Structural Event Monitoring Using IOT Module Based Wireless Sensor Network

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Abstract- *We mainly concentrate on safety measure for the constructing and constructed environments.Safety plays an major role in today's world and it is necessary that good safety system be implemented in places of structural event monitoring of buildings.The MEMS sensor plays a vital role for monitoring the axis of the building.If the temperature and fire reaches above threshold value and the structural damage is per-detected and it automatically alert the environment.and also will take necessary step to avoid the disaster.The sensor node detects the maximum threshold level,at the same it calculate where the damage is occurring and remaining time that the building can withstand further damage.Then it send the signal into digital form and transfer the values through IOT module .*

Keywords- IOT module,SHM,WSN,MEMS,Fire sensor

I. INTRODUCTION

For the effective approaches the Sensor network(WSN) has a powerful low cost platform for connecting large network of sensors.The term „Internet of Things" consists of two words, namely *Internet* and *Things*. *Internet* refers to the infrastructure with global network scalable, configurable capabilities based on interoperable and standard communication protocols.This SHM Structural Health Monitoring has monitored based on technology.Physical objects can be applicable to different application domains, such as e-health, warehouse management, etc. Each application domain may have different types of physical devices. Each physical device can have its own specifications, which is required to use in order to interact with it. To achieve the future Internet goal, a layered vision is required that can facilitate data access. Physically, embedded systems range from portable devices such as digital watches and MP3 players, to large stationary installations like traffic lights, factory controllers, or the systems controlling nuclear power plants. Complexity varies from low, with a single microcontroller chip, to very high with multiple units, peripherals and networks mounted inside a large chassis or enclosure.

II. SENSOR TYPES

MEMS

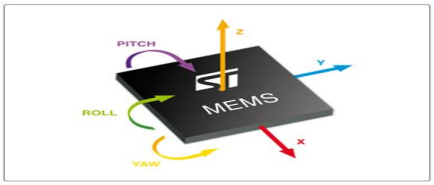
Micro-electromechanical systems (MEMS) is a technology that combines tiny mechanical devices with computer such as sensors, valves, gears, mirrors, and actuators embedded in semiconductor chips. MEMS or what he calls analogue computing will be he foundational technology of the next decade.MEMS is also sometimes called smart matter.

MEMS are already used as accelerometers in automobile air-bags. They've replaced a less reliable device at lower cost and show promise of being able to inflate a bag not only on the basis of sensed deceleration but also on the basis of the size of the person they are protecting. Basically, a MEMS device contains micro-circuitry on a tiny silicon chip into which some mechanical device such as a mirror or a sensor has been manufactured. Potentially, such chips can be built in large quantities at low cost, making them cost-effective for many uses

One of the newer sensors to come about in recent times is the accelerometer. Granted the idea and implementation of a sensor that measures acceleration has been around for a long time the newer technologies available to industry have made them super accurate. The MEMS Accelerometer usually comes in the smallest surface mount package and can detect acceleration in up to 3 axis. This tutorial will cover capturing data for only one axis.

Global position system sensors that can be included with courier parcels for constant tracking and that can also sense parcel treatment en route

Sensors built into the fabric of an airplane wing so that it can sense and react to air flow by changing the wing surface resistance; effectively creating a myriad of tiny wing flaps



III. FIRE/FLAME

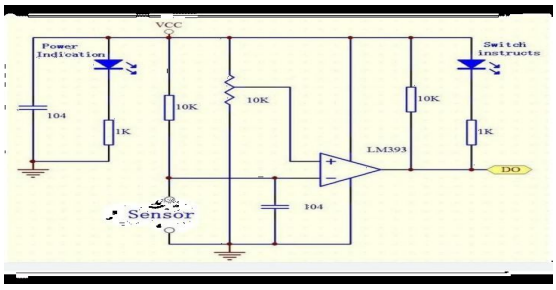
SENSOR MODULE

A key aspect of fire protection is to identify a developing fire emergency in a timely manner, and to alert the building's occupants and fire emergency organizations. This is the role of fire detection and alarm systems. Depending on the anticipated fire scenario, building and use type, number and type of occupants, and criticality of contents and mission, these systems can provide several main functions. First they provide a means to identify a developing fire through either manual or automatic methods and second, they alert building occupants to a fire condition and the need to evacuate. Another common function is the transmission of an alarm notification signal to the fire department or other emergency response organization. They may also shut down electrical, air handling equipment or special process operations, and they may be used to initiate automatic suppression systems.

Flame sensor is the most sensitive to coordinate is why its reaction is generally used as flame alarm purposes. This module can detect flame or wavelength in 760 nm to 1100 nm range of light source. Small plate output interface can and single-chip can be directly connected to the microcomputer IO port. The sensor and flame should keep a certain distance to avoid high temperature damage to the sensor.

The shortest test distance is 80 cm, if the flame is bigger, test it with farther distance. The detection angle is 60 degrees so the flame spectrum is especially sensitive. The detection angle is 60 degrees so the flame spectrum is especially sensitive.

IV. SCHEMATIC DIAGRAM:



V. TEMPERATURE SENSOR

Temperature is the most often-measured environmental quantity. This might be expected since most physical, electronic, chemical, mechanical, and biological systems are affected by temperature. Certain chemical reactions, biological processes, and even electronic circuits perform best within limited temperature ranges. Temperature is one of the most commonly measured variables and it is therefore not surprising that there are many ways of sensing it. Temperature sensing can be done either through direct contact with the heating source, or remotely, without direct contact with the source using radiated energy instead. There are a wide variety of temperature sensors on the market today, including Thermocouples, Resistance Temperature Detectors (RTDs), Thermistors, Infrared, and Semiconductor Sensors.

A silicon temperature sensor is an integrated circuit, and can therefore include extensive signal processing circuitry within the same package as the sensor. There is no need to add compensation circuits for temperature sensor Ics.

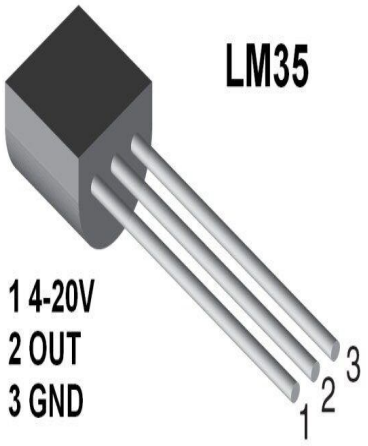
VI. THERMOCOUPLE:

It is a type of temperature sensor, which is made by joining two dissimilar metals at one end. The joined end is referred to as the HOT JUNCTION. The other end of these dissimilar metals is referred to as the COLD END or COLD JUNCTION. The cold junction is actually formed at the last point of thermocouple material. If there is a difference in temperature between the hot junction and cold junction, a small voltage is created. This voltage is referred to as an EMF (electro-motive force) and can be measured and in turn used to indicate temperature.

Lower threshold temperature can also be programmed and the host can be notified when temperature has dropped below this threshold. Thus, digital output sensor can be used for reliable temperature microprocessor-based systems.

This type of sensor consists of a material that performs the operation according to temperature to vary the resistance. This change of resistance is sensed by circuit and it

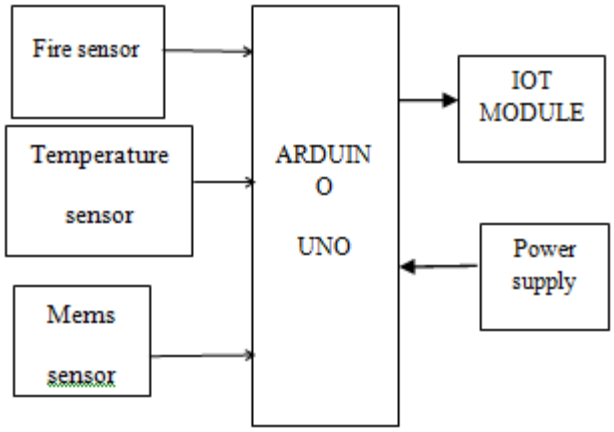
calculates temperature. When the voltage increases



temperature also rises. We can see this operation by using a diode.

Temperature sensors directly connected to microprocessor input and thus capable of direct and reliable communication with microprocessors. The sensor unit can communicate effectively with low-cost processors without the need of A/D converters.

VII. ARCHITECTURE DIAGRAM



VIII. ARDUINO UNO

Arduino is a tool for making computers that can sense and control more of the physical world than your desktop computer. It's an open-source physical computing platform based on a simple microcontroller board, and a development environment for writing software for the board.

Arduino can be used to develop interactive objects, taking inputs from a variety of switches or sensors, and controlling a variety of lights, motors, and other physical outputs. Arduino projects can be stand-alone, or they can be communicate with software running on your computer. The boards can be assembled by hand or purchased preassembled; the open-source IDE can be downloaded for free.

The Arduino programming language is an implementation of Wiring, a similar physical computing platform, which is based on the Processing multimedia programming environment.

An important feature of the Arduino is that you can create a control program on the host PC, download it to the Arduino and it will run automatically. Remove the USB cable connection to the PC, and the program will still run from the top each time you push the reset button. Remove the battery and put the Arduino board in a closet for six months. When you reconnect the battery, the last program you stored will run

IX. IOT MODULE

IoT-based system is in charge of providing knowledge from an environment to an non-expert user. IoT-based system can be used in different environments, so it needs to be able to address many heterogeneous devices. Thus, a major concern within developing an IoT-based system is how to handle the interaction with the heterogeneous devices for non-expert users. This concern can be addressed by a middleware layer between devices and non-expert users. This layer is responsible to hide the diversity of devices from the user perspective, and provides access transparency to the devices for the end users.

The idea of creating abstractions of devices been addressed in the literature. The middleware we found in the literature can provide satisfaction by facilitating the interaction with devices, but they do not support low-level device configuration .

Internet of Things (IoT) has increasingly gained attention in industry to interact with different types of devices. IoT can have influence on industry and society by integrating physical devices into information networks [8]. IoT impacts can be on different perspectives, namely for private and business users. From the perspective of a private user, IoT has effect on both working and personal fields, such as smart homes and offices, e-health and assisted living. From the aspect of a business user the impacts would be in fields such as automation and industrial manufacturing, logistics, business process management, intelligent transportation of people and goods.The module will collect all the information regarding the vibration tilts wil be measured and it will gives alert to the

system if it reaches the maximum threshold level.And the module will have all the data will be stored in the

X. CONCLUSION

This paper presents a review of recent research and development activites in SHM and discussed several technique that evaluates structural damage and issue related to the WSN.Traditionally, wired system is used for collection sensor data periodically. the main issue in the use of WSN in SHM are the scalability , accurarcy, reliablity and the data precision.

REFERENCES

[1] S. Wijetunge, U. Gunawardana, and R. Liyanapathirana, "Wireless Sensor Networks for Structural Health Monitoring: Considerations for communication protocol design," in Telecommunications (ICT), 2010 IEEE 17th International Conference on, 2010, pp. 694-699.

[2] X. Hu, B. Wang, and H. Ji, "A wireless sensor network-based structural health monitoring system for highway bridges," Computer-Aided Civil and Infrastructure Engineering, vol. 28, no. 3, pp. 193-209, 2013.

[3] Z. Dai, S. Wang, and Z. Yan, "BSHM-WSN: A wireless sensor network for bridge structure health monitoring," in Modelling, Identification & Control (ICMIC), 2012 Proceedings of International Conference on,2012, pp. 708-712.