Advanced Green house Monitoring using Raspberry-Pi and IOT

[1]Ch.Lakshmi Narayana, [2]K V R Vara prasad, [3]K Pasipalan rao
[1]Assistant professor, [2] Assistant professor, [3] Assistant professor
[1]ECEDeparment,
[1]Pragati Engineering College, Kakinada, India

Abstract : This paper is aimed to design advanced green house monitoring by different parameters like temperature, humidity, soil moisture and light using IOT. Here we will be using raspberry-pi as our main board and sensors which will collect all the real time data from the environment and this real time data will be fetched by the web server and display collected data. User can access this data from anywhere in the world through internet. Due to unnatural and unpredictable weather, farmers now a day face large financial losses due to wrong prediction of weather and incorrect irrigation methods used for crops, More over underground water scarcity has increased and water become very precious for agriculture usage. This system will prove to bean important part in development in agricultural field by effective utilization of greenhouse monitoring. The sensors used are soil moisture sensor, humidity sensor, temperature sensor.

IndexTerms **- Green House, Sensors. IOT, Raspberry-pi**

I. INTRODUCTION

We live in a world where everything can be controlled and operated automatically, but there still a few important sectors in our country where automation has not been adopted or not been put to a full-fledged use, perhaps because of several reasons one such reason is cost. One such field is that of agriculture. Agriculture has been one of the primary occupations of man since early civilizations and even today manual interventions in farming are inevitable. Greenhouses form an important part of the agriculture and horticulture sectors in our country as they can be used to grow plants under controlled climatic conditions for optimum produce. Every time drought problem is main issue for farmers .Real time greenhouse envisages monitoring and controlling of the climatic parameters which directly or indirectly govern the plant growth. Automation is process control of industrial machinery and processes, thereby replacing human operators.

II. HARDWARE & SOFTWRE MODULES

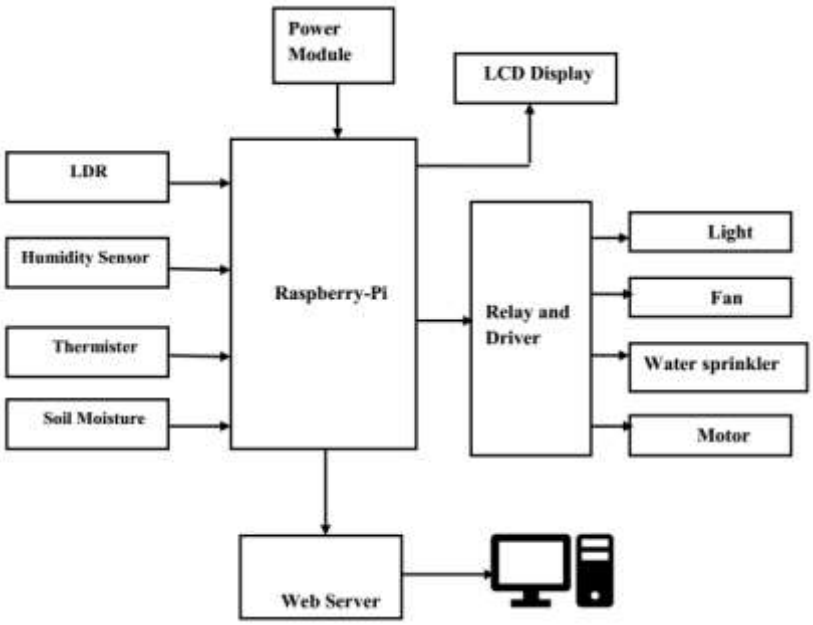

Figure 1. Block Diagram of System

2.1. Raspberry Pi 3 Model B

Figure 2. Raspberry-Pi

The Raspberry Pi is a credit-card-sized single-board computer developed in the UK by the Raspberry Pi Foundation with the intention of promoting the teaching of basic computer science in schools. The Raspberry Pi hardware has evolved through several versions that feature variations in memory capacity and peripheral device support.

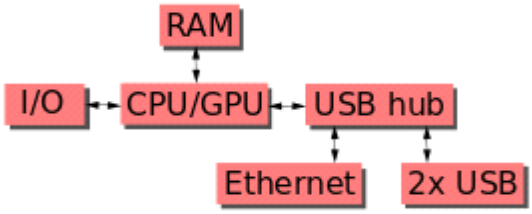

Figure 3. Block Diagram of Raspberry pi

The Raspberry Pi is based on the Broadcom BCM2835 SoC, which includes an 700 MHz ARM1176JZF-S processor, VideoCore IV graphics processing unit (GPU), and RAM. It has a Level 1 cache of 16 KB and a Level 2 cache of 128 KB. The Level 2 cache is used primarily by the GPU. The SoC is stacked underneath the RAM chip, so only its edge is visible.

2.2 Sensors

In this paper we have used 4 main parameters of the plant for measuring this parameters which are considered as the inputs for this paper.

Important parameters of plant:

1. Illumination (LDR)
2. Temperature
3. Soil moisture
4. Humidity

Figure 4. Types of Sensors

2.3 Software tools

2.3.1 Phython programming

Python is a widely used high-level, general-purpose, interpreted, dynamic programming language.Its design philosophy emphasizes code readability, and its syntax allows programmers to express concepts in fewer code than would be possible in languages such as C++ or Java. The language provides constructs intended to enable clear programs on both a small and large scale.

Python supports multiple programming paradigms, including object-oriented, imperative and programming or procedural styles. It features a dynamic type system and automatic memory management and has a large and comprehensive standard library.

2.3.2 Raspbian OS

Raspbian is a free operating system based on Debian optimized for the Raspberry Pi hardware. An operating system is the set of basic programs and utilities that make your Raspberry Pi run. However, Raspbian provides more than a pure OS: it comes with over 35,000 packages, pre-compiled software bundled in a nice format for easy installation on your Raspberry Pi.

III. WORKING OF A SYSTEM

This device is used to monitor different Parameters and activate the connected devices accordingly, for instance -

- Temperature is measured and if high temperature is detected, coolant will be turned on to moderates the temperature.
- Humidity is measured and if over humidity is detected coolant and sprinkler are activated
- If soil moisture is less then sprinkler will be activated to provide required water to crop
- Light sensor is used to detect light present in the surroundings

The sensor data is fed into Raspberry and then uploaded on the internet. The whole system uses IOT as a basic principle as all the devices are synchronized with each other and the information is collected in real time.

IV. RESULTS & DISCUSSIONS

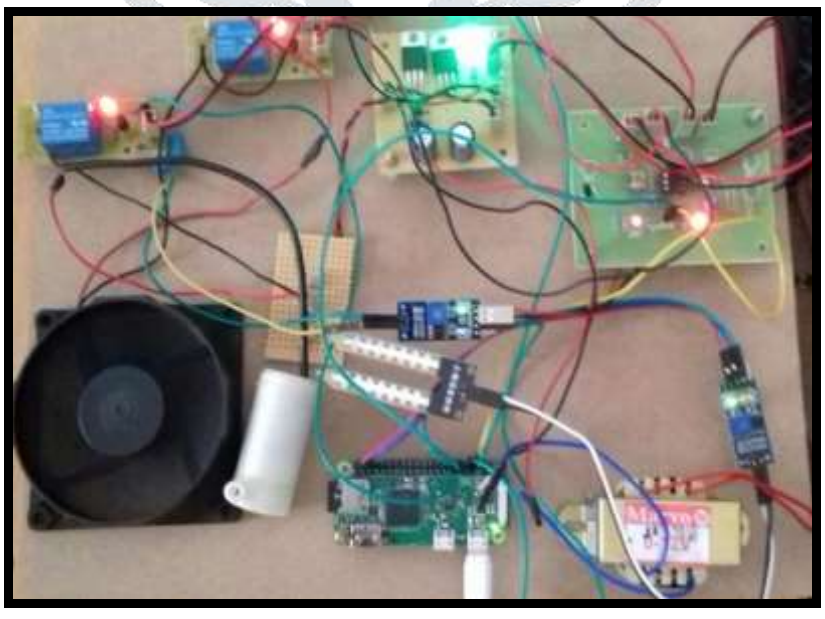

Figure 5. Hardware System

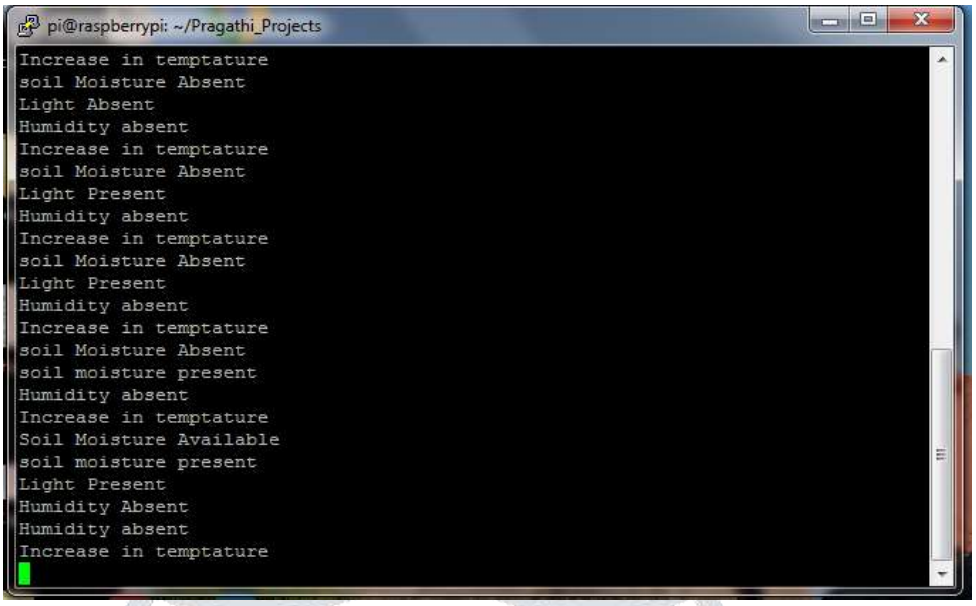

Figure 6. Output Window

Table 1 Sensors operation

SENSORS	CONDITION	OPERATION
Soil Moisture sensor	Present	Sprinkler OFF
	Absent	Sprinkler ON
Temperature sensor	Present	Coolant ON
	Absent	Coolant OFF
Humidity sensor	Present	Coolant ON
	Absent	Coolant OFF

V. CONCLUSION & FUTURE SCOPE

In today's world there is pressing need to increase the productivity of agriculture in spite of unpredictable weather conditions and water scarcity. In order to achieve this technological progress should be implemented in the agricultural sector , which here is made by the cloud IoT. The IoT can dramatically change the way we live our daily lives and store the information which can change our living standards. This monitoring system percepts different parameters inside the greenhouse using sensors , and cloud to provide the updates .The developed system can be proved profitable as it will optimize the resources in the green house. The complete module is of low cost and low power operation which makes it more viable for everyone**.**

VI. REFERENCES

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