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Highway Bridge Monitoring Using Wireless Sensing Network

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Abstract

Day by day the use of various technologies increased tremendously in various applications such as food industry, textile industry, farming sectors and list goes on. The wireless sensor network with GSM is used in large geographical area become cost effective and possible. The wireless sensing network for bridge monitoring is the best example. The 14 people were died and 18 were missing in a horrible incident happened on 3rd march 2016 when bridge on the Savitri river has been collapsed. If the status of that bridge was monitored time to time then this horrible accident could be avoided. Hence, we have developed a system which will continuously monitor the status of the bridge.

Keywords: *PIC 16F877A, Zigbee, GSM, Flex sensor, Accelerometer sensor.*

INTRODUCTION

In this era, India is one of the fastest growing economy, so, the infrastructure plays an important role in the GDP of the country. The bridges are also important if we concern about the transportation. Due to large traffic, bad environmental condition or overage of the bridges results in collision of bridge.

The proposed system collect appropriate data from different sensors, then it evaluates the bridge condition by comparing input data with ideal ratings. If the input data from bridge exceeds the ideal rating, then gates provided with the bridge are closed and the message consisting of bridge status will be sent by using GSM.

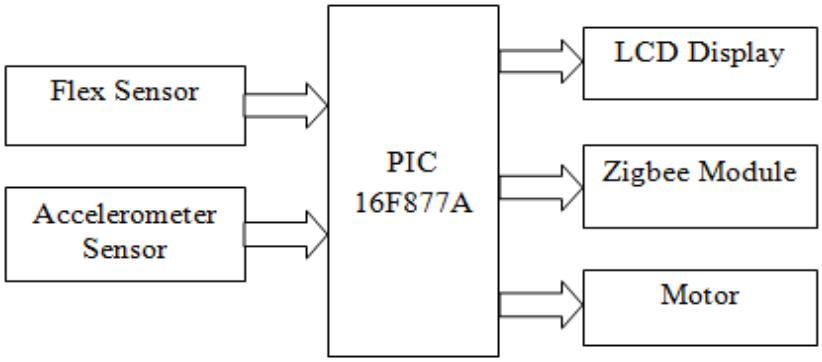
Proposed system

OBJECTIVE

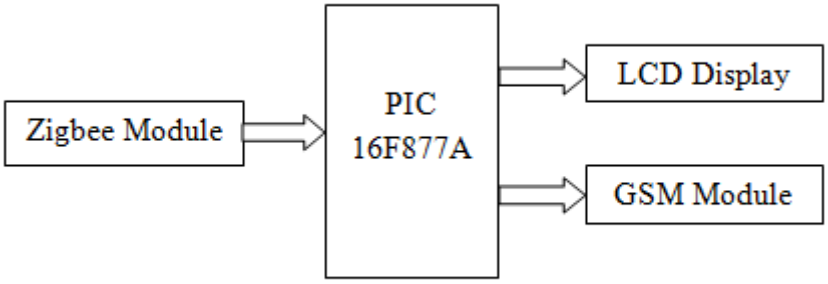
The objective of the Highway Bridge Monitoring Using Wireless Sensor Network is to check the status of the bridge based on the input data from sensors, display the condition of the bridge and transfer it to the receiver through Zigbee, send the message consisting of bridge status to the authorized person and close the gates when the bridge status is danger.

BLOCK DIAGRAM

Transmitter Module



Receiver Module



Block Diagram Description – Electronic Assembly Design

The proposed system includes two modules:-

1. Transmitter Module
2. Receiver Module

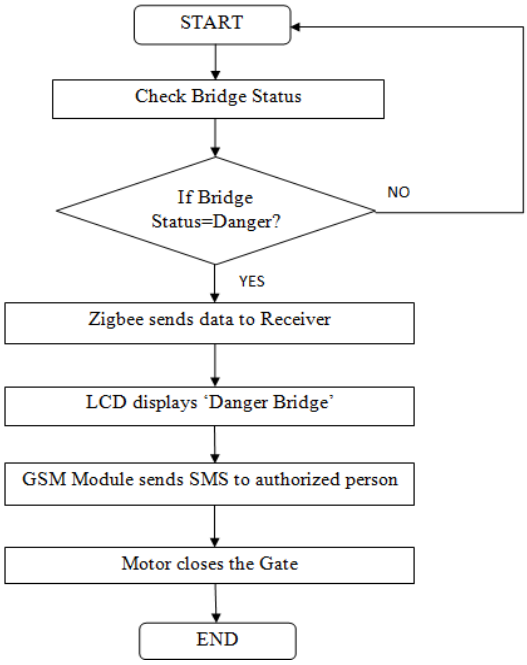
TRANSMITTER MODULE

Transmitter module consist of flex sensor, 3-axis accelerometer, LCD display, motor, PIC microcontroller along with zigbee transmitter. The PIC microcontroller continuously monitor the input data from the sensors and take corresponding action. The input data from sensors is compared with the predefined values stored in PIC microcontroller: If the bridge status is danger then motor is used to close the gates of bridge so as to prevent an accident. LCD is used to display the current status of bridge. The collected data from sensors is transmitted using Zigbee module to the receiver, here zigbee enables wireless communication. The alarm is used to indicate abnormal condition of bridge.

RECEIVER MODULE

The data transmitted is received using Zigbee receiver. PIC microcontroller processes the input data that is coverts it into a form compatible with the GSM module. The status of the bridge is send to the authorized person via GSM Module in the form of message. The LCD displays the bridge condition.

Flow Chart



ADVANTAGES OF SYSTEM

- Operators can access bridge real time status through mobile.
- User friendly.
- System is reliable.
- As GSM has worldwide connectivity we can send bridge status any time anywhere.

CONCLUSION

The proposed Highway Bridge Monitoring Using Wireless Sensor Network is used for real time status monitoring of bridge. The data from various sensors is collected and is shared with the help of Zigbee module. The Global System for Mobile (GSM) is used to transfer the message enclosed with the bridge status to the authorized person so, he will take appropriate action. By using this system we can save some someone's life.

APPLICATIONS

This prototype can be used for monitoring the bridge health; it also can be enhanced to be used for monitoring structures like buildings.

SCOPE FOR FUTURE IMPROVEMENT

The proposed system can be enhanced with extra feature, such as, using wireless crack sensor and stick scanner we can observe the external as well as internal cracks.

Also we can use GPS for real time mapping so as to control the traffic on the bridge, which may avoid overloading of the bridge.

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