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Structural Health Monitoring Using Iot

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ABSTRACT

In construction industry maintenance should be given utmost importance and focus. For continuous monitoring of maintenance Internet of Things (IoT) can be used. IoT can be used to monitor the structure from anywhere. Structural health monitoring using IoT is the latest technique employed all over the world, especially the buildings exposed to harsh environments. Sensors were used to collect the data from the structure from which we can identify the deterioration and the method to rectify. Cloud computing technique was also employed. A simple signal processing technique helps us to interact with buildings, which was the blessing of IoT. This paper presents the state of art survey about current research and implementations put into practice.

Keywords: IOT, Internet of Things, Cloud computing, Application.

1. INTRODUCTION

Computer application in the construction industry is minimal. A tool to study the safety and serviceability of concrete structures is scarce. For studying the real-time behavior of concrete structures, IoT becomes vital. Viren B. Chandanshive and Arbaz M. Kazi states that a large Network will develop by Internet of Things with number of wireless perceptible "things" interactive with one another and participating the developments. Fig. 1 depicts the consents of the inhabitants and possessions that can be linked at any given time, at any place, with any person, using some network plus some broadband utility. The Ambient Intelligence, insidious computing and omnipresent computing concepts are basically adopted in the IoT.

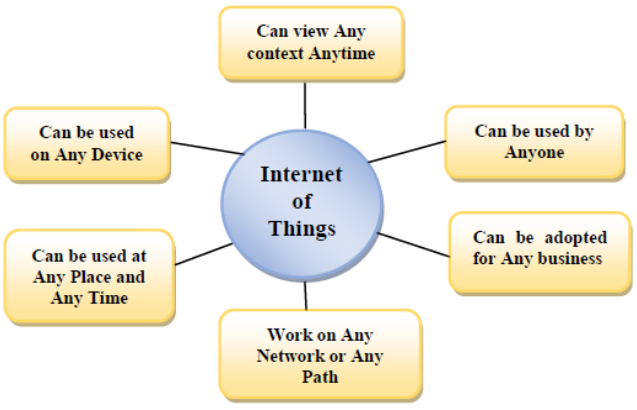

Fig 1. Consents of IoT

LITERATURE REVIEW

Ahmed Abdelgawad and Kumar Yelamarthi states that a complete real-time SHM platform is integrated with the IoT system. The proposed platform consists of Pro-Trinket, NRF module, Wi-Fi module, and Raspberry Pi 2. Fig 2 shows the proposed IoT platform.

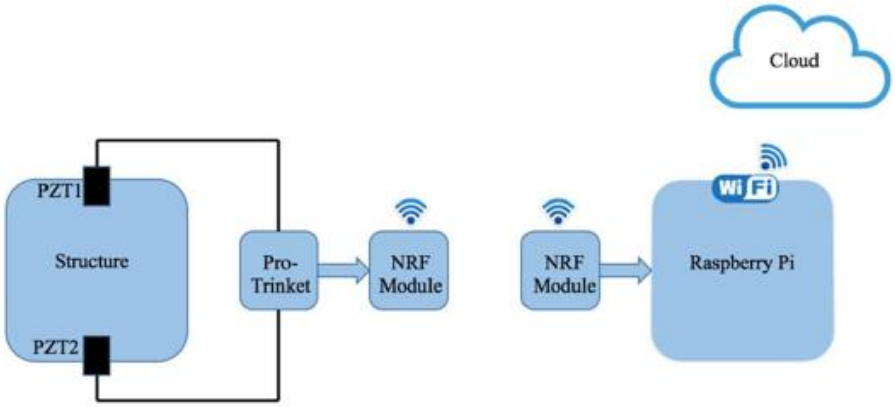

Fig 2. Proposed IoT platform.

The data will be stored in the cloud and can be checked remotely from any mobile device. The system has been validated using a real test bed in the lab. Results show that the proposed platform has a 1% error for the damage location and a 9% error for the damage width detection.

Prabastates that an attempt has been made to implement IoT to monitor deflection of Bridge decks using piezoelectric sensors. This process could make the whole system "self-sufficient for energy generation and utilisation". The findings of our project could pave a positive way of approach for the successful practical implementation of IoT to monitor bridges and also make it "self-sufficient" by adopting to an Alternate Energy Conversion system. Fig. 3 shows the Flow Diagram for IoT of Bridge Deck

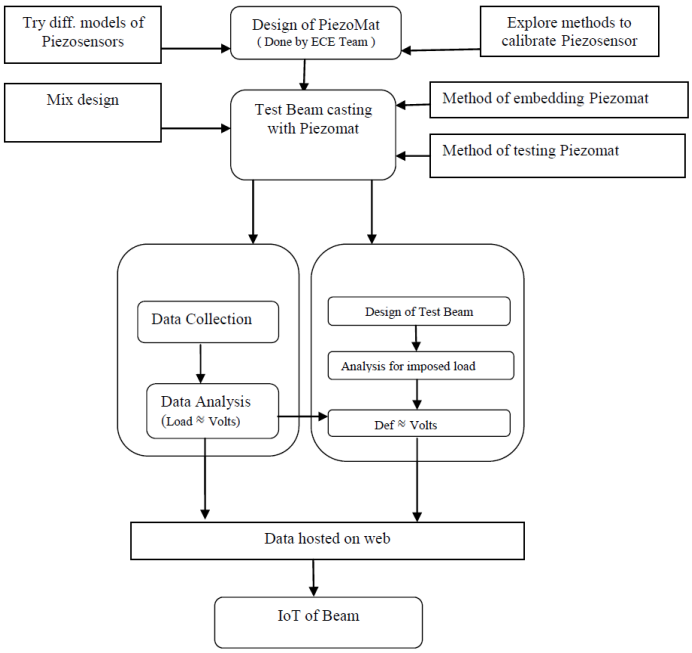

Fig 3. Flow Diagram for IoT of Bridge Deck

The findings will significantly contribute to research and development and when put to practical use, will enable practicing Civil Engineers to monitor and manage projects through IoT .

BrindaChanv et al. states that Internet of things (IoT), is the network of smart sensors that combine sensing and wireless transmission of vital safety parameters of buildings and structures, to distant computing units which continuously do the processing and monitoring of these parameters.Data collected by Arduino Uno is also given to the visual studio for locally storing data and visualizing data on the bar chart form as shown in Fig.4.

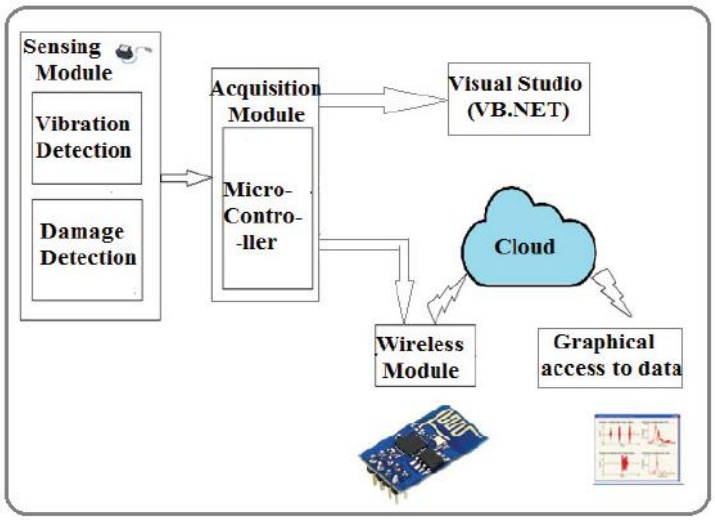

Fig. 4. Block diagram of proposed system

This system helps government to issue early warning of any unwanted critical condition for resident based on cloud data. So that, they can take a legal action earlier before it collapses.In future, we can also monitor some more advance parameter of building using IOT enabled devices or sensors for enhancing safety. Prototype of system can be used for various applications like environment health monitoring system, greenhouse monitoring system etc.

Carmelo Scuro states that sensors are smart since they are not only able to measure the physical quantities of interest but elaborate them and are able to transmit the information through the internet to take decisions.

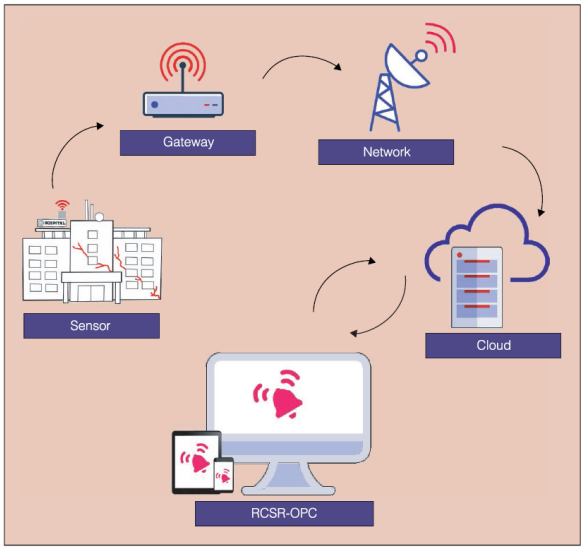

Fig5. Scheme of an IoT-SHM system.

In fact, the architecture of an IoT-SHM system (Fig. 5) can be schematized by: Smart Object (SO) sensors; gateway; remote control and service room (RCSR); and the open platform communications (OPC) server.

The advantages of the IoT paradigm in implementing the SHM monitoring system are highlighted with several actual examples, with the aim to boost the effort of scientific research in this direction. Among several application scenarios, particular importance is the monitoring of building materials through acoustic emission. This is a technique that will have great potential for development of IoT-SHM and allow systems with reduced battery consumption to continuously monitor existing and new structures.

CONCLUSION

The IoT-Structural health monitoring system is well adapted to application scenarios such as smart houses and smart cities, boosting on one side safety for humans and goods and on the other side reducing the costs of periodic monitoring. Both of these features introduce the capability of the monitoring system to implement criteria for providing a prognosis about the residual life of the structure or to optimize its maintenance.

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