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IOT Based Environment Monitoring

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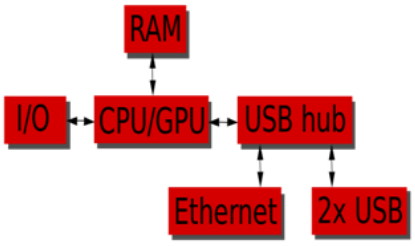
ABSTRACT:

Attention is needed for a farmer to protect his field from different disasters caused either by human or by nature. Human effort is not sufficient and also very expensive to pay for a worker. Here we are using few sensors to monitor the farm those are temperature sensor, moisture sensor to check whether the field is dry or wet and a LDR to verify the lighting at that place. All these will be monitored and sent to the authorized persons email id in the form of mail. So that necessary action can be taken accordingly within short spam of time. The **Raspberry Pi** is a credit-card-sized single-board computer developed in the UK by the Raspberry Pi Foundation . The Raspberry Pi has a Broadcom BCM2835 system on a chip which includes an ARM1176JZF 700 MHz processor Video Core IV GPU and was originally shipped with 256 megabytes of RAM, later Upgraded to 512 MB. It does not include a built-in hard disk or solid-state drive, but Uses an SD card for booting and long-term storage. This project uses regulated 3.3V, 1A power supply. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac out put of secondary of 230/12V step down transformer.

Hardware Modules:

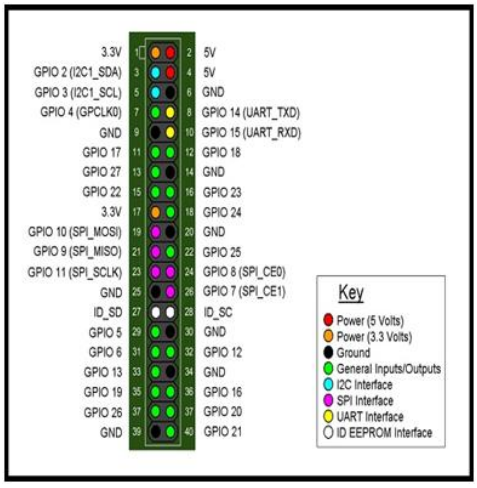
The Raspberry Pi is a credit-card-sized single-board computer developed in the UK by the Raspberry Pi Foundation with the intention of promoting the teaching of basic computer science in schools. Rather than a microcontroller board, the Raspberry Pi is a complete computer very like the computers with which you're already familiar. It uses a different kind of processor, so you can't install Microsoft Windows on it. But you can install several versions of the Linux operating system that look and feel very much like Windows. If you want to, you can use the Raspberry Pi to surf the internet, send an email or write a letter using a word processor. But you can also do so much more at a very cheap price. The Raspberry Pi circuit board, with components and sockets stuck on it is shown in Figure.

Fig : Raspberry Pi circuit board



Basic Hardware of Raspberri-PI

Pin Diagram



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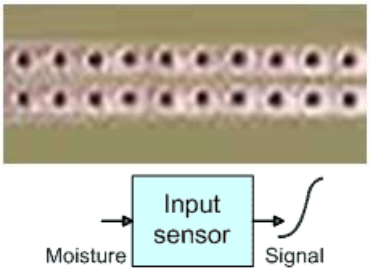
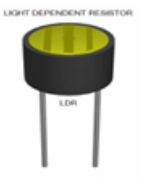
Raspbian OS

The Raspberry Pi primarily uses Linux kernel-based operating systems. Raspbian is an unofficial port of Debian Wheezy arm with compilation settings adjusted to produce code that uses "hardware floating point", the "hard float" ABI and will run on the Raspberry Pi. The port is necessary because the official Debian Wheezy armhf ((**ARM hard float**) refers to an ARM architecture with the additional floating point hardware Vector Floating Point (VFP). Software packages and cross-compiler tools use the armhf vs. arm/armel suffixes to differentiate.) Release is compatible only with versions of the ARM architecture later than the one used on the Raspberry Pi (ARMv7-A CPUs and higher vs. the Raspberry Pi's ARMv6 CPU). It provides some available deb software packages, pre-compiled software bundles. A minimum size of 2 GB SD card is required for Raspbian, but a 4 GB SD card or above is recommended. The downloaded Raspbian "wheezy" image file has to be unzipped and then written to a suitable SD card, formatting it for use.

Moisture sensor

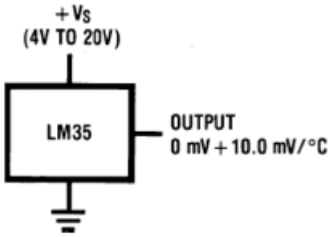
Soil moisture sensors measure the water content in soil. A soil moisture probe is made up of multiple soil moisture sensors. One common type of soil moisture sensors in commercial use is a Frequency domain sensor such as a capacitance sensor.





Temperature sensor:

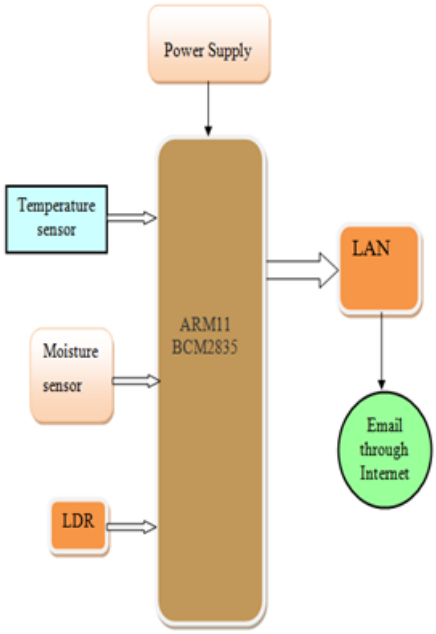
The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling.



LDR

LDRs or Light Dependent Resistors are very useful especially in light/dark sensor circuits. Normally the resistance of an LDR is very high, sometimes as high as 1000 000 ohms, but when they are illuminated with light resistance drops dramatically.

Block Diagram



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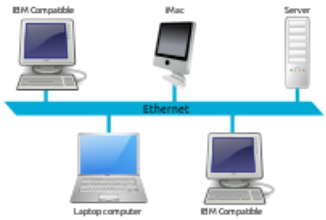
LAN:

A local area network (LAN) is a computer network that interconnects computers within a limited area such as a home, school, computer laboratory, or office building, using network media. The defining characteristics of LANs, in contrast to wide area networks (WANs), include their smaller geographic area, and non-inclusion of leased telecommunication lines. ARCNET, Token Ring and other technology standards have been used in the past, but Ethernet over twisted pair cabling, and Wi-Fiare the two most common technologies currently used to build LANs.



A conceptual diagram of a local area network using 10BASE5Ethernet

Algorithm

Step 1 : Switch on the power supply. This controller needs 3.3V DC.

Step 2 : Three sensors are interfaced to the controller.

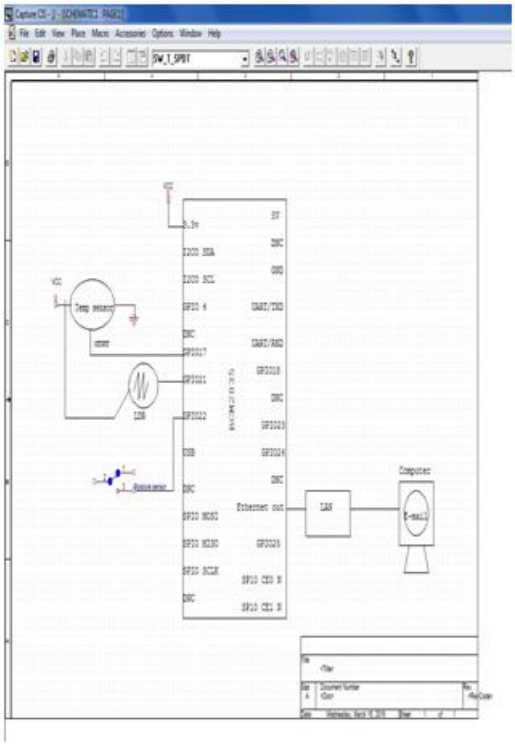
Step 3 : If there is change in temperature. If it goes to abnormal range then an intimation of e-mail is sent

Step 4 : Dry or wet condition in a field is known through this dry/wet sensor. If the sensor identifies dry condition an e-mail will be sent once and when ever it changes to a wet condition then also e-mail is sent.

Step 5 : Day/night mode is sensed by LDR so when ever there is a change from day to night mode or night to day mode then an e-mail is sent.

Step 6 : An Ethernet slot is there on a RPI board. LAN connection should be arranged so that all the information will be sent through e-mail.

Schematic diagram representation using Orcad



Advantages:

- Highly-flexible
- Fit & Forget System
- No need of human effort
- High security is provided

Conclusion

- This project is implemented using **Raspberry pi** for monitoring from remote place.

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