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IoT Based Building Quality Monitoring Against Cracks, Vibration and Falling Using Sensors with Web App Using Raspberry Pi

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***Abstract*—In urban areas the monitoring structural health of a building system plays an important role. There are incidents of cracks and vibration which cause the building fall and many accidents will accurse. In this project it is proposed to develop an embedded based monitoring a building against cracks, vibration and falling using sensors with Web app using Raspberry Pi. In order to implement the proposed system, each building owner and security person end should be provided with a web based mobile application consisting of so many options for the user to record the results from the vibration sensor and flex sensor and to transmit the same to a remote monitoring station using IOT. The whole system is monitor by the central processing unit Raspberry Pi to inform the responsible person whenever the crack or vibration occurs. It is proposed to employ an Internet of things for wireless communication so that the information can be passed to many responsible officers cell phone for immediate action.**

***Index Terms*— Construction Monitor Detection flex**

I. Introduction

In recent years, much attention has been given to structural health monitoring technology to diagnose the condition of structures using a sensor attached to them, and the number of research projects on the health monitoring of architectural structures is on the rise. If we have to reduce life cycle costs of a building from construction to maintenance, it is very effective to monitor structural health of a building. Most buildings built during 1970 construction rush in Japan seem to rapidly deteriorate, and it is necessary to establish structural health estimation of these buildings. In 2002, performance certification mark system of existing housings is started in Japan, and structural performance will be displayed by visual inspection and structural design data, etc. However, in this performance evaluation, measurement such as acceleration is not carried out because of technical difficulties. The decisions from the inspection by experts according to manuals tend to be judged to safe side. It is important to carry out measurement to evaluate damages objectively and quantitatively. Damage detection and health monitoring are classified into two methods. The first method is based on vibration measurement, and the other one is based on phenomena such as cracking or heat. Each method has its strong points and its weak points. A damage

Identification system based on vibration measurements is effective for damage detection of whole structures or the story of a structure but it is not effective for damage detection of a specific portion of a building such as its structural members. On The other hand, damage detection based on phenomena such as cracking or heat is effective for damage detection of a specific portion of a building such as its structural members. By combining these two methods, it becomes possible to monitor structural health precisely. For cracks detection flex sensor and vibration sensor for vibration detection are used and the whole system is monitor by the central processing unit Raspberry Pi to inform the responsible person whenever the a crack or vibration occur. It is proposed to employ a Internet of things for wireless communication so that the information can be passed to many responsible officers cell phone for immediate action.

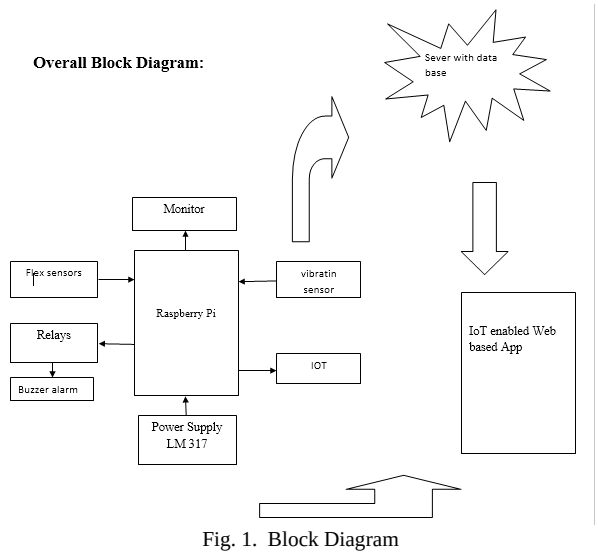

Fig. 1. Block Diagram

II. Working Principle

In this project, it is proposed that the structural health monitoring of a building against cracks and vibration. By implementing this proposed system in a real time; surely it will be able to control the damage of buildings in the domestic areas. In this work, it is proposed to develop an embedded based

remote monitoring and prevention system by continuously recording the results of sensors. In order to implement the proposed system, each security officer end should be provided with a web based mobile application consisting of so many options for the user to record the result using a flex sensor and vibration sensor and to transmit the same to a remote monitoring station using IOT. In this project first we mount the vibration sensor and flex sensor in the building walls, if any vibration occurs, immediately the information will update on web page and alarm will on, simultaneously the flex sensor also give the result if it reach the threshold value than information will update on web app and alarm will on.

A. Requirements for Hardware and Software

1) Hardware

1. Raspberry Pi
2. Relay
3. Solenoid Valve
4. Monitor
5. Ultrasonic sensors
6. IR Sensor
7. Power Supply

2) Software

1. Python
2. Linux
3. IoT

3) Technical specifications

1. Operating voltage of embedded circuitry is 3.3vdc
2. Current consumption of device in active mode 200mill amp
3. Operating frequency of device is 10MHZ to 60MHZ

4) Advantages

1. Economical
2. Portable
3. Low maintenance cost
4. Helpful to know about the earth quake
5. Helpful for the society to prevent accidents

5) Applications

1. It can be used in large buildings.
2. The concept can be used in building management system.
3. The concept can be used in earth quakes.
4. The concept can be used in fly overs.
5. The concept can be used in Making of smart cities.

III. Conclusion

It is proposed that the structural health monitoring of a building against cracks and vibration. In this project first we mount the vibration sensor and flex sensor in the building walls, if any vibration occurs, immediately the information will update on web page and alarm will on, simultaneously the flex sensor also give the result if it reach the threshold value.

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