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DESIGN AND IMPLEMENTATION OF SMART CROP PROTECTION SHED USING INTERNET OF THINGS

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ABSTRACT
This Crop shed useful to all real time applications to protect from rains. Mainly this system is used for agro-sector to protect from rains. Agriculture is the backbone of our country. About 70% of our country's revenue comes from agriculture. But during heavy rain falls, the farmer faces lot of problems because of the rain. Cultivated crops get washed off or destroyed. So, to avoid this problem this project is designed which helps if protecting the crops from heavy rainfall. We will use a rain sensor to detect rain and RASPBERRY PI PICO/microcontroller. Here the rain sensor detects the water that comes short circuiting the tape of the printed circuits. Then the controller indicates the DC motor to run which opens the roof automatically to close shed. The resistance lower when the sensor is dry i.e., higher output voltage vice-versa then shed will be open. DHT11 sensor is to monitor the live temperature and humidity. If the temperature exceeds the threshold voltage, then automatically turn on exist fan to control room temperature and everything is alerts us by using IOT server.

Keywords:
Crop protection shed, IoT, rainfall.

1. INTRODUCTION
Now the day's technology is passing with time, it completely occupies the lifestyle of human beings. Even though there is such an importance for technology in our routine life there are even people whose lifestyles are very far to this well-known term technology. So, it is our responsibility to design a few reliable systems which can even be efficiently used by them, farmers. The farmer who toil and does hard work to produce the crop suffers a lot at the end. The factors include unexpected rains when yielded crop is dried before selling, which will destroy the crop yield or make the yield second grade. To avoid such conditions, automatic rain protected drying sheds are to be developed. In this project, we propose a system in which the rain is detected automatically, and protective shield is wrapped on the rooftop sensor an intelligent microcontroller and a DC motor are employed. The rain sensor of such drying shed which protects the crop against rain and getting wet. To automate this task, a rain senses the rain and data is passed to the microcontroller. The microcontroller processes the data and activates the DC motor control circuit, and a protective wrapper is wrapped on the roof top.
In the Current system there is no protection for crops against natural disasters such as Floods, Rains and as well as from over Sun heat. Which are in turn Reduces the plant growth in turn reduces yield. The formers Commit Suicides After their crops got destroyed due to natural weather Calamities. Only Weather Updates or alerts are given to formers through Media. But there is no exact time alert or there is no system which can protect former Crops.
In present days unexpected and unseasonal rains also there which will spoil the agriculture. If cyclone or flood occurs there will be loss of crops and loss of chores of money to the govt in the form of relief funds. For HudHUd there were a loss 9 chores of agriculture land and govt spend the 11chroes of money in form of relief fund so we lost 20 chores of lacks only for one cyclone. In India unexpected rains are common. we can overcome this loss by implementing the automatic system which can cover the agriculture land and which can store the rainwater for farming. The main part of this system is to detect the rainfall and to detect the moisture percentage of the field. If the water is more than the

sufficiency then the system should be activated to protect the crops. We will design a roofing structure which can allow flowing the water into the predesigned path and if the water storing capacity is exceeded then water should flow to the drainage system without effecting the remaining areas.
In the Current system there is no protection for crops against natural disasters such as Floods, Rains and as well as from over Sun heat. Which are in turn Reduces the plant growth in turn reduces yield. In this project we are proposing the system which prevents the spoilage of crops due to heavy rains. This is achieved with embedded system design. The actual concept of this project is protecting the crops from heavy rainfall by covering the field automatically and also to save the collected rain water. In the Current system there is no protection for crops against natural disasters such as Floods, Rains and as well as from over Sun heat. Which are in turn Reduces the plant growth in turn reduces yield. The farmers Commit Suicides After their crops got destroyed due to natural weather Calamities. Only Weather Updates or alert are given to formers through Media. But there is no exact time alert or there is no system which can protect farmer Crops.An Intelligent System is designed to protect farmer crops from natural disasters such as over rains, floods and even from Over Sun heat. A movable Panel is designed to protect agriculture field.

2. LITERATURE SURVEY

This chapter explains existing agricultural problems faced by the farmers in the society. This project provides automatic watering machinery which will work based on humidity and temperature sensor. Rain water sensors are implemented to get information regarding rain, so desired or undesired crops can be covered. Weather condition may vary from place, water requirement varies from crop, excessive rainfall or scarcity of water damage crop. To make the system more effective drip lines can be laid down so water directly reaches to roots. This design will sense when motion is detected the controller will initiate the camera to take a picture and send the image to farmer according to program written in python environment. In motion detection system there is process of detecting changes related to objects and surrounding environment. The video based surveillance system generally useful for identification of the animals or human images or frames whenever they enter the agricultural field by ringing the alarm. A new procedure is used to identify and analyze the period of motion as detected from both static camera and moving camera. By using motion detection, it saves the monitoring time and cost. A real time device has been developed to detect and classify the objects periodically. We can use frequency analyses to detect the regular motion. we can also capture the image and classify them based on image processing algorithm.
We have gone through past researched work on these types of projects. Comparison in different method agriculture is the backbone of Indian economy. Because without agriculture living is impossible since agriculture produces the main source food for us. But in today's situation the availability of a labor of caring out agriculture activities is rare. The automation in all kind of industries leads to industrial growth. Here agriculture process is automated. In this proposed system all the machines to work on its own with the help of inputs received from the sensors which are monitoring the agriculture land round the clock and a single person is enough to monitor weather everything going normal. The entire process is controlled and monitored by programmable logic controller[1]. The Agriculture process involve seeding, irrigation, planting, fertilizing weeding, harvesting. Here three processes can be implemented. Main Objective is even a professional can work in the agricultural field. These manual cultivation for one acre of a land requires money of around Rs. 15000 – 17000 but due to this technique we reduces the cost and is nearly Rs.9000-10000 only and also the yield is high when compared to normal one[2] Sanjay Kumawat, Ashwini Kapadnis et al [1] has proposed this RainGun Irrigation System uses automatic microcontroller in which the irrigation will take place only when there is intense requirement of water and a large quantity of water can be saved. This system has developed a software stack called Android used for mobile devices that include operating system, middleware and key applications and

the management of the field resources can be enhanced. The Android SDKprovides the tools and APIs necessary to begin developing applications on the Android platform using the Java programming language. An integral part of serving multiple needs of humans is mobile phone. The use of GPRS feature in mobile is the solution for irrigation control system. These systems covered lower range of agriculture land and not economically affordable. The GSM is used to send message when there is enormous amount of water in the land. In order to avoid washing away of soil contents which the nutrient availability an Android app is used. The Microcontroller increases System Life and lowers the power Consumption. This system lacks in extra ordinary features and is limited to automated irrigation. The merit is installing the automatic irrigation system and determining the PH value which saves time and ensures judicious usage of water and farmers get to know earlier that what crops can be grown in this field. The demerit is this system works in areas where there is no regular supply of electricity. Naveen K.B,Sagar G.H et al [2] has proposed this system design and simulation can be done using proteus software. There are two sensors which are rain sensor and soil moisture sensor. Rain sensor determines the amount of rainfall and moisture content is measured by the moisture sensor which will be displayed on LCD. The auto roof is used. The automatic rain water and crop saving system protects crops from large amount of rain water and also prevents wastage of water. Human efforts are reduced by the use of auto roof and electricity can be saved and productivity can be maximized during sunny and rainy season. Irrigation is the back bone of human civilization since beginning of agriculture. In the present scenario on conservation of water and save the natural resources available for mankind. By continuously monitoring the status of the soil and using soil moisture sensor we can control the flow of water and thereby reduce the wastage. The merits are Low power consumption and easy to install. Remote monitoring is possible from field to farmer's home. By automatic control of DC motor, we can reduce power consumption. Wastage of water can be reduced. High Humidity and temperature can be detected and controlled. Controlling moisture of soil. The demerit is costly to implement. A.Pederi and H.S.Cheporniuk et al [3] has proposed this paper presents combination of new approaches and technologies in modern-day agriculture. Perspectives and benefits of usage of Unmanned Aerial Vehicles in different spheres of agriculture considered on the base of spraying drone project called "Aerodrone". The merit is Unmanned System Reduces Human Effort. The demerit is Costly to implement. For couple of years the term precision agriculture has often been used in UAV industry. This can be explained by the fact that farmers worldwide are making their decisions more often depending on the data that were collected by the drones. UAVs can spray different types of plant protection chemicals. There are a lot of plant protections products exist today. Main pesticides that used in precision agriculture are insecticides, fungicides, herbicides. Ukraine based start-up "Aero Drone" develops a unique project that has no analogues worldwide. As far as it known, this project is the first working prototype of fixed-wing spraying UAV. It has many advantages comparing with traditional crop protection methods. "AeroDrone" PAM-20 has suspended portable control unit that includes autopilot, modems, measuring devices, sensors and other electronics. Such control unit may be installed on other UAVs, but with other settings file, which should be uploaded by the operator before the flight. Autopilot provides full-automated mission and supports up to 1000 GPS-points for mission routing. Shital Mahadik,Monika Paygude, Supriya Randive et al [4] has proposed this paper brings forward modified device based on wireless network and radio communication. Three levels are included in the system. The android control platform or a android cellphone for surveillance, the controller and action unit (sensors and detectors). Orders can be sent from the Android control platform or cellphone to the controller information such as soil moisture, saline content, water level processed by the controller can be sent to the android platform or cellphone by GSM modem. The merits are reduces man power, reliable system, low cost system. The demerits are consumes more water and slow growth rate. Wen-Yaw Chung, Jocelyn F.Villaverde, Janine Tan et al [5] has proposed this soil moisture sensor in determines volumetric water content. Volumetric water content is defined as the

ratio of the volume of water and the total sample volume of dry soil. The calibration curve of the EC-5 sensor can be obtained from the soil sample from Dai-Yun organic farm. The analog data obtained from the characteristic curve serves as the voltage input of the analog to digital converter. The MPC82G516A micro controller is programmed by using KEIL uVision4 IDE. The wireless transceiver nRF24L01 is connected to the MPC82G516A micro controller to transmit the data to the receiver node. Tera Term terminal emulator is used such that transmitted data can be viewed to the computer monitor and stored in the database. The stored values will be used in making the irrigation schedule of the green house. These values determine the volumetric water content of the soil. The four classifications considered in the irrigation scheduling are dry soil, slightly moist soil, moist and wet soil. The merits are easy installation and replacement in the farm. The demerit is it is very difficult to reach the increasing food demand. Vidadala et al[6] has proposed this implementation of agricultural automation system is done by using web and GSM technologies. The embedded project is to design and develop a low cost system which is based on embedded platform for agricultural automation. Optimum usage of water is the main objective of this system. This project uses soil moisture sensor and temperature sensor to detect the water quantity present in agriculture and water level sensor is used for detecting water level in tank. In this system we monitor the status of sensors through WEB and GSM technology. Here temperature, soil moisture and water level can be monitored in web page through microcontroller and information will be send by SMS. The information about the status of the sensor will be viewed at remote location by using GPRS technology. The merit is to design and develop a low cost system which ensures optimum usage of water. The demerits of this paper is due to activating sensor for long time it may misbehave and causes a great problem. Kirankumar et al [7] has proposed this considering an area where any of the crops grown and a solution is found for an agriculture system by different deployment technique. The device will successfully help in growth of a plant by monitoring temperature, pesticides, humidity without human interference and can be implemented in half acre of land as a prototype model. The merit is agricultural growth of the plant without human interference. The demerits of this paper device if implemented in the large scale the overall cost can be brought down that is demonstrated using qualnet simulator. Saleemmaleekh et al [8] has proposed this with the advancement in technology, the world around us in every part of our life getting automated. The manual procedures are being replaced by these automated systems, since they are with energy efficient and consume less labor work. This paper proposes the advantages of having Wireless Sensor Network technology in Indian agricultural sector, which shows the path to the rural farmers to replace some of their traditional techniques. Here, multiple environmental data such as Humidity, Soil moisture, Soil pH etc. are collected by a set of wireless sensor nodes and applied as input to the Peripheral Interface Controller (PIC). The data is checked continuously by PIC controller and a set of control actions like Irrigation, Soil fertility check etc. are made if they exceed threshold level. After every activity, an evidence message is sent through SMS via GSM modem to the farmer. The module by module design and implementation of the system are given. The merit of this paper is the system overcomes the limitations of traditional agricultural procedures by utilizing water resource efficiently and also International Journal of Engineering Science and Computing, February 2019 19899 http://ijesc.org/ reducing labor cost. The demerits of this paper is difficult to maintain. Jaichandran et al [9] has proposed this prototype for automatic controlling and remote accessing of irrigation motor. Prototype includes sensor node, controller node and mobile phone. The sensor node is deployed in irrigation field for sensing soil moisture value and the sensed data is sent to controller node. On receiving sensor value the controller node checks it with required soil moisture value. When soil moisture in irrigation field is not up to the required level then the motor is switched on to irrigate associated agriculture field and alert message is send to registered mobile phone. Mobile phone is used for sending request SMS to get soil moisture value in irrigation field and commands can be sent as SMS to switch on/off the irrigation motor. Prototype is experimented by abstraction three pots containing soil with different moisture level

as irrigation fields. The experimental results show that the prototype is capable for automatic controlling and remote accessing of irrigation motor based on the feedback of soil moisture sensor. The merit of this paper is that farmer can monitor and control irrigation activity from remote location. The demerits of this paper is farmer have to bear huge financial losses because of wrong prediction of weather and incorrect irrigation method to crop. Priyanka et al [10] has proposed this system involves some sensors, LCD display, GSM and ARM processor. All the sensors will give analog output but our processor will accept only the digital data. So we have to connect all the sensors to the ADC channel pins which are in-built to the processor.LCD will be on field display purpose. GSM module will contains a Subscriber Identity Module (SIM) user can communicate with this SIM-Number. When the particular command activated or given by the user, immediately the corresponding sensor will activates and reads the present reading and immediately sends results to the same user mobile and displays in the LCD panel in the field. Immediately user will take the necessary action if required. Here we are using total seven sensors to monitor the field condition. Those are Temperature, Humidity, Soil moisture, Leaf sensor, PH sensor, Level sensor, Phase sensor. All these devices are connected to the ARM processor GSM is used for communication purpose, with the help of AT (attention)- Commands we can communicate with the components. For soil module and level sensing applications we are using motors. One motor is used to store water and another is for releasing the stored water into the soil. The merit of this paper is economic growth, income distribution and food security. The demerits of this paper is insufficient data.

3. PROPOSED SYSTEM

The proposed system multi functionalities of agriculture system. This system have many feature to detect the automatic rain fall and auto shed close system when raining season. This system also manual mode of shed and temperature control along with agriculture weather monitoring and alert over IOT using Raspberry Pi pico. We will use a rain sensor to detect rain and PICO microcontroller. Here the rain sensor detects the water that comes short circuiting the tape of the printed circuits. Then the controller indicates the DC motor to run which opens the roof automatically to close the field using a polythene sheet. The resistance lower when the sensor is dry i.e., higher output voltage vice-versa. Temperature sensor is to monitor the live temperature and if the temperature exeed the threshould voltage then automatically turn on exast fan to control room temperature and everything is alerts us by using GSM massage to authorised person.

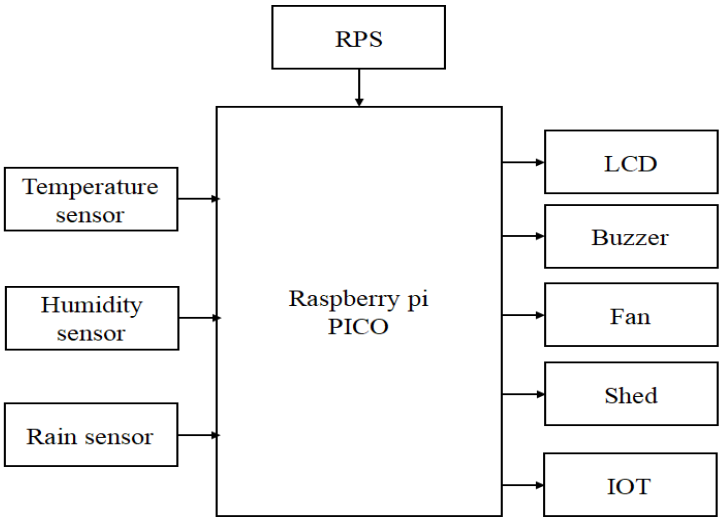

Fig. 1: Block diagram of proposed system.

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In the crop yield drying process, there is utter necessity to sense the excess moisture or rain is very important else the hard yarned crop yield will be destroyed which is a tremendous loss to the former. To avoid this condition, sensing the parameters is done through the moisture sensor or rain sensor. The sensed data is sent to the microcontroller. A microcontroller is an intelligent controller which is pre-programmed according to the requirement. The data collected from the sensor is processed and relevant action is taken. The microcontroller is instructed to control the DC motor which is used to cover the drying shed. As soon as excess moisture or rain is detected, the motor is activated by the microcontroller and the protective cover is covered on the rooftop of the drying shed.

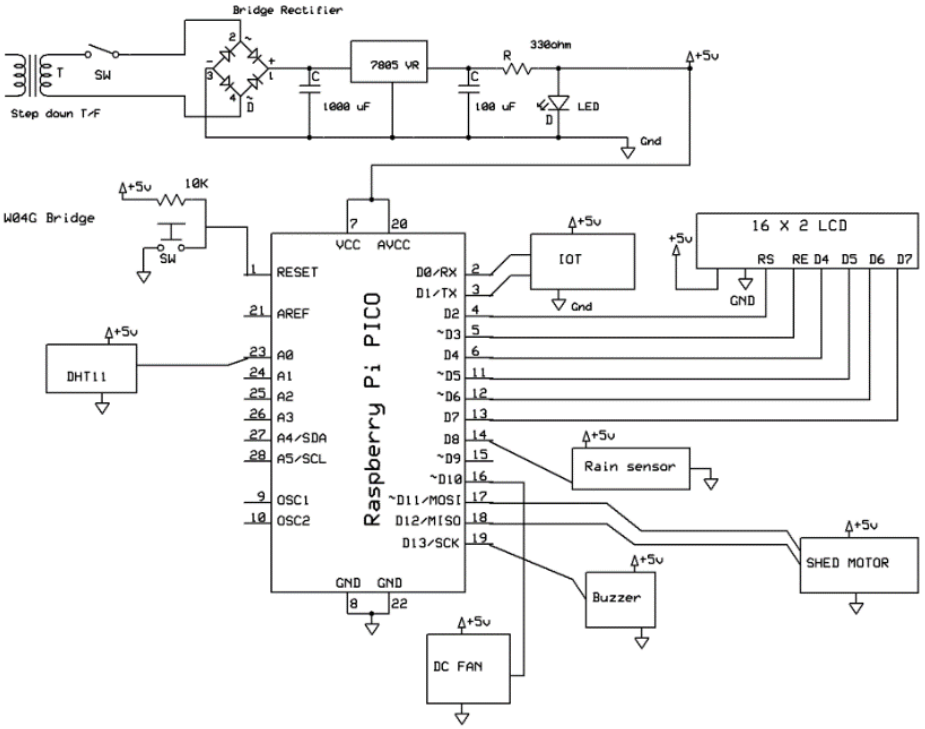

Fig. 2: Schematic diagram of proposed system.

In the proposed system, We will use a rain sensor to detect rain and microcontroller. Here the rain sensor detects the water that comes short circuiting the tape of the printed circuits. Then the controller indicates the DC motor to run which opens the roof automatically to close shed. The resistance lower when the sensor is dry i.e., higher output voltage vice-versa then shed will be open. DHT11 sensor is to monitor the live temperature and humidity. This system having mode switch to control Fan/Shed automatically and manual, with respect to temperature and humidity based. If the temperature exceed the threshold voltage then automatically turn on exist fan to control room temperature and everything is alerts us by using IOT server.

4. CONCLUSION

We designed and implemented multipurpose sheds for protection of agriculture fields from heavy rain falls. We implemented using Raspberry pi pico , rain sensor and shed with IOT module based alert. The Automatic Crop protection has been achieved successfully using the microcontroller unit. The circuit has been tested and verified. We Developed Automatic crop protection shed programmed by using the RASPBERRY PI PICO microcontroller. The program has been successfully tested and verified for several specified conditions. The switching mechanism can be done automatically with the help of a microcontroller using D.c motor. By using this project, we can protect thousands of hectares of land from unseasonal rain. We can also increase the rate of production of crops by which we can

improve the economic standards of farmers and as production increases the cost of the crop decreases for the users.

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