DESIGN AND FABRICATION OF MULTIPURPOSE SOLAR OPERATED KISAN MACHINE

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Abstract: Farmers are the back-bone for every country. Present days ,rapid growth of population has been observed along with that ,requirement of food also increasing as it the necessary to survive, but interest towards farming is reduced among the people due to cost of labour, heavy rate of work, health issues while spraying the fertilizers and chemicals to the crop. So, in order to demolish these problems a flexible sprayer is required which consists of two major motions reciprocator and rotary motions. The range of the spraying can be adjusted with the help of regulator and the aim of the project is to develop a flexible sprayer and to reduce the problems faced by farmer while spraying the fertilizers and chemicals.

In this proposed system, we have designed a IoT based Solar operated Kisan The aim of this project work is to develop and modernized process for spraying system; hence it is widely used in all farms because it is easy to use and operate.

Keywords **– Fertilizers, Flexible Spraying system. Microcontroller, Node MCU, Motor driver, Pump.**

I.INTRODU CTION:

The applications of pesticides using spraying equipment are play an important role. The chemicals are widely used for increasing agricultural production through better insect and pest management. Spraying is one of the most effective and efficient technique for applying small quantity of liquid1through fine droplets to protect the crops. In India, many versions of hand operated and power operated spraying equipment's are being used. At present, the farmers generally using all kinds of manually operated knapsack sprayer which can cover 0.4 ha/hr and motorized sprayer can cover 1.2-1.6 ha/hr for spraying of pesticides on crops like cotton, red gram. Farmers are facing the problem of coverage of large area within a short period of time as the pest attack is serious problem and spreads quickly.

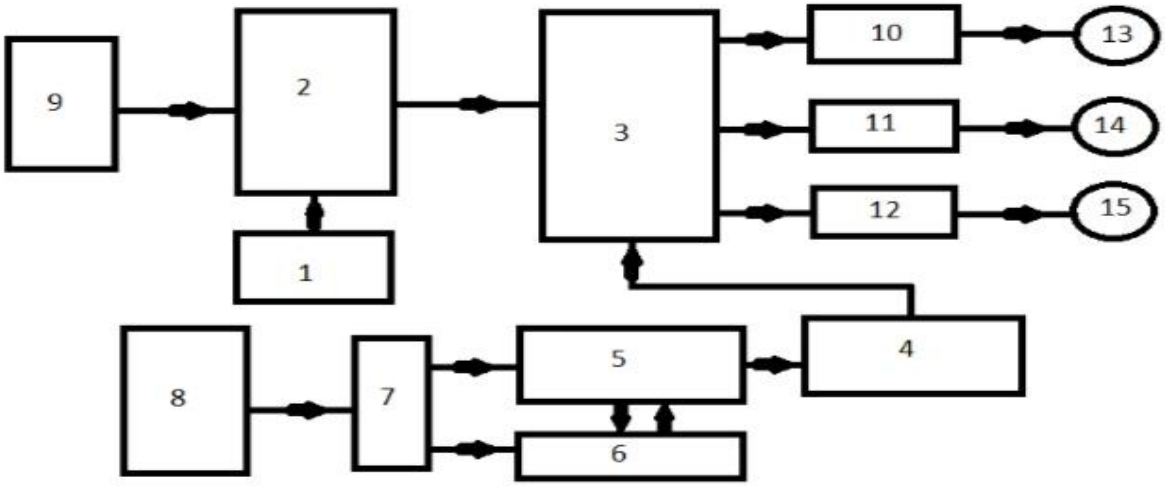
In the market, different versions of tractor operated or bullock operated sprayers are available, many of the farmers generally spray 6-8 times in a season using manually operated or motorized sprayer to cover large area within a short period of time. Modern spraying technique will improve the operators comfort, safety and spraying effectiveness which would go a long way in increasing crop yield.

Generally the power required for spraying is met out from either alone or combination of human source and mechanical power viz., either petrol engine or dual fuel engines for operating the pump. Sometimes the batteries are used for running the motor which operates the pump for discharging the chemicals. But these batteries require electricity for charging them. However, due to rapid rise in the price of fossil fuels and their limited availability, there is now greater awareness of the need for development of renewable energy gadgets, which is the need of the hour. Because of inadequate supply of electricity, there is a frequent power cut and this situation is shill worse in the rural areas. Hence, there is a greater scope for utilization of solar energy for generation of electricity using solar photovoltaic cells and further to utilize the same for spraying, water pumping, lighting etc.

In this project Blynk app is used to control the movements of the bot. Blynk is a Platform with iOS and Android apps to control Microcontroller, Arduino, Raspberry Pi and the likes over the Internet. It's a digital dashboard where you can build a graphic interface for your project by simply dragging and dropping widgets. It's really simple to set everything up and you'll start tinkering in less than 5 mins.

Blynk it is a supporting application of hardware components to work on the internet base by using the node mcu 8266, relay and other iot based things to work as per our requirement.

II.BLOCK DIAGRAM



1- Blynk application
2- Node MCU
3- Micro controller
4- Voltage regulator and filter
5- Charginig circuit
6- Battery
7-12v Trasformer
8- Soar pannel
9- Power bank
10,11,12 - Relay
13,14 - Motor
15 - Pump

Fig-1: Block diagram

III.**HARDWARE USED**

MOTOR:

A motor is a device which is used to drive or lift the components. The motor used in this is a DC Motor in which the electrical energy is converted into mechanical energy. Motor used in this is a used where the high torque is required. Brushed DC motors can be varied in speed by changing the operating voltage or the strength of the magnetic field. The speed of motors are always constant but torque producing is depends on type of gear box arranged at the end of motor shaft.

Fig-2: Motor

DIAPHRAGM PUMP:

A pump is a device which is used to trasfer fluid from one pace to other and also discharge at high pressure compared to initial pressure. The pump get a output pressure of 8bar which is sufficient to our project.

Fig-3: Diaphragm pump

WHEELS:

Wheels are main component for every moving object because of the wheels are main source to move. The wheels that are used in our project are made up of stainless steel rod and mild steel plates to get more strength. This wheels can be moved easily along with the load. The wheels are of different sizes but according to requirement we designed our wheels. The main function of using wheels for this equipment is that machine can be moved from one corner to the other corner of the work areas premises as per the requirement.

Fig-4: Wheels

SOLAR PANNEL:

Solar panel is used to absorb the energy of the sun radiation and to store that energy in battery and used in the night times due to the absence of sun. The panel is made up pf photo voltaic cell to absrb the energy. This solar panel is used in our home purpose also because electricity is very important in our daily needs, so to reduce our electricity bill cost we can use solar system**.**

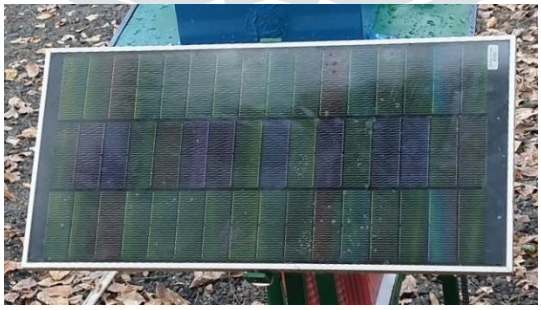


Fig-5: Solar pannel

NOZZLE:

A nozzle is a device designed to control the direction or characteristics of a fluid flow as it exit pipe. A nozzle is often a pipe or tube of varying cross sectional area and it can be used to direct or modify the flow of a fluid. Nozzles are frequently used to control the rate of flow, speed, direction, mass, shape, and/or the pressure of the stream that emerges from them. In a nozzle, the velocity of fluid increases at the expense of its pressure energy**.**

Fig-6: Nozzle

NODE MCU:

The ESP8266 is a low cost MCU with built in Wi-Fi. It can be paired with another host microcontroller, like an Arduino, to provide Wi-Fi networking capability for a basic IoT development platform. Additionally, the ESP8266 can be used as a stand-alone MCU, as it includes a 32-bit 80Mhz processor, 16 GPIO pins (4 PWM enabled) and a built in Analog-to- Digital converter, SPI and I2C interfaces. The MCU has a n operating voltage of 2.5V – 3.6V and average operating current of 80 mA.

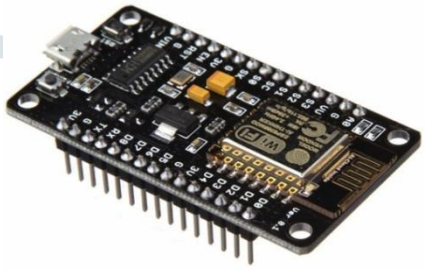


Fig-7: Node MCU

LIGHT STAND:

we used the light stand in our project to adjust the height of spraying so that the spraying can be done from 5ft to 10ft so that we can easily spray for any farm.

Fig-8 : Light stand

BLYNK APPLICATION:

It is used to control the kisan machine by the interface of internet. This application have control swithes of on/off and also front ,right, and left switches to move the kisan machine.

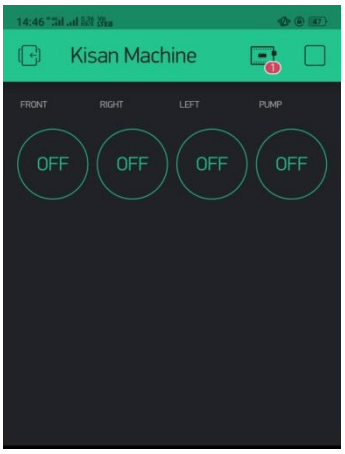


Fig- 9 : Blynk app

IV.DESIGN OF KISAN MACHINE:

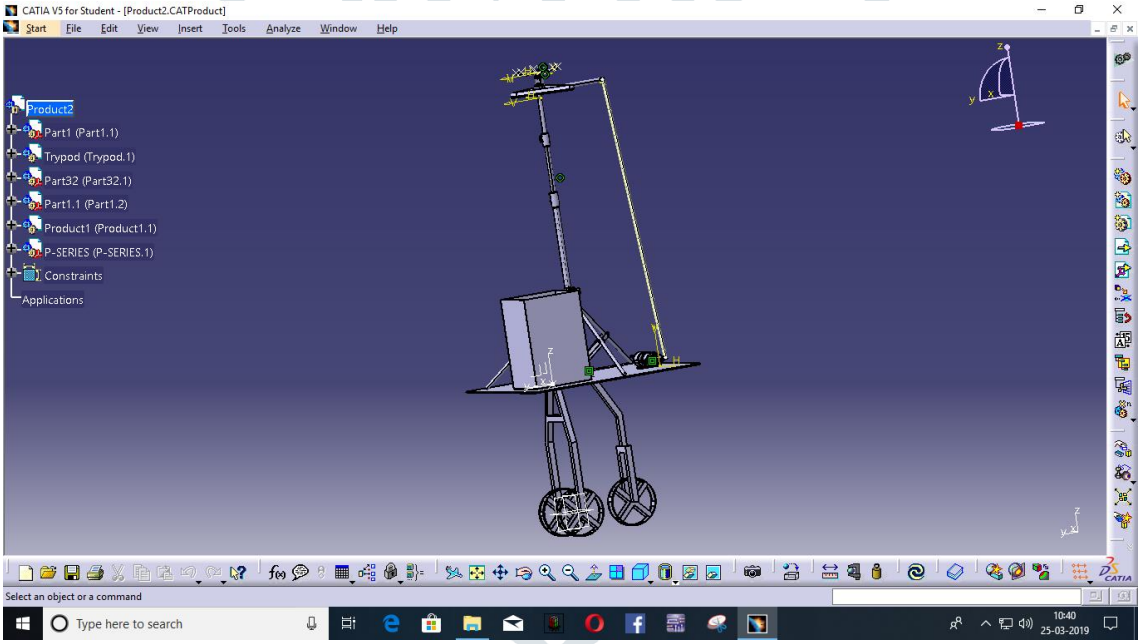


Fig- 10: Assemble of kisan machine

The design of kisan machine is drawn in CATIA V5 software and we designed our project by satisfying the farmer needs.

V.RESULT AND DISCUSSION

The performance was evaluated both in laboratory and field and the results have been analysed. The discharge rate of the solar operated sprayer during laboratory and field conditions were measured, the average discharge rate solar sprayer during both laboratory test and field test were more or less same about 0.15 litre/sec (9 litres/min). The kisan machine can spray up to 4m radius at constant position. The speed of the machine is 10km/h, which corresponds to a theoretical field capacity of about 0.8 hectare per hour. The effective field capacity of the sprayer was observed to be 0.64 ha/h which corresponds to an average coverage of 4ha/day of 8 hours operation. equipment does not use any other external source.

Fig-11: Assembly of the kisan machine

The results that are obtained from the project are listed in below table.

WEIGHT	32kg
DISCHARGE	9lit/min
PRODUCT COST	Rs 15000
MAINTENANCE COST	Low
PRESSURE	8Bar

VI. CONCLUSION AND FUTURE WORK

A kisan machine was developed for spraying which uses solar energy as source of power and also operating by using IoT. It consists of a solar panel of 24 W capacity, a 12V DC battery, 2 DC motor, operated by the battery, a pump, to spray the pesticide and a tank to hold the pesticide. The performance evaluation of the sprayer, the effective field capacity of the sprayer was observed to be 0.64 ha/h which corresponds to an average coverage of 4ha/day of 8 hours operation. The payback period for this kisan operatd machine when compared to mini tractor sprayer is 48days. As the equipment does not use any other external source of power and that it is operated by the user himself, it reduces drudgery, is quite economical and eco-friendly as it uses solar energy which can be easily affordable by small and marginal farmers. Further, it power can also be used to charge the battery so that in absence of solar energy the Kisan machine can easily work.

Now we fabricating this model availability of components and economical and technology in future we will make according to that time technology if all the farmer use we can save the power and also no effect of chemicals. Also we can attach the plough as the attachment to our project by replacing the back wheel with plough for harvesting purpose and also there is no extra charges of power or fuel because we are using solar panel of 24 volts and also we are using rechargeable battery to charge the battery by using solar energy.

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