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Multiple Sensors Based Earthquake Detection with IOT on Arduino

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***Abstract* :** *The purpose of this project is developing an intelligent sensing and alerting system that can be used to alert the people in CWC (Central ware housing corporation) by detecting temperature, moisture, fire and earthquake using different sensors. We are going to place these sensors in ware house. The control unit grabs the values from sensors and sends these values through Wi-Fi module to web ink.*

The Internet of things (IOT) is the network of physical devices, vehicles, home appliances and other items embedded with electronics, software, sensors, actuators, and network connectivity which enable these objects to connect and exchange data. IOT allows objects to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention.

This project makes use of micro controller. It acts as heart of the project. This controller can efficiently communicate with the output and input modules which are being used. Temperature sensor, fire sensor, moisture sensor, MEMS sensor, Wi-Fi modules are interfaced to this micro controller. Temperature sensor senses the temperature in the house and moisture sensor senses the moisture content in the house. Additionally, it can monitor the fire and earthquake by using fire sensor, MEMS sensor. If the value exceeds the predefined value alerts given through webpage. This intelligent process is done by using Embedded C language.

Key words:- CWC, MEMS sensor, IOT, CWC, Wi-Fi Module.

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I. INTRODUCTION

The purpose of this project is develop an intelligent sensing and alerting system that can be used to alert the people in CWC (Central ware housing corporation) by detecting temperature, moisture, fire and earthquake using different sensors. We are going to place these sensors in ware house. The control unit grabs the values from sensors and sends these values through Wi-Fi module to webpage.

Central ware housing corporation is into scientific storage and handling more than 400 commodities include agriculture produce, industrial raw materials, finished goods and variety of hygroscopic and perishable goods items. One of the main problems in CWC is Storage loss of food grains and perishable goods due to atmospheric moisture beyond threshold results and hence damages the food grains/ perishables. These are being controlled through quality control practices including recording of moisture and other parameters, physical condition of warehouse.

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This project makes use of micro controller. It acts as heart of the project. This controller can efficiently communicate with the output and input modules which are being used. Temperature sensor, fire sensor, moisture sensor, MEMS sensor, Wi-Fi modules are interfaced to this micro controller. Temperature sensor senses the temperature in the house and moisture sensor senses the moisture content in the house. Additionally, it can monitor the fire and earthquake by using fire sensor, MEMS sensor. If the value exceeds the predefined value alerts given through webpage. This intelligent process is done by using Embedded C language.

II. HARDWARE DESCRIPTION

Microcontroller

The device is manufactured using Atmel's high-density non-volatile memory technology. The On-chip ISP Flash allows the program memory to be reprogrammed In-System through an SPI serial interface, by a conventional non-volatile memory programmer, or by an On-chip Boot program running on the AVR core. The Boot program can use any interface to download the application program in the Application Flash memory. Software in the Boot Flash section will continue to run while the Application Flash section is updated, providing true Read-While-Write operation. By combining an 8-bit RISC CPU with In-System Self-Programmable Flash on a monolithic chip, the Atmel ATmega48PA/88PA/168PA/328P is a powerful microcontroller that provides a highly flexible and cost-effective solution to many embedded control applications.

Power supply

Power supply is a supply of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others. A power supply may include a power distribution system as well as primary or secondary sources of energy.

MEMS:

The ADXL335 is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. The product measures acceleration with a minimum full-scale range of ±3 g. It can measure the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration. The user selects the bandwidth of the accelerometer using the CX, CY, and CZ capacitors at the XOUT, YOUT, and ZOUT pins. Bandwidths can be selected to suit the application, with a range of 0.5 Hz to 1600 Hz for the X and Y axes, and a range of 0.5 Hz to 550 Hz for the Z axis.

LM 35: (TEMPERATURE /FIRE SENSOR)

The LM35 sensor series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. To detect the heat produced during fire occurrence we use temperature sensor. The Temperature Sensor LM35 sensor series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature.

Soil Moisture Sensor

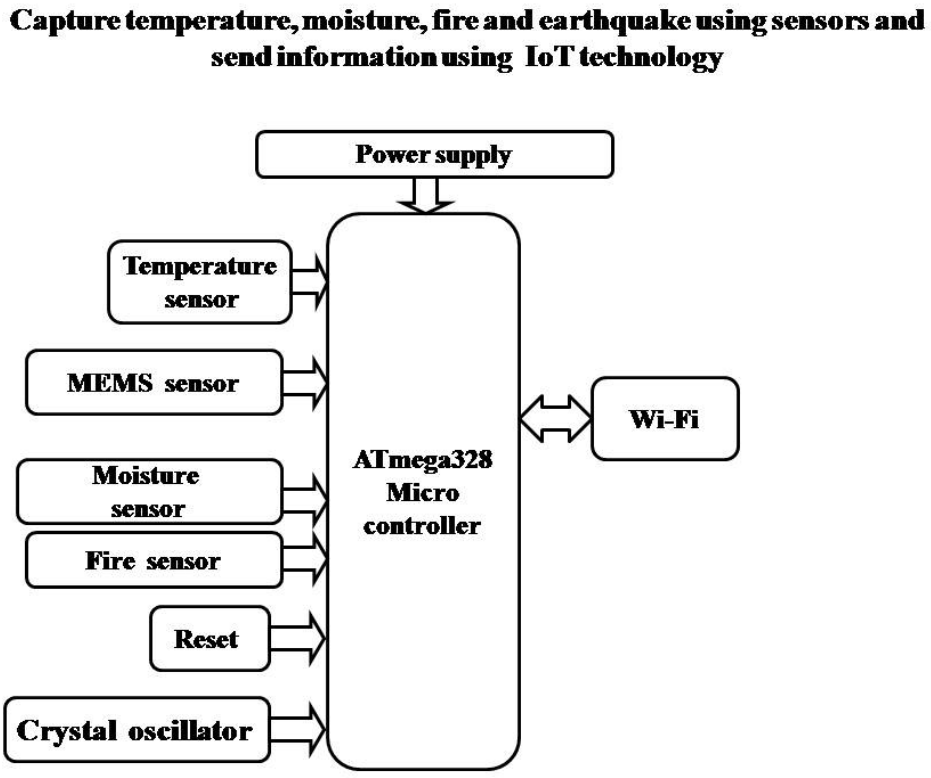
We are the leading suppliers for Soil Moisture Sensor. Soil Moisture Sensor is a simple breakout for measuring the moisture in soil and similar materials. The soil moisture sensor is pretty straight forward to use. The two large exposed pads function as probes for the sensor, together acting as a variable resistor. The more water that is in the soil means the better the conductivity between the pads will be and will result in a lower resistance, and a higher SIG out.

ESP 8266 Wi-Fi module

The ESP8266 Wi-Fi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much Wi-Fi-ability as a Wi-Fi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost-effective board with a huge, and ever growing, community.

This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime. Its high degree of on-chip integration allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area. The ESP8266 supports APSD for VoIP applications and Bluetooth co-existence interfaces; it contains a self-calibrated RF allowing it to work under all operating conditions, and requires no external RF parts.

III. BLOCK DIAGRAM

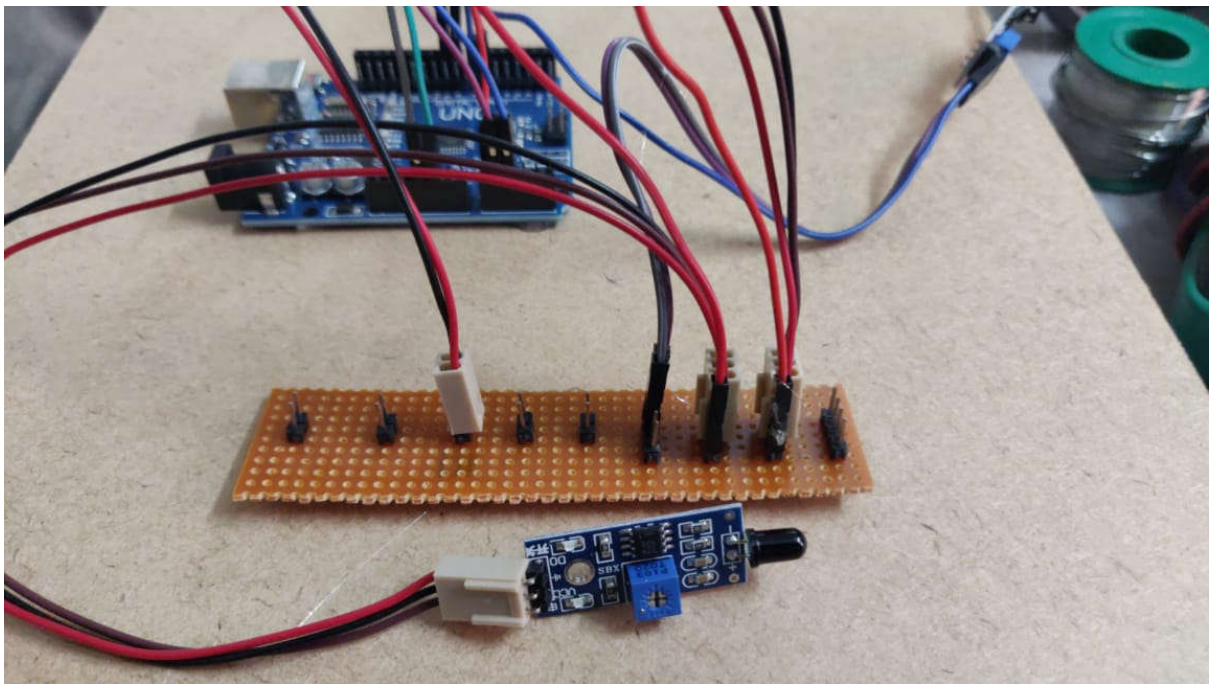


WORKING:-

Microcontroller board wired to ADXL335 accelerometer module (connected across CON2) with its ADC inputs, namely, X-axis to A0, Y-axis to A1 and Z-axis to A2. Two pushbuttons through supply of 5V are wired to Arduino Uno interrupt pins 2 and 3 that are pulled down to ground via resistors R2 and R1. These buttons are used for incrementing and decrementing the threshold of vibration detection. A 16×2 LCD (LCD1) is wired in 4-wire mode with Arduino pins contrast control and backlight enabled.

IV. RESULTS

The paper "**Multiple Sensors Based Earthquake Detection with IOT on Arduino**" was designed such that to develop an intelligent sensing and alerting system that can be used to alert the people when tsunami or earth quake comes. The control unit was used to grab the signal and convey the message to the nearest control station through Wi-Fi technology.



V. CONCLUSION

Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology, the project has been successfully implemented. Thus, the project has been successfully designed and tested.

VI. FUTURE SCOPE

Our paper "**Multiple Sensors Based Earthquake Detection with IOT on Arduino**" is mainly intended to develop an intelligent sensing and alerting system that can be used to alert the people when tsunami or earth quake comes. We are going to place a sensor in different parts of the ocean. If the earth got disturbed in a larger magnitude means it sense the level and the signal are converted into electrical signal by a transducer. The control unit grabs the signal and conveys the message to the nearest control station through Wi-Fi technology.

So in our Prototype we are going to measure the Earth Quake magnitude by a vibrating (MEMS Accelerometer) sensor. To perform the intelligent task, Microcontroller is loaded with a program written using embedded 'C' language.

This project can be extended using high efficiency GPS receiver and a GPRS module. The GPRS module gives the intimation of the tsunami detection area directly to the predefined web link. By interfacing MMC/SD card we can log the range of area effected by tsunami or earth quake and also about the time using GPS on Google earth in the computer.

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