Design of Secured IoT based Smart Agrobot

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Abstract: In Today's world due to increasing usage of fossil fuels the problems arising like global warming, ozone layer depletion. Thus renewable energy resources play a role of pathfinder for the present and future generations. Solar energy which is abundantly and freely available can be used for various applications such as grass cutter. The solar powered grass cutter is designed and developed based on the principle of movement. Grass cutter works in an open environment so it is possible to access solar rays in the daytime to charge a battery on lawns at the time of working of the machine. The robot is dual powered with a Solar panel rechargeable battery .Solar energy is converted into electricity to charge a battery. The system control is done by the Arduino UNO and Raspberry Pi. Wheels and cutting operations are done using dc motors. DC battery is utilized for powering and standby mode operation of the system. The design objective is to come up with a cutter that is portable, durable, easy to operate and maintain. It also aims to design a self-powered IoT based grass cutter.DHT11 measure and displays the live temperature and humidity using a raspberry pi. Performance test gave a cutting efficiency of 89.55 %with less human effort .Data is also sent on a cloud.

Index Terms **- IoT,DHT11,Aurdino,temperature.**

I. INTRODUCTION

Agriculture is the backbone of India. It plays a vital role in the growth of country's economy. In India, agriculture has to face serious challenges like scarcity of agricultural labour, in peak working seasons but also in normal time. This is mainly for increased nonfarm job opportunities having a higher wage, migration of labour force to cities and low status of agricultural labours in the society. In India two types of crop cutting like manual method and mechanized type of crops cutter. The crop cutting i.e .cutting crop manually using labour but this method is very lengthy and time consuming also nowadays pollution is a major issue for all over the world. In the case of Gasoline crop cutters, gases are emitted in the air,it gives pollution. So the solar power cutter is introduced. AGROBOT is a machine that uses cutting blades which are used to cut the grass in field, yards, gardens. The working principle of the AGROBOT provides high-speed rotation to blades. The main part of the prototype consists of solar panel, blades and the DC motor. To gain maximum power from the solar panel we used MPPT, for controlling the motor Arduino Uno is used. High carbon steel is used for cutting blades. to make our device fully automotive Raspberry pi plays main role. With reference to current literature availability, there are many variations of the grass cutter that are exist in global market, which may not fulfill the requirement and operational cost. The main purpose of this study to design and fabricate a grass cutter which is cost effective, durable easy to use.

Proposed System

Our project is solar based smart Agrobot. The team's goal, in essence, is to take the first step toward the creation of consumer product. In today's world, there is an automatic crop cutter but they are very costly as compare to our product. The main part of our project is, it works on solar energy. It is free of cost source of energy. Other energy source makes pollutions, which is harmful to the operator as well as a farm but our project does not produce any pollutant in the environment. It is maintenance free and easy to repair. So it is user friendly product. Now a day's, there is a shortage of labour in the farms due to the excessive craze for corporate jobs in Mega cities. To overcome this problem we have found solution that is IoT based smart solar Agrobot. In addition to this, it is also checked humidity as well as the temperature of the farm. This helps the farmer to take preventive action on the crops.

II. REVIEW OF LITERATURE

1. Robotic Agriculture Machine.

In the current generation, most of the countries do not have sufficient skilled man power specifically in the agricultural sector and it affects the growth of developing countries. So it's a time to automate the sector to overcome this problem. In India, there are 70%of people dependent on agriculture. So we need to study agriculture. The innovative idea of our project is to automate the process of harvesting. The energy required for this machine is less as compared with tractors or any agricultural instrument Pollution is also a big problem which is eliminated by using a solar plate.

2. Solar Grass Cutter With Linear Blades By Using Scotch Yoke Mechanism.

Moving the grass cutters with a standard motor powered grass cutters is an inconvenience, and no one takes pleasure in it. Cutting grass cannot be easily accomplished by elderly, younger, grass cutter moving with engine create noise pollution due to the loud engine, and local air pollution due to the combustion in the engine. Also, a motor powered engine requires periodic maintenance such as changing the engine oil. Even though electric solar grass is environmentally friendly, they too can be an inconvenience. Along with motor powered grass cutter, electric grass cutters are also hazardous and cannot be easily used by all. Also, if the electric grass cutter is corded, mowing could prove to be problematic and dangerous. The prototype will also be will be charged from the sun by using solar panels.

3. Farm power sources, their availability and future requirements to sustain agricultural production.

N. S. L. Srivastava checked in the interests of the farmers and the difficulties they face while harvesting and keeping the agriculture field. This paper was an in depth study of the farming conditions of the farmers and their basic problems. Indian Government Analysis was the survey finished by Indian Government in the financial year of 2015-16. This survey was intended to analyse and gather the data related to the problems and problems faced by the Indian farmers. Asia and Pacific Commission on Agricultural Statistics 23rd Session Siem Reap, Cambodia, 2630 April 2010 was intended to discuss the features of small scale farmers across Asia. This commission recognizes the problems faced the average land holdings and the average income of the small scale farmers.

4. A Portable and Automatic Weed Cutter Device.

The idea of an autonomous machine used to reduce manpower with efficient work has given in this paper. Mainly this paper explains the application of green energy. This knowledge can be used in the agricultural field as a future scope. This paper gives a description of multipurpose grass cutter which is sensor based for special purposes like in grass trimming, hedge trimming etc. utilization of sensor and design calculation are used in the proposed system. After taking a review of various types of agricultural cutters we decided to propose a model to cut the weeds which restrict the growth of the plant with a portable and automatic weed cutter vehicle.

5. Design and Implementation of Automatic Lawn Cutter.

The self powered design objective is to come up with a mower that is portable, durable, easy to operate and maintain. It also aims to design a self-powered mower of the electrical source; a cordless electric lawn mower. The heart of the machine is a battery-powered DC electric motor. It is also a useful method for our lawn mower. It is similar to our lawn cutter using display and keypad. The present technology commonly used for trimming the grass is by using the manually handle device. In this project, we have automated the machine for trimming the grass.

6. Agricultural Machinery Industry in India.

Farm mechanization helps in effective utilization of inputs to increase the productivity of land and labour. Besides, it helps in reducing the drudgery in farm operations. The early agricultural mechanization in India was greatly influenced by the technological development in England. Irrigation pumps, tillage equipment, chaff cutters, tractors and threshers were gradually introduced for farm mechanization. The high yielding varieties with assured irrigation and a higher rate of application of fertilizers gave higher returns that enabled farmers to adopt mechanization inputs, especially after the Green revolution in the 1960s. The development of power thresher in 1960, with integrated Bhusa making attachment and aspirator blower and mechanical sieves for grain and straw separation, was the major achievement of Indian engineers.

III. METHODOLOGY

3.1 Block diagram:

Our proposed system is represented in the block diagram shown below in fig 1.

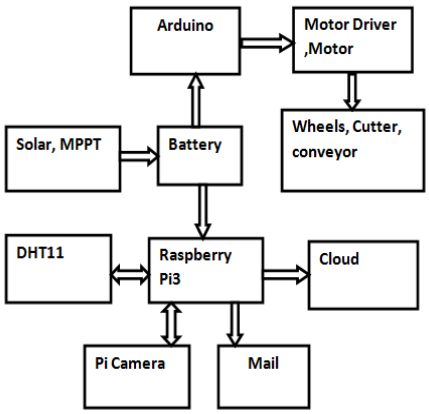

Fig 1: Block diagram of Agrobot

3.2 Working:

At the first stage of design, the two cutter are used for cutting the crops. Similarly the conveyor belt is used to move the cut crops at one side. Arduino UNO R3 is used to automatically control the overall system that reduces the design and complexity in the circuit. Wheels are connected to the DC motors and these motors are connected to the Arduino through motor driver IC L293D.The wheels rotate according to the given program in the Raspberry pi 3.

The second part is to check the humidity and temperature of the field and report it to the cloud after particular short time intervals. The humidity and temperature both are checked by the DHT11 sensor. Here we have used cloud server named as Cloud4Rpi which handle the data on the cloud.

The camera is used for security purpose which captures the image of the field after every 1 minute and sends it to the user's e-mail account. In this way the security of the field is maintained. This camera and DHT11 are connected to the Raspberry pi 3 as the whole operation is done by using Raspberry pi 3 and Arduino UNO R3 by using Wi-Fi connectivity.

3.3 Flowchart:

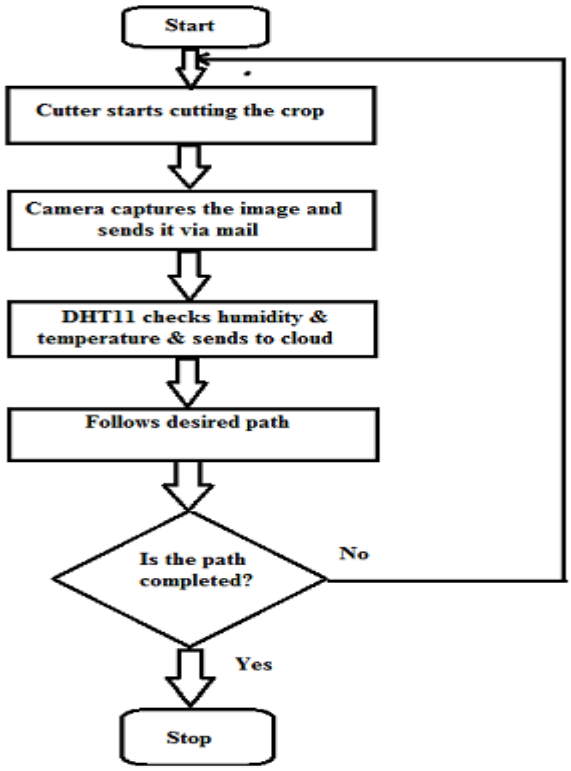

Fig 1: Flowchart of program,

From the flowchart given we see that the battery starts the Arduino and it starts the 4DC motors. At the same time, the battery activates the Raspberry Pi which will start the 2cutter motors. Now the cutter starts cutting the crop. The camera continuously monitors the field. By using Raspberry pi the images and videos will be sent to the cloud. Also, the DHT11 sensor continuously checks the humidity and temperature of the field. Then this information is sent to the cloud. The Raspberry Pi is given a program which follows a fixed path given in the program. After completion of the path, the Agrobot stops cutting crops. If the path is not completed then it restarts the motors from the beginning. After completing the cutting operation it stops working.

IV. RESULT AND DISCUSSION

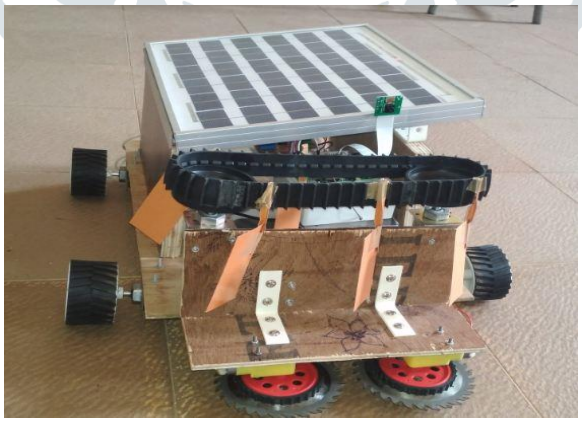

Fig 2: Entire Assembly

In the Agrobot grass cutter we have the whole assembly of Agrobot which cut the grass automatically as well as capture the image of field and send the data to the Gmail account measure the humidity and temperature and store it to cloud. The entire assembly is shown in figure 2.

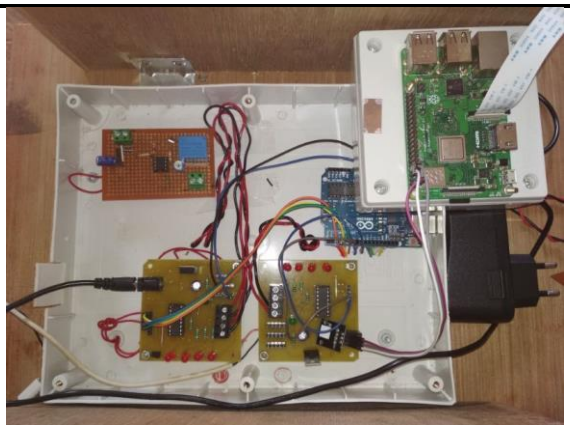

Figure 3 : Hardware Circuit

In design of smart IOT based Agrobot grass cutter will automatically cut down the grass. The data of humidity measured by DHT11 temperature will be displayed on cloud as well as image captured and send the data message to the Gmail account. The main hardware circuit of the project is shown in figure 3 above. It consist of Arduino kit rasbbery pi-3,dc motor,DHT11,solar panel battery, MPPT.

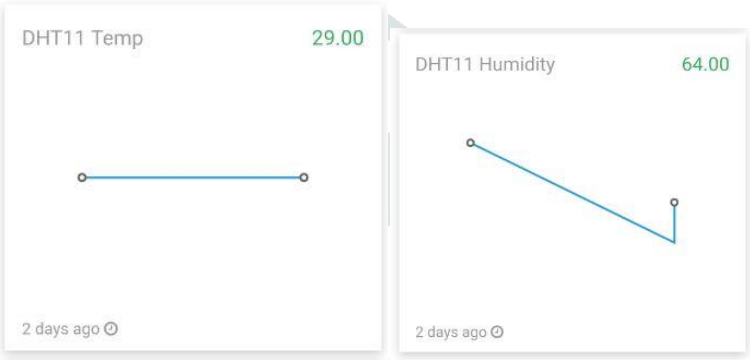

Figure 4: Graphical Representation of sensor DHT11

Graphical representation of sensor DHT11 is shown in figure 4 above. DHT11 will sense the humidity and temperature and data will send to the cloud4RPi

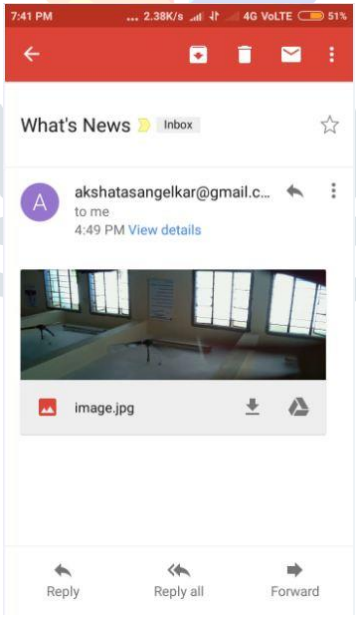

Figure 5: Image send to Gmail account

Here we have shown camera interfacing for capturing live images for security purpose. The captured image will be displayed directly to the user Gmail account which is shown in figure 5.

V. FUTURE SCOPE

This project has enormous potential and may be used in various other ways, due to its cheap and cost efficient design.

1]It can be also used as the grass cutter.
2]It can remotely perform jobs.
3]The size of wheels can be increased so that it can move easily in any type of farm.
4]More security factors can be added if needed.
5]More operations can be added such as fertilizer sprinkler etc.

VI. CONCLUSION

Our IoT based smart solar agrobot contains raspberry pi3 as well as Arduino Uno. It works completely on solar energy. The raspberry pi is the heart of the agrobot. The Arduino controls the six dc motors. The raspberry pi checks the humidity and temperature of the farm. The energy required to run the agrobot is taken via solar panel in the battery. Hence it is a pollution-free agrobot. Our product is cost-effective and easy to handle. Any common man can operate this very easily and efficiently. It requires very less power as well as voltage.

VII. REFENECE

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