N address bits and 12 N information bits. Each location/information can be set to one of the two rationale states. The customized addresses/information are transmitted together with the header bits by means of a RF or an infrared transmission endless supply of a trigger flag. The ability to choose a TE trigger on the HT12E or a DATA trigger on the HT12A.

D. Zig Bee Receiver

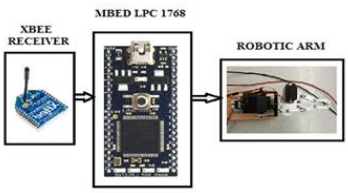

Fig. 3. Zig bee Receiver

The Receiver consists of RF Receiver, Amplifier, Decoder and Reset Circuit. The description of each block is given in following sub sections. The module of Zig Bee Receiver is as shown in Fig. 3.

E. Amplifire

Amplifier amplifies the signals received at the receiver. The amplifier used is ULN2803.This amplifier has 8 built in not gates. Hence the signals outputted from the amplifier are inverted. These inverted signals are then used to drive circuit block**.**

F. Decoder

The 212 decoders are a series of CMOS LSIs for remote system applications. They are paired with Holtan's 212 series of encoders. For proper operation, a try of encoder/decoder with identical variety of addresses and format ought to be chosen. The decoders receive serial addresses and knowledge from a programmed 212 series of encoders that are transmitted by a carrier exploitation AN RF or an IR transmission medium.

G. Reset Circuit

It consists of 5V-power supply with the arrangement of 10K pull up resistor and 0.1Mf ceramic capacitor. In additional to this a low bit MCLR switch is connected to the circuit that is manually operated**.**

H. Sprayer

The sprayer consists of shift circuit, motor, camera, ultra-sonic sensing element generator, embedded chip. The basic function of sprayer is to spray the pesticides**.**

I. Motor

The dc motor is used to drive the robot. These motors can be made to rotate in either direction by supplying the voltage accordingly**.**

J. Oscillator

Normally the embedded chip works under the frequency of 4 MHz, so to generate this frequency we are making use of the crystal oscillator of 4 MHz with the parallel arrangement of capacitor which helps to produce the stable frequency.

3. Operation

Here the receiver circuit won't to modification the direction of moving vehicle. Let consider any one key is pressed, say the key L is pressed, the output line 1 of the decoder is activated or the decoder outputs signal on its first o/p line. This is then given to the ULN2803 amplifier. The signal that is given to the electronic equipment gets inverted and also the inverted signal is then given at the output. i.e., logic one at the electronic equipment input is regenerate as logic zero at the output. This negative supply is then used to drive the first relay (or R1). The relay switches and make the motor to rotate the vehicle towards left. Relay acts as a switch. It has 5 terminals. They are positive (+), negative (-), normally closed (NC), normally open (NO)

and common terminals. Always the common terminals reside to towards the normally closed terminal side. Relay operates with 12v dc supply. When the 12v dc is given to the positive terminal & 0v to the negative terminals the relay switches on. The electromagnetic field is generated and the common terminal switches towards the normally open terminal. These changes make the motor, to get 12vdc supply at its positive terminal and 0v at its negative terminal. If this condition satisfies, then the vehicle is rotated towards left. The key R is designed to move the vehicle towards right. When the R [4th] key is pressed the 4th line of the decoder sends signal high to the amplifier. This high signal is inverted and so we obtain the low signal at its output. Low signal is then given to the relay R3. The relay operates similarly as explained previously and the motor2 is rotated, thus making the vehicle to move towards right. The keys 1 and 3 together drive the vehicle in the forward direction. When these two keys are pressed at a time, the relays R1 andR3 operate at once and move the vehicle in the forward direction. By pressing keys 1 and 3 high signals are obtained at the output of a decoder on its first and third line. The same high signal is given to the amplifier. The amplifier outputs low signal, this low signal switches the relay R1 & R3. This in turn activates motor 1 & 2. When the two motors are being supplied with 12v they rotate and move the vehicle in the forward direction. The keys 2 & 4 together drive the vehicle in the reverse direction. When these two keys are pressed at a time, the relays R2 & R4 operate at once make the vehicle to move in reverse direction. When the keys 2 & 4 are pressed simultaneously, decoder output high signals at the output on these lines particularly. The o/p of the decoder is given to the amplifier. The amplifier then converts high signals to low signals. These low signals are used to drive the relays R2 & R4. When the relay R2 operates, the positive 12v is supplied to the negative terminal of the motor1 and negative voltage is supplied to the positive terminal of the motor1.This is the main reason for the vehicle to move in reverse direction. Thus the motor1 is made to rotate in the reverse direction similarly relay R4 operates along with the relay R2 and make the vehicle to move backward.

4. Future scope

Innovation is consistently developing and there is dependably scope for development and headways in each field of work. In future execution this framework should be possible that can give sign after culmination of pesticide. The utilization of GSM model to send message when pesticide is done should likewise be possible in future. There is no much support cost and no working expense as it is utilizing sunlight based vitality it is free of expense and there is no contamination its working key is extremely basic and that it is practical to the agriculturists it is increasingly profitable that it tends to be utilized for both for showering and well as water system.

5. Acknowledgement

We take this opportunity to express our gratitude and indebtedness to our guide Ms. U. S. Raut, Assistant Professor, Electrical (E & P) Engineering department, who has been constant source of guidance and inspiration in preparing this paper.

6. Conclusion

This paper presented the design and implementation of automatic solar powered pesticides sprayer.

References

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