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Zidong Polyhouse Using IOT

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Abstract: Internets of things and image processing have been so far applied for various applications independently. This paper describes an approach to combine IOT and image processing in order to determine the environment or man-made factor. Here the controlling mechanism for monitoring the environment factors inside a polyhouse is proposed. In this technique the ambient temperature, humidity can be monitored and controlled using raspberry pi. Also camera is interface with raspberry pi to find the disease attacked plant using image processing technique. Raspberry pi has inbuilt Wi-Fi by using that farmer can check those status inside the polyhouse through mobile application.

I. INTRODUCTION

Even in the modern era of industrialization, agriculture plays a Very significant role on the overall socio-economic development of India. The backbone of Indian Economy is Agriculture.43% of India's territory comes under agricultural lands. Around 52% of India's population is getting employment only because of agriculture along with other related fields like forestry and logging . Agriculture also accounts for 8.56% of the country's total exports. According to a survey made in 2007, agriculture accounts for 16.6% of India's Gross Domestic Product. In India, the most influential field as compared to others is agriculture, which perhaps needs more emphasis on better agricultural practices. Crop growth is mainly influenced by the surrounding environmental climatic variables, the amount of water supplied and the fertilizers used for irrigation. By proper monitoring of the soil conditions and environmental conditions the quality of agriculture can be increased. Polyhouse is ideal for proper plant growth and high yield of the crop, where the climatic parameters can be controlled automatically. Polyhouse cultivation is the modern, one of the most intensive, is considered highly productive and environment friendly agriculture practice. Polyhouses are constructed using an ultraviolet plastic sheet of thickness 1501m which lasts for a minimum of 5 years. It is built using bamboos or iron pipes. In general the length of polyhouses is 25-30 feet and width of 4-5 feet. The size of the polyhouse may vary according to the requirement. Mostly the polyhouses are always directed towards East to West which allows the polyhouse to utilize the maximum sunlight. Irrespective of the season the temperature and humidity levels can be automatically controlled in the polyhouse thus resulting in proper plant growth and high yield of the crop. The existing variations in the demand and supply of off-season for vegetables and fruits can be lowered by adopting modern technology.

II. RELATED WORK

A. Iot in agriculture

Major challenges in agriculture are to cultivate produce in the farm and deliver it to the end consumers with the best possible price and best possible quality. Currently all over the world. It is found that arund 50% for the farm produce never reach the end consumer due to wastage and suboptimal prices. This paper provides the solution to reduce the transport cost, predictability of prices on the past data analytics and the current market condition, reduce number of middle hobs and
Agents between the farmer and the end consumer using IOT based solution.

B. Image Processing in smart agriculture

This concepts describes an approaches using an iot sensing network which takes the readings of the crucial environment factors and the image of the leaf lattice it is processed under Matlaboftware by the help of histogram analysis to arrive at conclusive results

III. SYSTEM ARCHITECTURE

In plant premise all hardware set up is installed along with Poly house station. There are various sensors like temperature, humidity, and a LDR sensor which senses the environment and send signal to Raspberry pi. Raspberry pi has inbuilt ARM processor which process the data and send it to internet through LIFA connection. User can also set limit range of parameter and if parameter goes beyond that value then it will give poly house control signal to motor in plant and it will turn on/off device automaticall.Camera is

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interfaced with raspberry pi, to find the disease attacked plant using image processing technique.

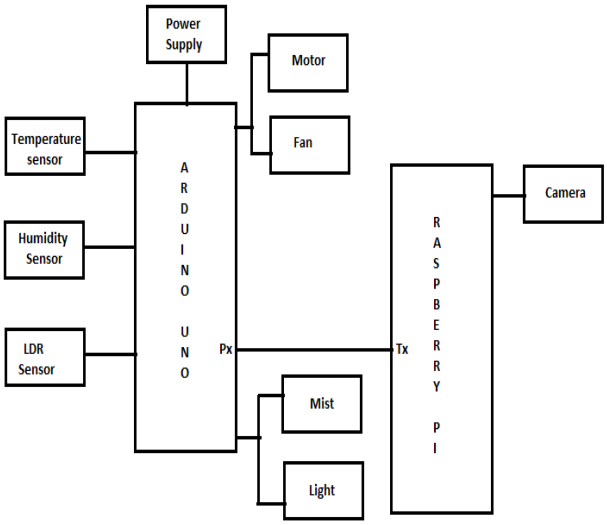


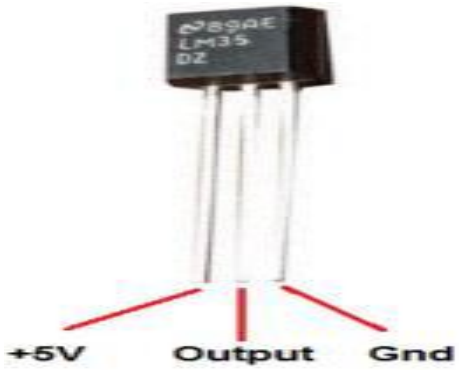
Fig 1.System Architecture

IV. ADVANTAGE

Polyhouse concept is fully automated Using Iot Monitoring Database can be done, so we can eliminate record using resistor. Image processing disease identification is very much helpful to identify the disease attacked plant and to separate that particular plant.

V. BLOCK DESCRIPTION

A. Temperature Sensor



Among the variety of temperature sensors available in the Market, LM35 is used for the implementation of the proposed System because of its advantages like accuracy, it provides no Oxidation as it is sealed and produces high output voltages.

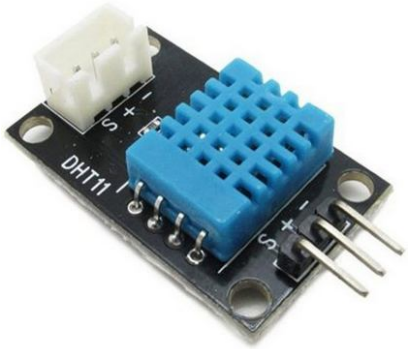
Also it does not require any external calibration or trimming toprovide typical accuracies of ±1⁄4°C at room temperature and ±3⁄4°C over a full −55 to +150°C temperature range. It has very low self-heating of less than 0.1°C in still air, as it draws only 60 µA from its supply. The LM35 is rated to operate over the temperature range −55° to +150°C.

T=(A/1024*5000)/10

B. Humidity Sensor

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His sensor includes a resistive-type humidity measurement component and an NTC temperature measurement component, and connects to a high-performance 8-bit microcontroller, offering excellent quality, fast response, anti-interference ability and cost-effectiveness.Each DHT11 element is strictly calibrated in the laboratory that is extremely accurate on humidity calibration. The calibration coefficients are stored as programs in the OTP memory, which are used by the sensor's internal signal detecting process.

C. Ldr sensor



A *light-dependent resistor* (LDR) connects to a voltage divider circuit, also known as a *potential divider* (PD), for proper circuit operation. There are two configurations of the circuit depending upon the position of the LDR within the potential divider network.You can have a configuration where the voltage output (Vout) increases as light increases or one where the voltage output decreases as light increases. The following calculators and their respective formulas show how both configurations work

D. Ardiuno



The Arduino/Genuino Uno can be programmed with the (Arduino Software (IDE)). Select "Arduino/Genuino Uno from the Tools > Board menu (according to the microcontroller on your board).The ATmega328 on the Arduino/Genuino Uno comes preprogrammed with bootloader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol.

E. Raspberry pi

The Raspberry Pi Foundation designed this little board, the Raspberry Pi, to address a last generation of computer programmers and

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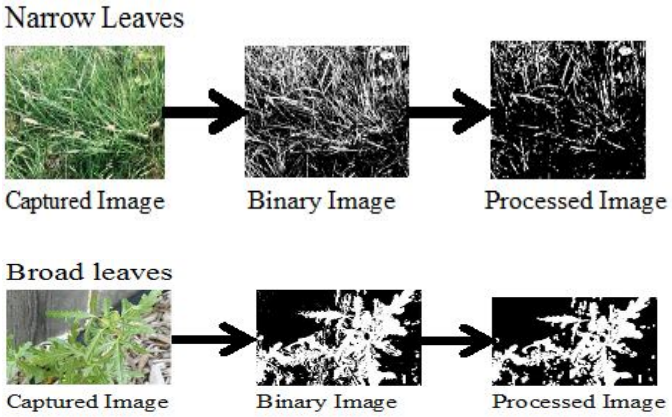
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hardware engineers.



So, this little board here is low cost, it's easily accessible, it's very simple to use. When power up it get a nice little desktop environment, it includes all of the things that need to do to get started to learn programming. There's lots of information out there on the internet that can take away and start programming code in to make things happen. It is possible to do everything with a Raspberry Pi.The real advantage of a Raspberry Pi as far as programming is concerned is the network port.

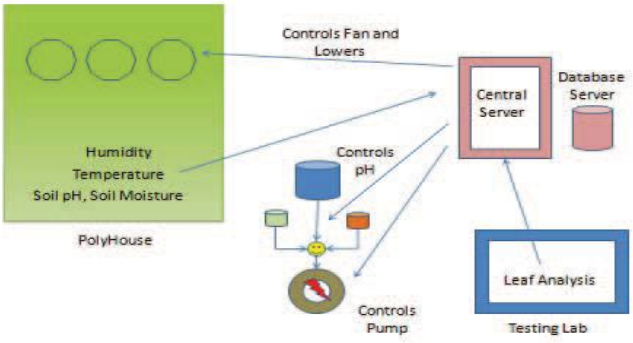
D. Camera unit



An area of application of Computer Vision, one that has always fascinated people, concerns the capability of robots and computers in general to determine, recognize and interact with human counterparts. Plant detection using OpenCV is really simple, We basically need to go through this steps on the Raspberry Pi every time.

VI. MODULES

A. Module-1

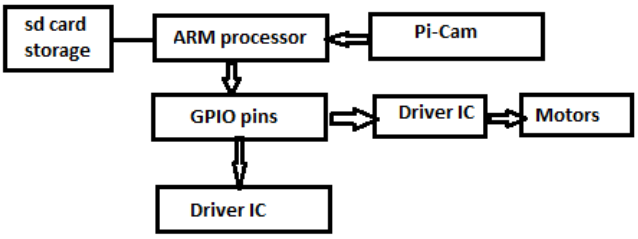


Soil pH ,soil moisture can be measured using pH and moisture potential metre at various points in the polyhouse and sent to the central server over Wi-Fi. Temperature inputs from the temperature sensor will help the central server to open or close the flaps of the polyhouse as well as to start the fans to blow the filter air in or out of the polyhouse. Humidity sensor data will help the central server to the control the sprinklers to control the humidity within the polyhouse. It is noticed that pH fluctuates after application of various pesticides and fertilizer.

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B. Module-2



The first step is image acquisition which is accomplished by the raspberry pi camera. The next step is processing of the image captured. The image is subjected to morphological modifications like thresholding, erosion and dilation to detect the presence of the plants in the region of interest(ROI). If present determining whether it is a weed or the plantation crop.
The final steps directed spray of the herbicide on the weed in the ROI.

VII. CONCLUSION

In this paper low cost,low power, Wi-Fi technology is applied. The system realize is remote intelligent control to the room equipment through internet it improve the operational efficiency and system application flexibility by using wireless sensor network and at the same time reduce man power cost.
The provision of automatic control environment inside the polyhouse makes the farmers work easy and it can be achieved by using the proposed system.

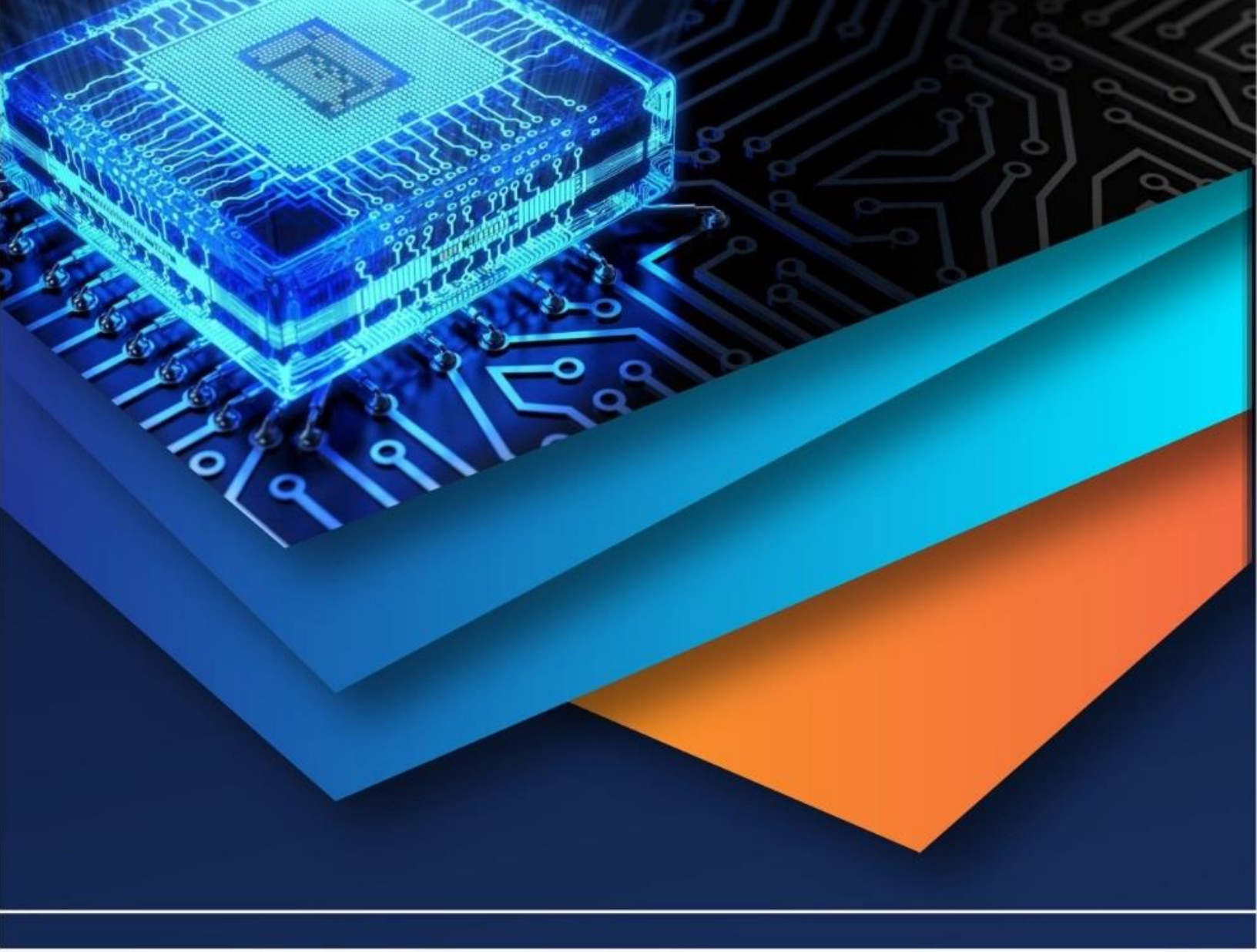
VIII. FUTURE SCOPE

The image analysis for plant disease detection can be further improved by dividing the image into more number of regions and have as many nozzles to spray the chemicals. It can be turned into a very robust closed loop system by incorporating a memory module. The image processing algorithm can be developed further so that the detection becomes more generic.

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