

Building Health Monitoring System

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Abstract- This paper deals with Structural audit system. The requirement of structural audit is for maintenance purpose and repairs of existing structures whose life has exceeded the age up to 30 years to avoid any mishaps and safe the human life. It is widely used as a construction material being inexpensive, easy for construction, applications and because it is high strength and cost ratio. During this period there are many buildings and earlier have reduced strength in due course of time and because of structural deficiency, material deterioration, unexpected over loadings or physical damage. If, further use of such a deteriorated structure is continued it may be dangerous to the lives of all living beings. There is a need of appropriate actions and major for all such buildings to improve its performance and restore the desired functions of structure which may lead to increase its functional life. The structure pathology detection is an important security task in building constructions, which is performed by an operator to look manually for damages on the materials required for construction of the building. This task could be dangerous if the structure is hidden or not easy to reach. On the other side, embedded devices and wireless sensor network (WSN) are becoming popular and cost is less, enable the design of an alternative pathology detection system to monitor structures based on technologies. This article introduces a Bluetooth, WSN model system, autonomous system, easy to use and it consumes low power.

Keywords- Structural Audit; Vibration Sensor; Testing; NDT method; Evaluation.

I. INTRODUCTION

In India, there are many buildings which are old and can collapse anytime. If such structure is continued then it may affect the lives of humans and also surrounding habitations. So we should have to take appropriate action to improve the performance of structure. This will also restore the desired function of structures. Thus, it is almost important to perform structural auditing of existing buildings and to implement maintenance or repair work time to time which will increase the life of buildings and safety of the humans. To act more responsible and preemptive towards the ruined buildings, the municipal corporation must issued notice to the buildings structure and co-operative societies which have been completed more than 30 years to carry out mandatory

structural audit and then submitted the audit report. Once we get the audit report immediately take the action on the all critical areas where the damage is detected It also helps us in delivering a strong building structure with low cost solutions and proper maintenance program. This paper deals with study of different parameter of structural audit including visual inspection. Non-destructive testing, core sampling and testing. It also emphasizes on different repairs and retrofitting measures to be used for buildings after structural audit.

Structural Audit is an overall health and performance of building. Structural Audit is an important tool for understanding the real status of the old building. It ensures that the building and its premises are safe and there is no risk. It studies and suggests proper repairs and measures required for the buildings to perform better. Structural audit is done by an experienced and licensed structural consultant person. A purposed Structural Audit consists of: 1.To save human life and building. 2. To understand the condition of buildings. 3. To find critical areas to repair immediately. 4. To observe with Municipal or any permitted requirements. 5. To enhance life cycle of building by suggesting protective and correct measures. 6) To understand the health of your building and to project the expected future life.

II. BLOCK DIAGRAM

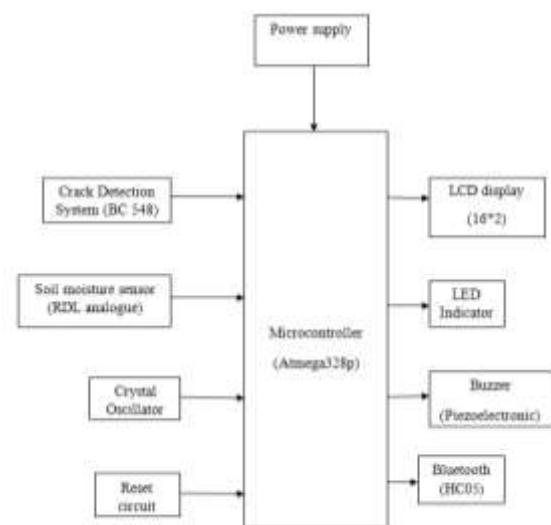


Fig.1. Block Diagram

The system enlisted in the paper consists of following blocks: Controller Atmega328P, Crack detection sensor, Soil moisture sensor, Bluetooth module, LED, LCD display, Buzzer.

AtMEGA328p

The ATmega328p is based on the AVR enhanced RISC architecture. It is a low power CMOS 8-bit microcontroller. This empowers system designed to optimize the device for power consumption versus processing speed.

Sensors

In this paper used Soil moisture sensor, Crack detection sensor, tilt sensor etc. These sensors are used to monitor the different parameters of the rehalitation of building.

LCD Display

An LCD is an electronic display module in which we use liquid crystal to produce a visible image. The commonly used module in hardware is 16*2 LCD display. In structural audit we mainly used LCD to display the problems related to buildings.

BUZZER

This article used a Piezo buzzer. The buzzer is a device which is used to produce a sound. The main working principle of buzzer is that, when an electric potential is applied across a piezoelectric material, a pressure variation is generated at that point. A Piezoelectric material consists of piezo crystals in between two conductors.

III. METHODOLOGY

Structural audit consists of 2 methods:-

- Destructive met
- hod
- Non-destructive method

A. Destructive method

In this method detection is done manually like if there are crack present external and Internal wall. Cracks in beam and column, spalling of concrete, deterioration of structure building leakage if and get the deep knowledge about settlement in foundation, strata, settlement in soil etc.

B. NDT method

NDT stands for non destructive method mainly done is to audit process technically and with the help obtain data.

IV. CIRCUIT DIAGRAM & SIMULATION

The following diagram shows the circuit simulation of overall structural audit using the ATmega328p controller. The Software used for the simulation purpose is listed below:

- Proteus8 Professional
- Arduino IDE

The Proteus software tool is used for electronic design automation. Here this paper uses Proteus for PCB layout also for circuit simulation for manufacturing printed circuits boards. Arduino IDE includes all the software which will run all programs and communicate with an Arduino board.

Our project is Atmega328p based project which is mainly used the security purposed. In this project we are dealing with the evacuation of human form a structure to prevent loss of life. It is mainly for the civil engineers. In this project we have used the soil moisture sensors, vibration sensors & tilt sensors as the major reasons behind collapsing of structure are excess water present beneath. The foundation vibration due to natural calamities & flitting of building beyond a particular angle.

The sensors used in this project are integrated with Atmega328p development board with some of the ideal parameters. The output form every of the either sensors is received in Atmega328p microcontroller & all composed with these ideal range. If it exceeds those parameters it will raise an alarm within the structure to evaluate that structure at it is going to collapse soon.

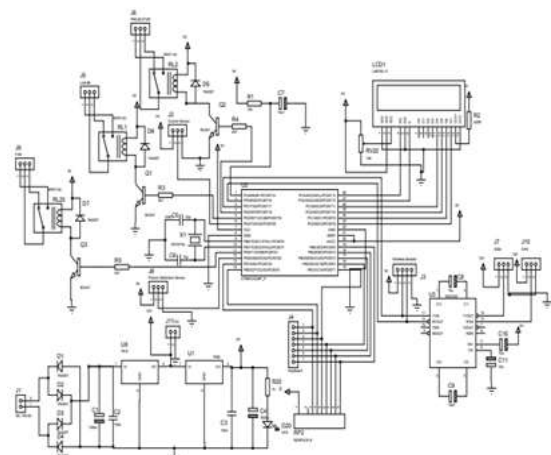


Fig.2.circuit diagram

V. FLOWCHART

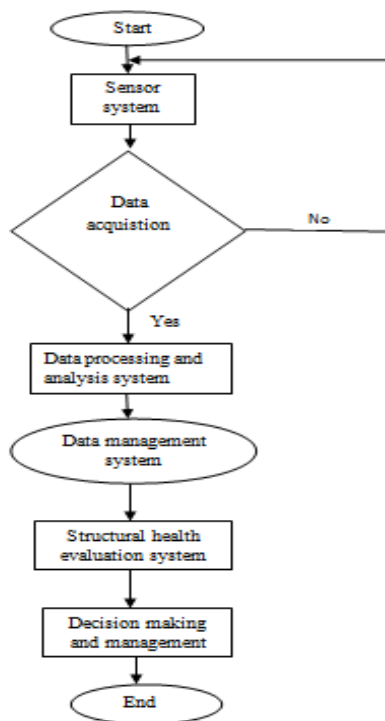


Fig.3.Flowchart

V. CONCLUSION

From the consideration of all the above points we conclude that the lacking of structural are due to combined effects of carbonation, corrosion and due to continuous drying and wetting. The result survey tells us to conclude that suffering of building is widely spread. So it needs to be stopped to avoid complete collapse of the structure.

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