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Remote Control Based Solar Ploughing Machine

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ABSTRACT

In order to reduce the cost of cultivation and to encourage farmers to use cost effective and smart mechanisms to design this device effectively. This mechanism reduces human labor and it is a ecofriendly (Zero emission) method of ploughing .Operating this machine requires no technical knowledge or training and is very much user friendly. Sensor are fixed in the front wheel of the machine using which the machine deviates itself from stones and other obstacles in the ploughing field.

Keywords: Remote Control, PIC 16f877 Microcontroller, Servomotor, RF Transmitter and Receiver, Solar Panel, Battery

1. INTRODUCTION

This mechanism can be operated automatically from the distance of 15-100 meter by a remote using Radio frequency control unit. In order to plow one hectare of land it costs rupees three thousand for tractor rent diesel and wages for the labors. This machine will cut down all such cause with only a very nominal amount for annual maintenance. Indian agriculture includes a mix of traditional to modern farming techniques. In some parts of India, traditional use of cattle to plough farms remains in use. Traditional farms have some of the lowest per capita productivities and farmer incomes. One of the major economic issues faced by the country is agriculture as this is the sector which is source of livelihood for about 54% of Indians till date. Still today this sector is not well developed and faces lots of problems resulting into low productivity of crops.

Since 2002, India has become the world's largest manufacturer of tractor with 29% of world's output in 2013; it is also the world's largest tractor market. Above a tractor in use in north India.

1.1. PROTOTYPE MODEL

This intent will be focused for farmers to grow up their life by developing the agriculture growth in india.This machine gets power from the solar energy. It will be operated remotely by left/right turning and deviates from the obstacles with the help of Ultrasonic sensor.

Fig 1.1 Prototype Model

2. CIRCUIT DIAGRAM

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Based on the DC geared motor we can drive the machine towards Forward/Backward by rotating the motor in clockwise and anticlockwise direction with the help of driver circuits.

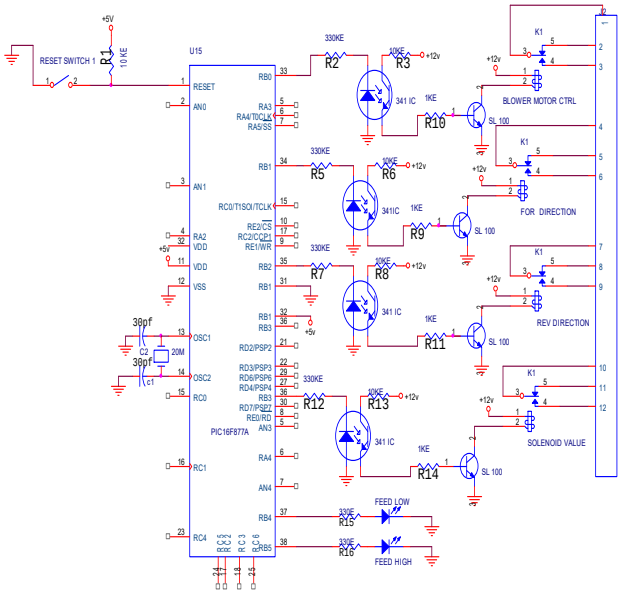

Fig 2.1 Circuit Diagram

2.1. SOLAR PANEL

The efficiency of a module determines the area of a module given the same rated output an 8% efficient 230 watt module will have twice the area of a 16% efficient 230 watt module. A single solar module can produce only a limited amount of power; most installations contain multiple modules. A photovoltaic system typically includes a panel or an array of solar modules, an inverter, and sometimes a battery and/or solar tracker and interconnection wiring.

Electrical connections are made in series to achieve a desired output voltage and/or in parallel to provide a desired current capability. The conducting wire that take the current off the modules may contain silver, copper or other non-magnetic conductive transition metals.

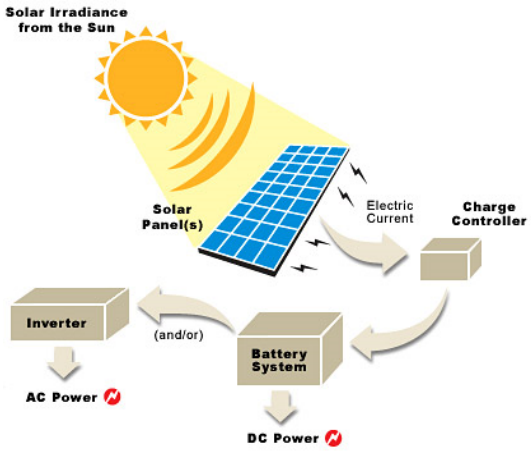

Fig 2.1.1 Solar Working

The cells must be connected electrically to one another and to the rest of the system .Externally popular terrestrial usage photovoltaic modules use MC3 (older) or MC4 connectors to facilitate easy weatherproof connections to the rest of the system.

Bypass diodes may be incorporated or used externally, in case of partial module shading, to maximize the output of module sections still illuminated.

Some recent solar module designs include concentrators in which light is focused by lenses or mirrors onto an array of smaller cells. This enables the use of cells with a high cost per unit area (such as gallium arsenide) in a cost effective way.

2.2. CONTROLING THE MACHINE WITH MICROCONTROLLER

Using these RF transmitter & receiver circuits with a Microcontroller would be simple. We can simply replace the switches used for selecting data on the HT-12E with the output pins of the microcontroller. Also we can use another output pin to select TE, or transmit enable on the HT-12E. By taking pin-14 LOW we cause the transmitter section to transmit the data on pins 10-13.

To receive information simply hook up the HT-12D output pins to the microcontroller. The VT, or valid transmission pin of the HT-12D could signal the microcontroller to grab the 4-bits of data from the data output pins. If you are using a microcontroller with interrupt capabilities, use the VT pin to cause a jump to an interrupt vector and process the received data.

The HT-12D data output pins will LATCH and remain in this state until another valid transmission is received.

NOTE: You will notice that in both schematics each of the Holtek chips have resistors attached to pins 15 and 16. These resistors must be the exact values shown in the schematic. These resistors set the internal oscillators of the HT-12E/HT-12D. It is recommended that you choose a 1% resistor for each of these resistors to ensure the correct circuit oscillation.

2.2.1. RANGE OF OPERATION

The normal operating range using (only) the LOOP TRACE ANTENNA on the transmitter board is about 50 feet. By connecting a quarter wave antenna using 9.36 inches of 22 gauge wire to both circuits, you can extend this range to several hundred feet. Your actual range may vary due to your finished circuit design and environmental conditions.

The transistors and diodes can be substituted with any common equivalent type. These will normally depend on the types and capacities of the particular loads you want to control and should be selected accordingly for your intended application.

2.3. RF MODULE (RADIO FREQUENCY)

Radio Frequency, any frequency within the electromagnetic spectrum associated with radio wave propagation. When an RF current is supplied to an antenna, an electromagnetic field is created that then is able to propagate through space. Many wireless technologies are based on RF field propagation.

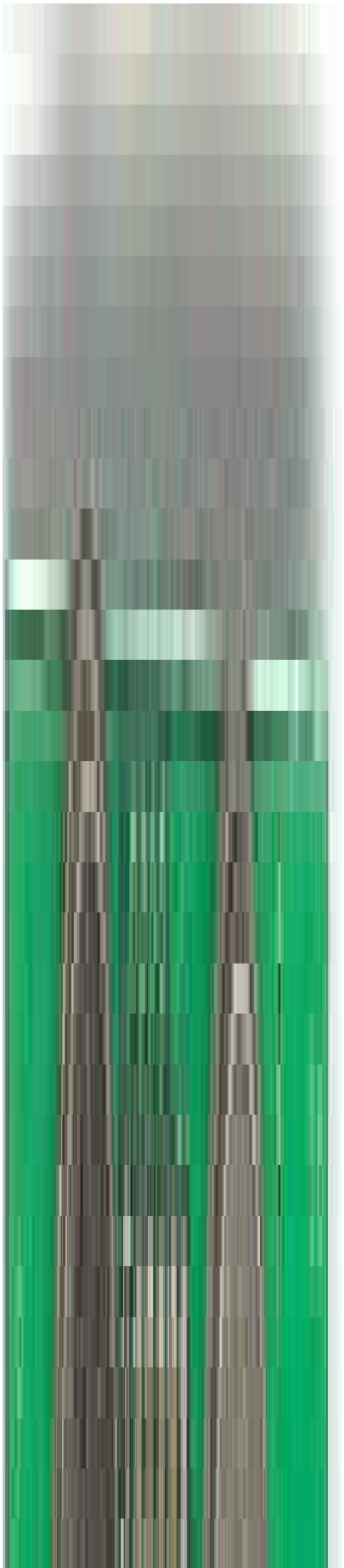

Fig 2.3.1Receiver Module

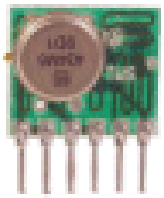

Fig 2.3.2 Transmitter Module

Radio Frequency. The 10 kHz to 300 GHz frequency range that can be used for wireless communication

Radio Frequency. Also used generally to refer to the radio signal generated by the system transmitter, or to energy present from other sources that may be picked up by a wireless receiver.

- Wireless mouse, keyboard
- Wireless data communication
- Alarm and security systems
- Home Automation, Remote control
- Automotive Telemetry
- Intelligent sports equipment
- Handheld terminals, Data loggers
- Industrial telemetry and tele-communications
- alarms In-building environmental monitoring and control
- High-end security and fire

2.4. TRANSMITTER

The TWS-434 extremely small, and are excellent for applications requiring short-range RF remote controls. The transmitter module is only 1

The size of a standard postage stamp, and can easily be placed inside a small plastic enclosure.

TWS-434: The transmitter output is up to 8mW at 433.92MHz with a range of approximately 400 foot (open area) outdoors. Indoors, the range is

approximately 200 foot, and will go through most walls.

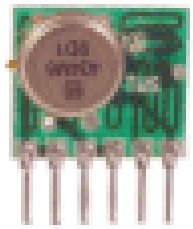

Fig 2.4.1 Transmitter

3.TRANSMIT AND RECEIVE DATA

3.1. GENERATING DATA

The TWS-434 modules do not incorporate internal encoding. If you want to send simple control or status signals such as button presses or switch closures, consider using an encoder and decoder IC set that takes care of all encoding, error checking, and decoding functions. These chips are made by Motorola and Holtek. They are an excellent way to implement basic wireless transmission control.

3.2. RECEIVER DATA OUTPUT

A 0 volt to V_{cc} data output is available on pins. This output is normally used to drive a digital decoder IC or a microprocessor which is performing the data decoding. The receiver's output will only transition when valid data is present. In instances when no carrier is present the output will remain low.

3.3. DECODINGDATA

The RWS-434 modules do not incorporate internal decoding. If you want to receive Simple control or status signals such as button presses or switch closures, you can use the encoder and decoder IC set described above. Decoders with momentary and latched outputs are available.

3.4. TRANSMITTING AND RECEIVING

Full duplex or simultaneous two-way operation is not possible with these modules. If a transmit and receive module are in close proximity and data is sent to a remote receive module while attempting to simultaneously receive data from a remote transmit module, the receiver will be overloaded by its close proximity transmitter. This will happen even if encoders and decoders are used with different address settings for each transmitter and receiver pair. If two way communications is required, only half duplex operation is allowed.

3.5. ANTENNAS- WIRE WHIP

The WC418 is made of 26 gauge carbon steel music wire that can be soldered to a PC board. This antenna has a plastic coated tip for safety and is 6.8 inches long, allowing .1 inch for insertion in a terminal or PC board.

Figure 3.5.1 Antenna

4. ANTENNA

The following should help in achieving optimum antenna performance:

- Proximity to objects such a users hand or body, or metal objects will cause an antenna to detune. For this reason the antenna shaft and tip should be positioned as far away from such objects as possible.
- Optimum performance will be obtained from a 1/4 or 1/2 wave straight whip mounted at a right angle to the ground plane. A 1/4 wave antenna for 418 Mhz is 6.7 inches long.

- In many antenna designs, particularly 1/4 wave whips, the ground plane acts as a counterpoise, forming in essence, a 1/2 wave dipole. Adequate ground plane area will give maximum performance. As a general rule the ground plane to be used as counterpoise should have a surface area => the overall length of the 1/4 wave radiating element (2.6 X 2.6 inches for a 6.7 inch long antenna).

- Remove the antenna as far as possible from potential interference sources. Place adequate ground plane under all potential sources of noise.

5. OUTPUT

Fig 5.1. Side View

Fig 5.2. Back View

6. CONCLUSION

In order to reduce the cost of cultivation and to encourage farmers to use cost effective and smart mechanisms we are worked hard to design this device effectively. This mechanism reduces human labor and it is a ecofriendly (Zero emission) method of ploughing. Operating this machine requires no technical knowledge or training and is very much user friendly. Sensor are fixed in the front wheel of the machine using which the machine deviates itself from stones and other obstacles in the ploughing field. In future we enhance our intent by introducing Android app based remote access.

7. REFERENCES

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