

A Cyber - Physical System for Environmental Monitoring Through IoT Module

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Abstract

In this project we are using moisture sensor, CO sensor, light sensor and Temperature sensor. Moisture sensor is arranged to check the moisture content, light/LDR sensor's output varies with the lighting at that place and informs the controller about this. Temperature sensor is given to identify about the abnormal change in temperature. Dangerous gas is sensed using CO sensor.

All the parameters are being displayed on LCD and the same values are updated in the web server through IoT module interfaced to the controller. This is to make the information available about these parameters in the remote location also.

Introduction

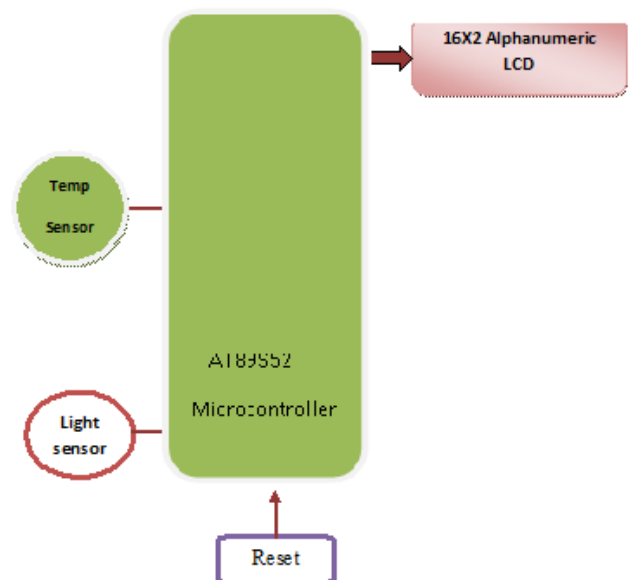
A cyber physical system is being developed to monitor the environmental conditions or the ambient conditions in indoor spaces at remote locations. The communication between the system's components is performed using the existent wireless infrastructure.

Some indoor places like poultry need continuous monitoring of few environmental parameters which cannot be identified by human. So there is a need for electronic equipment. We are using few sensors to detect and intimates to the controller which acts as heart of entire system.

Existing system

In this project we are using LPC2148, Moisture sensors, 2 AC submersible pump, 3traic boards in combination with MOC 3021 based opto coupler which acts as a driver, Temperature sensor, LDR The status of motor can be displayed on 16X2 LCD. To

check the status of day and night mode we are using LDR sensor,. The status of LDR can be displayed on LCD.

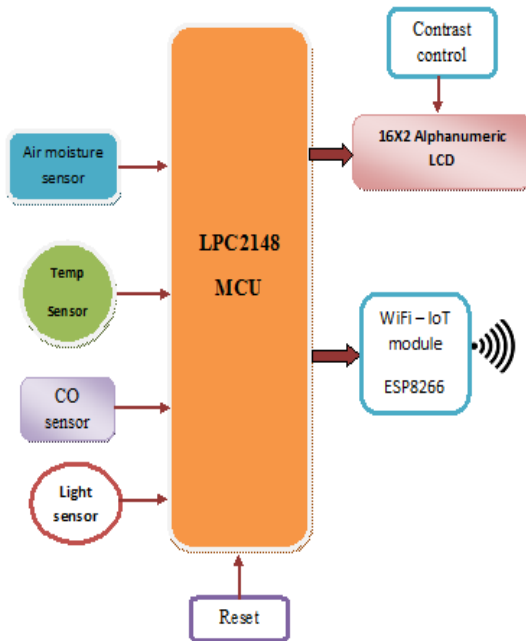


Draw back

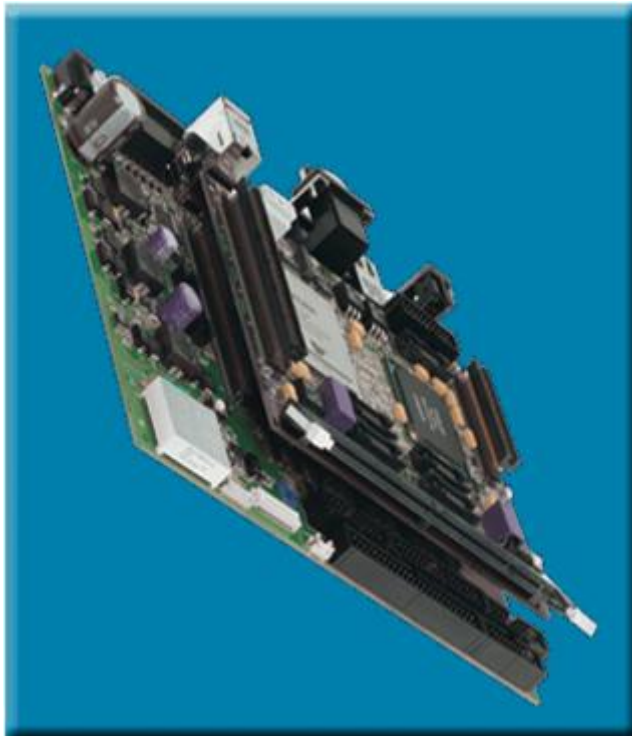
Here and CO sensor and Air Moisture sensor are not there to identify human and dangerous gas. There is no remote alert using IOT

Proposed system

This project uses sensors such as Humidity, Smoke Sensor, Temperature sensor (LM35). Whenever hazardous gas is detected then buzzer alert is given. The temperature sensor LM35 senses the temperature and converts it into an electrical (analog) signal. The analog signal is converted into digital format by the analog-to-digital converter (ADC). Then the fan will be ON. The status of every sensor will give updares through the IOT.. Light gets on when ever LDR senses night mode. Motor will be on in case of dry condition detected by moisture sensor.



ARM7TDMI Processor Core



- Current low-end ARM core for applications like digital mobile phones
TDMI
T: Thumb, 16-bit compressed instruction set

D: on-chip Debug support, enabling the processor to halt in response to a debug request

M: enhanced Multiplier, yield a full 64-bit result, high performance

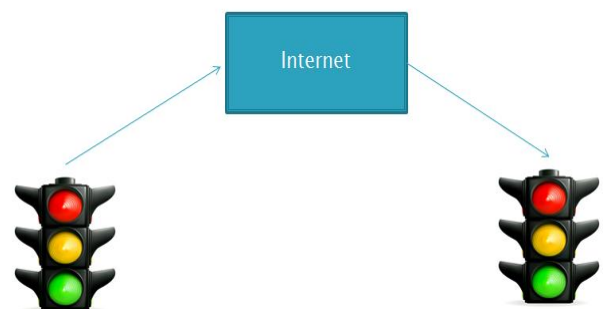
- I: Embedded ICE hardware
- Von Neumann architecture

INTERNET OF THINGS

Internet is helping people to communicate each other using different applications



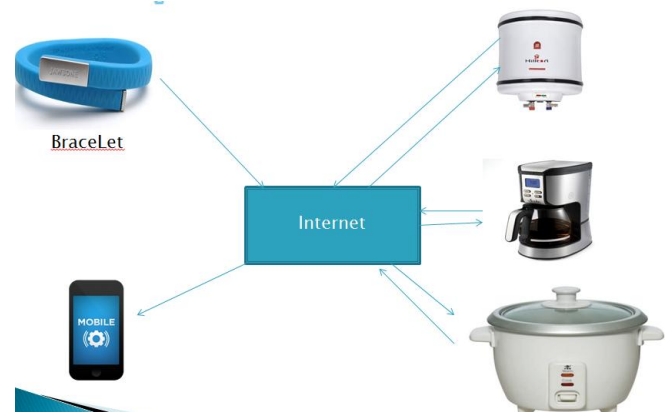
Traffic Light Wants to communicate to other traffic light using internet?



Internet of things helps the things to communicate each other using IoT module

ESP8266EX

The Internet of Things (IoT) is the network of physical objects or "things" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data.

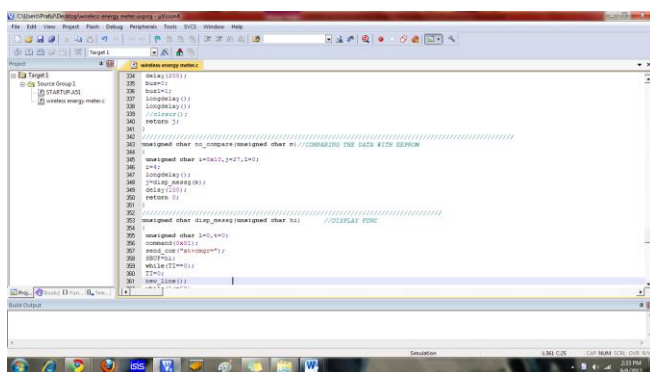
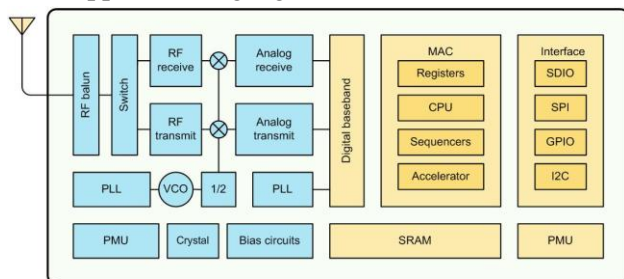


Wi-Fi module

ESP8266EX offers a complete and self-contained WiFi networking solution; it can be used to host the application or to offload WiFi networking functions from another application processor. When ESP8266EX hosts the application, it boots up directly from an external flash. It has integrated cache to improve the performance of the system in such applications. Alternately, serving as a WiFi adapter, wireless internet access can be added to any micro controller-based design with simple connectivity (SPI/SDIO or I2C/UART interface).

Software tools

Keil compiler is a software used where the machine language code is written and compiled. After compilation, the machine source code is converted into hex code which is to be dumped into the microcontroller for further processing. Keil compiler also supports C language code.



Flash Magic

Flash Magic is a tool which is used to program hex code in EEPROM of micro-controller. It is a freeware tool. It only supports the micro-controller of Philips and NXP. It can burn a hex code into that controller

which supports ISP (in system programming) feature. Flash magic supports several chips like **ARM Cortex M0, M3, M4, ARM7 and 8051**.

LCD

LCD stands for Liquid Crystal Display. LCD is finding wide spread use replacing LEDs (seven segment LEDs or other multi segment LEDs) because of the following reasons:

Command	RS	RW	D7	D6	D5	D4	D3	D2	D1	D0	Execution Time
Clear display	0	0	0	0	0	0	0	0	0	1	1.64mS
Cursor home	0	0	0	0	0	0	0	0	1	x	1.64mS
Entry mode set	0	0	0	0	0	0	0	1	I/D	S	40uS
Display on/off control	0	0	0	0	0	0	1	D	U	B	40uS
Cursor/Display Shift	0	0	0	0	0	1	D/C	R/L	x	x	40uS
Function set	0	0	0	0	1	DL	N	F	x	x	40uS
Set CGRAM address	0	0	0	1	CGRAM address						40uS
Set DDRAM address	0	0	1	DDRAM address							40uS
Read "BUSY" flag (BF)	0	1	BF	DDRAM address							-
Write to CGRAM or DDRAM	1	0	D7	D6	D5	D4	D3	D2	D1	D0	40uS
Read from CGRAM or DDRAM	1	1	D7	D6	D5	D4	D3	D2	D1	D0	40uS

These components are "specialized" for being used with the microcontrollers, which means that they cannot be activated by standard IC circuits. They are used for writing different messages on a miniature LCD.



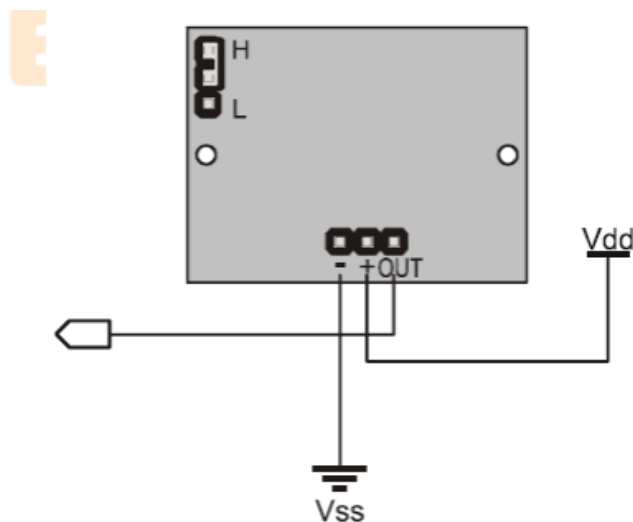
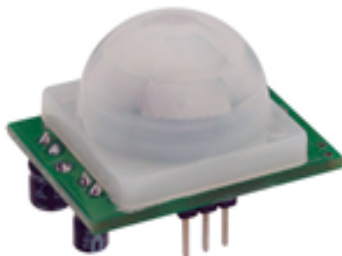
TEMPERATURE SENSOR

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.



PIR SENSOR

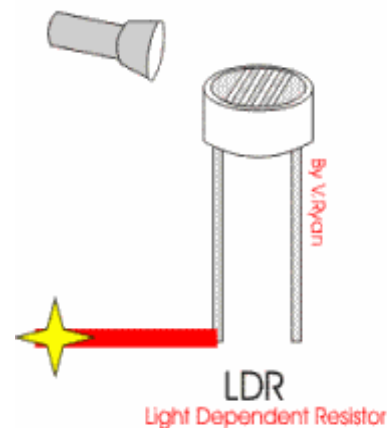
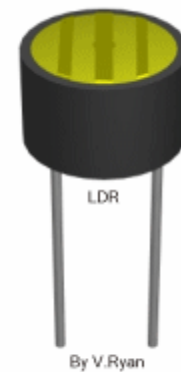
A PIR sensor, or Passive Infrared sensor, is a type of detector that is capable of detecting infrared light emitting from objects within its field of view. PIR sensors differ from other infrared sensors because they are only able to receive infrared waves rather than being able to emit and receive them. Because all objects emit infrared (electromagnetic waves that travel with heat), PIR sensors are able to detect objects that are in front of them. In fact, PIR sensors can see many things that humans cannot. PIR sensors are used for a number of applications, such as night vision, motion detection, and laser range finding.



LIGHT DEPENDENT RESISTOR

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. The animation opposite shows that when the torch is turned on, the resistance of the LDR falls, allowing current to pass through it.

LIGHT DEPENDENT RESISTOR



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Advantages:

- Reliability
- Ease of Operation
- Useful to detect harmful gases

Applications:

- Can be used in Mines to detect presence of dreadful gases.
- In public places like shopping malls, etc, this project can be applied where public safety is a major task.
- In Marine Applications

Conclusion

The greenhouse vegetable production needs less labor, less capital, has faster returns than normal vegetable production. We have arranged few sensors to maintain environment automatically. The status of every sensor will given through the SMS. Here PIR, LDR sensors are also used and their respective relay are also activated accordingly.

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