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Measurement System With Accelerometer Integrated RFID Tag for Infrastructure Health Monitoring

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ABSTRACT: Structural Health Monitoring (SHM) has become an important research problem which has the potential to monitor and ensure the performance and safety of civil structures. Traditional wire-based SHM systems require significant time and cost for cable installation. With the recent advances in wireless communication technology, wireless SHM systems have emerged as a promising alternative solution for rapid, accurate and low-cost structural monitoring. This proposed system presents a newly designed integrated wireless monitoring system along with internet of things, that supports real-time data acquisition from multiple wireless sensing units and placed in the cloud to monitor from anywhere. The selected wireless transceiver consumes relatively low power. In addition to hardware, embedded multithreaded software is also designed as an integral component of the proposed wireless monitoring system. A direct result of the multithreaded software paradigm is a wireless sensing unit capable of simultaneous data collection, data interrogation and wireless transmission. A reliable data communication protocol is designed and implemented, enabling robust real-time and near-synchronized data acquisition from multiple wireless sensing units. An integrated prototype system which consists of MEMS accelerometer, RFID and wireless module, has been fabricated.

INTRODUCTION:

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. This method uses the frequency shift as the basic feature for the identification of state change of the structure. Wired piezoelectric accelerometers are being widely used for this purpose with sophisticated data acquisition (DAQ) and conditioning modules for accurate measurements. Commercial accelerometers are used in wired acceleration measurements of structures with high-end commercial DAQs. In economizing the installations, wireless sensor systems with active wireless sensor nodes have been used mostly with Microelectromechanical systems (MEMS)-based accelerometers for dynamic acceleration measurements. Continuous research work has been carried out to acquire dynamic acceleration data using commercial wireless nodes and commercial wireless accelerometer systems.

When considering wireless sensor systems for infrastructure health monitoring, low-power sensors are preferred to avoid frequent servicing of sensors installed in positions which are inaccessible or difficult to access. Radio-frequency identification (RFID) technology has been identified as an attractive solution and used for wireless sensor development related to infrastructure monitoring. RFID-based techniques with backscatter signal power measurement have been used to measure displacement and strain . The RFID multiprobe impedance-based sensor method with backscatter signal measurement has been proposed and used to detect water infiltration on concrete. However, in practice, the environment in the vicinity highly influences backscatter signal power where misleading information may result when using it as an indirect indicator. Therefore, using these methods for acquiring accurate measurements is difficult in noise prone infrastructure environments .Direct sensor integration has been made possible with the availability of new generation RFID chips. Passive (i.e., battery-less) and semipassive RFID tags have been developed using these RFID chips for various applications. The semipassive RFID tags use battery power for integrated sensors where they still follow the passive backscatter communication. This is entirely different from the communication of the active wireless sensors and nodes with transceivers which consume power. Therefore, the advantage of passive communication at the tag can be acquired into a wireless system using the semipassive RFID tags. Furthermore, as they use low battery power in operation, enhancing them into battery-less state may be possible with suitable power harvesting techniques

2 EXISTING SYSTEM:

In existing system we have MEMS accelerometer to take vibrations in the building which gives to the microcontroller in turn sends to the monitoring section through RF wireless technology. Here we have two sections. At the monitoring section siren alert is given to intimate. RF communication is implemented in a single place and also in a shorter distance

3.PROPOSED SYSTEM:

In this project we have MEMS accelerometer to sense the shaking of the building which in sends to the microcontroller which in turn sends to the monitoring section through Zigbee wireless technology. Here we have three sections, the two floor sections has ARM7 microcontroller, Bluetooth device and MEMS accelerometer. The monitoring section has PC and a Bluetooth wireless device, which will collect the data from the floor sections and analyze the stability of the building.

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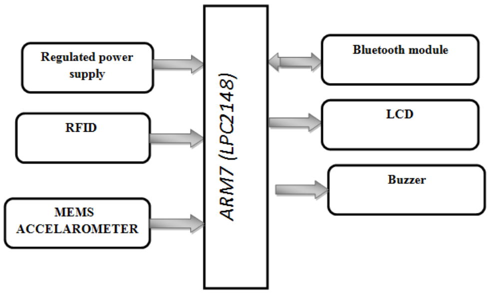


Fig 1 block Diagram

WORKING:

In this venture we have MEMS accelerometer to detect the shaking of the building which in sends to the microcontroller which thusly sends to the observing segment through bluetooth remote innovation. Here we have three segments, the two story areas has microcontroller, bluetooth gadget and MEMS accelerometer. The observing segment has versatile and a bluetooth remote gadget, which will gather the information from the floor areas and examine the solidness of the building.

RESULTS

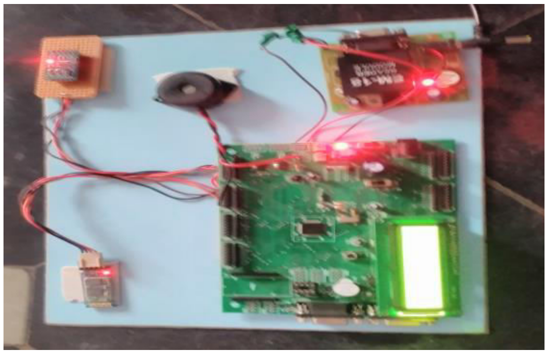
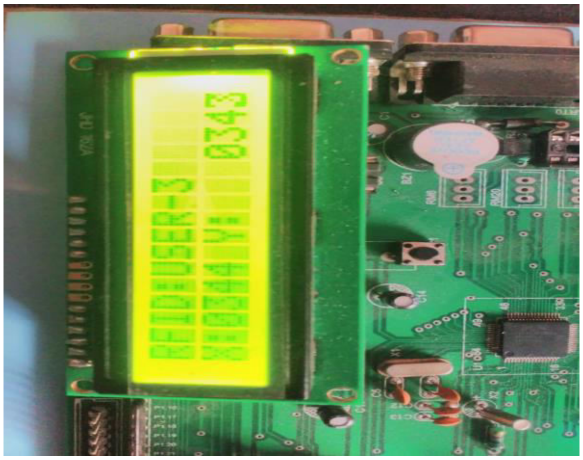


Fig 2 kit Diagram



CONCLUSION AND FUTURE SCOPE:

In this project, a dynamic acceleration measurement system with an accelerometer integrated semipassive RFID tag was presented for remote monitoring of infrastructure. Design considerations for acquiring maximum possible spectral bandwidth for the prominent axis dynamic acceleration measurements under the limitations of the selected RFID hardware were discussed. Measurements were conducted using a structural specimen, and the experimental results have shown that the system can acquire natural frequency information of the structural specimen. The results were validated by analytical calculations and comparing those with measurement results from the standard commercial systems. The experiment with the loaded specimen has shown that the system can distinguish the state changes of structures due to load changes. Therefore, the proposed RFID-based wireless system can be used for infrastructure health monitoring.

As future work, field testing will be done by enhancing the proposed system by incorporating the modified RFID tag antenna which performs better when mounted on structural blocks made out of concrete or metal.

BIBILOGRAPHY

[1] A. Deraemaeker, ―Vibration based structural health monitoring using large sensor arrays: Overview of instrumentation and feature extraction based on modal filters,‖ in New Trends in Vibration Based Structural Health Monitoring, A. Deraemaeker and K. Worden, Eds. New York, NY, USA: Springer, 2010, pp. 19–32.

[2] W. Fan and P. Qiao, ―Vibration-based damage identification methods: A review and comparative study,‖ Struct. Health Monitor., vol. 10, no. 1, pp. 83–111, Jan. 2011.

[3] PCB Group, Inc. (2015). Accelerometers—Sensors for Shock, Vibration and Acceleration. [Online]. Available: http://www.pcb.com/ Test Measurement/Accelerometers, accessed Oct. 9, 2015.

[4] Honeywell. (2015). Honeywell Test and Measurement Sensors.[Online]. Available: https://measurementsensors.honeywell.com, accessed Oct. 9, 2015.

[5] National Instruments. (2015). Data Acquisition (DAQ)—National Instruments. [Online]. Available: http://www.ni.com/data-acquisition, accessed Oct. 9, 2015.

[6] MEMSIC Inc. (2015). Wireless Sensor Networks. [Online]. Available: http://www.memsic.com/wirelesssensor-networks, accessed Oct. 9, 2015.

[7] S. Jang et al., ―Structural health monitoring of a cable-stayed bridge using smart sensor technology: Deployment and evaluation,‖ Smart Struct. Syst., vol. 6, nos. 5–6, pp. 439–459, Mar. 2010.

[8] LORD MicroStrain. (2015). Wireless Nodes. [Online]. Available: microstrain.com/wireless/sensors, accessed Oct. 9, 2015.

[9] M. Jayawardhana, X. Zhu, R. Liyanapathirana, and U. Gunawardana, ―An experimental study for decentralized damage detection of beam structures using wireless sensor networks,‖ J. Struct. Monitor. Maintenance, vol. 2, no. 3, pp. 237–252, 2015.

[10] R. Bhattacharyya, C. Floerkemeier, and S. Sarma, ―Towards tag antenna based sensing—An RFID displacement sensor,‖ in Proc. IEEE Int. Conf. RFID, Apr. 2009, pp. 95–102.