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Rfid Tag for Civil Infrastructure Health Monitoring By Using Iot Module

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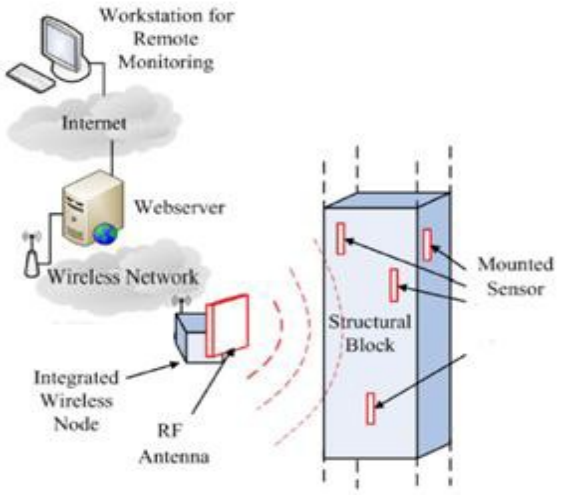
ABSTRACT:
Infrastructure health monitoring is an essential discipline in civil engineering as it provides vital information which can be used to evaluate the state of civil structures, such as bridges, buildings, and tunnels. For this purpose, measurements of dynamic responses of structures are highly important. Vibration-based infrastructure health monitoring is extensively used in this process to acquire the necessary vital information (e.g., natural frequencies and mode shapes) by measuring dynamic acceleration of structures. Here we are implementing an earth quake monitoring system. An earthquake (also known as a tremor or temblor) is the result of a sudden release of energy in the Earth's crust that creates seismic waves. Earthquakes are recorded with a seismometer, also known as a seismograph. This project presents Microcontroller based An Earthquake Detection using Sensing Element to reduce its destructive losses. Few sensors are mounted on building walls to identify the earth quake and its severity. Tilt sensors and accelerometer are used to detect and these are fed as input to the controller and RF communication is used to intimate about this at the local monitoring station.A buzzer alert will be given if the vibrations are not severe, which is detected using accelerometer. The siren sounds high in case of much severe vibrations which are found using tilt sensors. At this monitoring station an IoT module is connected to make the informationAbout this disaster using internet at remote location also. This project uses regulated 3.3V, 500mA power supply. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/12V step down transformer



INTRODUCTION:

An embedded system is a combination of software and hardware to perform a dedicated task. Some of the main devices used in embedded products are Microprocessors and Microcontrollers. Microprocessors are commonly referred to as general purpose processors as they simply accept the inputs, process it and give the output. In contrast, a microcontroller not only accepts the data as inputs but also manipulates it, interfaces the data with various devices and controls the data for measuring dynamic acceleration of infrastructure remotely using semi passive radio-frequency identification (RFID) tag. This measurement is critical to the vibration-based method for infrastructure health monitoring. Design considerations of accelerometer integrated ultrahigh-frequency RFID tag and dynamic acceleration measurements through an RFID wireless link are discussed. Measurement results of the system for a structural specimen have shown that it is capable of acquiring data which provides the information of natural frequency of the structural specimen. Moreover, the system can distinctively identify the state changes of the structural specimen by natural frequency shifts. These results are benchmarked against the results obtained with two commercial systems. It is shown that the standard deviation of the measurement of the natural frequency is ±0.01 Hz which is very close to the standard deviation of the commercial measurement systems

LITERATURE SURVEY:

Based on the vibrations caused by sensor the earth quake is known and siren/buzzer alert will be given.

Experimental Activities: Internet of Things

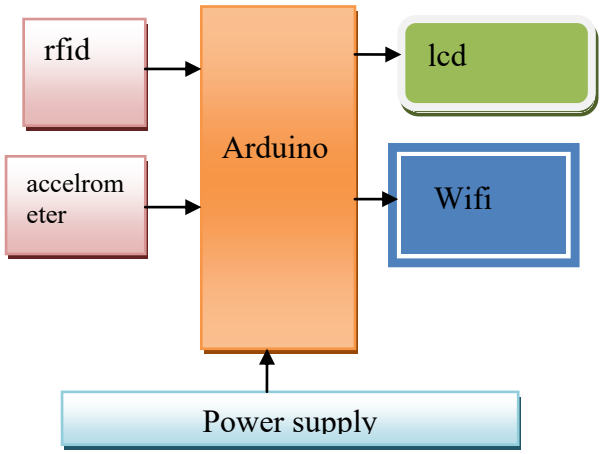
Internet is helping people to communicate each other using different applications.

METHODOLOGY:

Here we are implementing an earth quake monitoring system. An earthquake (also known as a tremor or temblor) is the result of a sudden release of energy in the Earth's crust that creates seismic waves. Earthquakes are recorded with a seismometer, also known as a seismograph. This project presents Microcontroller based An Earthquake Detection using Sensing Element to reduce its destructive losses. Few

sensors are mounted on building walls to identify the earth quake and its severity. Tilt sensors and accelerometer are used to detect and these are fed as input to the controller and RF communication is used to intimate about this at the local monitoring station. A buzzer alert will be given if the vibrations are not severe, which is detected using accelerometer. The siren sounds high in case of much severe vibrations which are found using tilt sensors. At this monitoring station an IoT module is connected to make the Information about this disaster using internet at remote location also.

BLOCK DIAGRAM

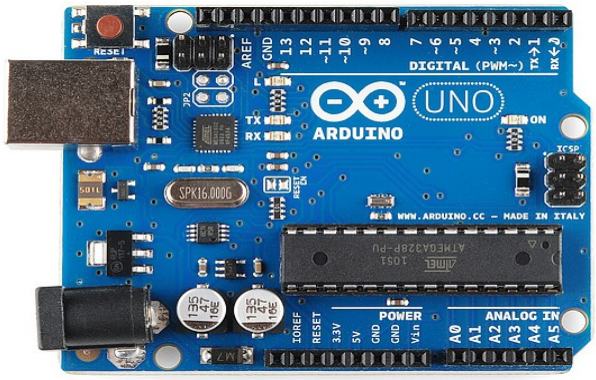


ARDUINO

Introduction

Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware (called a programmer) in order to load new code onto the board – you can simply use a USB cable. Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package.



This is an Arduino Uno

The Uno is one of the more popular boards in the Arduino family and a great choice for beginners. We'll talk about what's on it and what it can do later in the tutorial.

This is a screenshot of the Arduino IDE.

Believe it or not, those 10 lines of code are all you need to blink the on-board LED on your Arduino.

ACCELEROMETER

Breakout board for the 3 axis ADXL335 from Analog Devices. This is the latest in a long, proven line of analog sensors - the holy grail of accelerometers. The ADXL335 is a triple axis MEMS accelerometer with extremely low noise and power consumption - only 320uA! The sensor has a full sensing range of +/-3g.

There is no on-board regulation, provided power should be between 1.8 and 3.6VDC.

Board comes fully assembled and tested with external components installed. The included 0.1uF capacitors set the bandwidth of each axis to 50Hz.

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RFID

An RFID reader's function is to interrogate RFID tags. The means of interrogation is wireless and because the distance is relatively short; line of sight between the reader and tags is not necessary. A reader contains an RF module, which acts as both a transmitter and receiver of radio frequency signals. The transmitter consists of an oscillator to create the carrier frequency; a modulator to impinge data commands upon this carrier signal and an amplifier to boost the signal enough to awaken the tag. The receiver has a demodulator to extract the returned data and also contains an amplifier to strengthen the signal for processing. A microprocessor forms the control unit, which employs an operating system and memory to filter and store the data. The data is now ready to be sent to the network.

WI-FI MODULE

ESP8266EX offers a complete and self-contained Wi-Fi networking solution; it can be used to host the application or to offload Wi-Fi networking functions from another application processor.
When ESP8266EX hosts the application, it boots up directly from an external flash. In has integrated cache to

improve the performance of the system in such applications. Alternately, serving as a Wi-Fi adapter, wireless internet access can be added to any micro controller-based design with simple connectivity (SPI/SDIO or I2C/UART interface). ESP8266EX is among the most integrated Wi-Fi chip in the industry; it integrates the antenna switches, RF balun, power amplifier, low noise receive amplifier, filters, power management modules, it requires minimal external circuitry, and the entire solution, including front-end module, is designed to occupy minimal PCB area. ESP8266EX also integrates an enhanced version of Tensilica's L106 Diamond series 32-bit processor, with on-chip SRAM, besides the Wi-Fi functionalities. ESP8266EX is often integrated with external sensors and other application specific devices through its GPIOs; sample codes for such applications are provided in the software development kit (SDK).

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

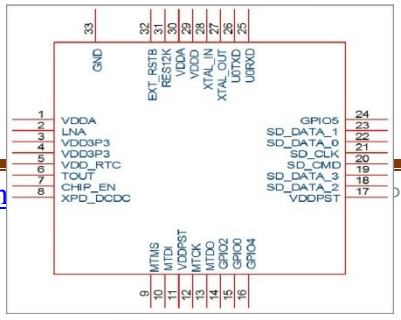
DIFFERENT MODULES:

- ESP8266 (ESPRESSIF)
- ESP8089
- ESP6203

Features:

- 802.11 b/g/n
- Integrated low power 32-bit MCU
- Integrated 10-bit ADC
- Integrated TCP/IP protocol stack
- Integrated TR switch, balun, LNA, power amplifier and matching network
- Integrated PLL, regulators, and power
- management units
- Supports antenna diversity
- WiFi 2.4 GHz, support WPA/WPA2
- Support STA/AP/STA+AP operation modes
- Support Smart Link Function for both Android and iOS devices
- SDIO 2.0, (H) SPI, UART, I2C, I2S, IR Remote Control, PWM, GPIO
- STBC, 1x1 MIMO, 2x1 MIMO
- A-MPDU & A-MSDU aggregation & 0.4s guard interval
- Deep sleep power <10uA, Power down leakage current < 5uA
- Wake up and transmit packets in < 2ms
- Standby power consumption of < 1.0mW (DTIM3)
- +20 dBm output power in 802.11b mode
- Operating temperature range -40C ~ 125C
- FCC, CE, TELEC, WiFi Alliance, and SRRC certified

Pin Definitions



AT commands
are used to control MODEMs. AT is the abbreviation for Attention. These commands come from Hayes commands that were used by the Hayes smart modems

Important AT commands:

- **AT+CWLAP** List all the access points
  AT+CWJAP?+CWJAP="ssid","password "Join Access Point
- **AT+CIFSR** Get IP Address
- **AT+CWMODE?+CWMODE=3** Select therespective mode Address

Major Fields of ESP8266EX applications to

Internet-of-Things include:

- Home Appliances
- Home Automation
- Smart Plug and lights
- Mesh Network
- Industrial Wireless Control
- Baby Monitors
- IP Cameras
- Sensor Networks
- Wearable Electronics

Advantages:

1. Ease of operation
2. Low maintenance cost
3. Fit and forget system
4. No wastage of time
5. Durability
6. Accuracy
7. Easy to implement

Application:

- All buildings
- Malls

CONCLUSION:

This project has been designed and implemented with LPC2148 MCU in embedded system domain. Experimental work has been carried out carefully. The result shows that higher efficiency is indeed achieved using the embedded system according to requirement of the user. Few sensors are mounted on building walls to identify the earth quake and its severity. Tilt sensors and accelerometer are used to detect and these are fed as input to the controller and RF communication is used to intimate about this at the local monitoring station.

Result and Scopes for Advancements:

A buzzer alert will be given if the vibrations are not severe, which is detected using accelerometer. The siren sounds high in case of much severe vibrations which are found using tilt sensors. At this monitoring station an IoT module is connected to make the information about this disaster using internet at remote location also. in this paper, we have studied the most imperative parts of the IoT with accentuation on what is being done and what are the issues that require further research. Without a doubt, current advances make the IoT idea possible however don't fit well with the versatility and effectiveness prerequisites they will confront.We believe that, given the interestshown by industries in the IoT applications, in the next years addressing such issues will be a powerful driving factor for networking and communication research in both industrial and academic laboratories.In this review article, we tried to provide an overview of the key issues identified with the improvement of IoT advances and administrations. Various examination challenges has been distinguished, which are relied upon to end up significant exploration patterns in the following years. The most pertinent application fields have been discussed, and various cases have been distinguished. We do hope that this survey will be useful for researchers and practitioners in the field of IoT, helping them to understand the huge potential of IoT and also highlighted which are the major issues to be tackled, devising innovative technical solutions able to turn IoT from a research vision into reality.

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