Internet of Things Based Bridge Monitoring and Alerting System

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Abstract— Bridge Monitoring and Alerting system is notable to health diagnosis of bridges. In today's existing technology and systems, there is no such technology which checks the bridge condition. But bridge requires continuous monitoring because it may get collapsed due to excessive load of vehicles, high water level and pressure. So using this proposed system we can check the water level, bridge load and condition of the bridge which will inform us that, whether the bridge will collapse or not. Since it is automated, so human work is less. If the water level, pressure and vehicle load crosses its high limit value then it sends alert with buzzer and auto-barrier.

Keywords: Internet of Things, Arduino Uno, Bridge Monitoring and Alerting system

I. INTRODUCTION

Development and evolution of the nation depends on the engineering structures such as bridges, dams, building, roads which affect people in their day to day life. Whenever bridge gets collapsed many people lose their lives and some get heavily injured. Nowadays there is no such application which will provide us with alert messages if the bridge is going to get collapse. And the systems which are available for this purpose are way costlier because current system uses complicated and high cost wired networks among the sensors in the bridge. And also the wire which connects the bridge and management services is also very costly,so the whole installation and monitoring will be very costly for a normal middle class person.. But in this proposed system , bridge is continuously monitored ,environment is sensed and data is send to web applications through severs and then alert message will be given out with the help of buzzer and auto-barrier, whenever the bridge movement is detected or the level of river water crosses its high range. It is also very helpful in the emergency conditions like bridge collapse or to prevent from flood.
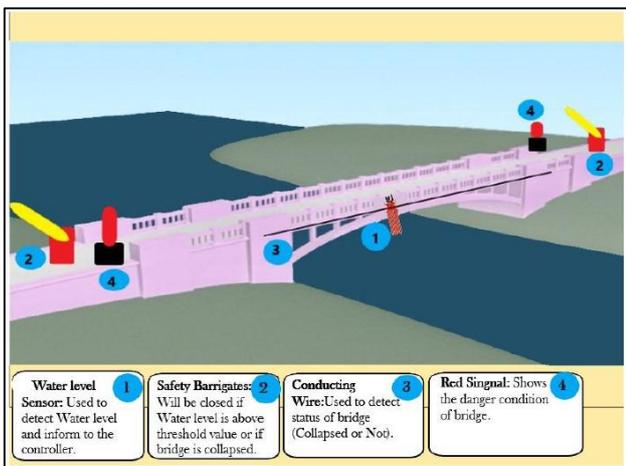
II. CHALLENGES

To help the management of bridge safety more efficiently, is one of the most important challenge for the city development. Since authorities stays far away from the bridge, it is not possible from them to regularly monitor the bridges. Rescue operation also come slowly as they only get notified when the whole incident has been happened. So to overcome that we will make use of IOT technology. Wireless network and sensor technologies can help the bridge safety monitoring system to collect data and monitor the bridge conditions in real time.

III. APPROACH

A. Hardware Implementations:

The design of the system basically depends on hardware components. This project main part is Arduino and some sensors like weight sensor, water level point sensor; Wi-Fi module to send alert messages. Sensors are used for sensing the load on the bridge, and water level of the river. The nodes of the sensors are connected to Arduino Uno and are programmed accordingly to transmit the information to users and web applications.

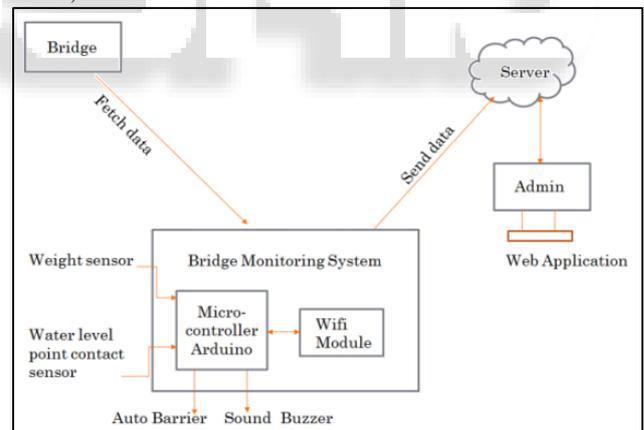The main hardware components are Arduino Uno, load sensor, water level sensor.

Fig. 1: Block diagram

1) Arduino Uno:

ATMEGA328P is basically use to implement coding in it and connect sensors and modules to it for working.
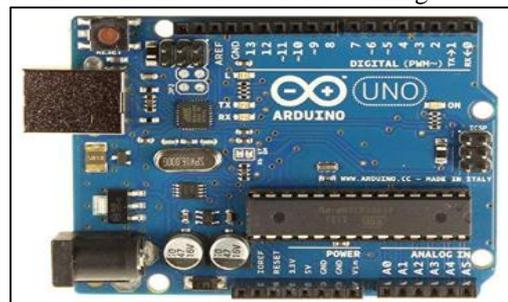

Fig. 2: Arduino Uno

2) Load Sensor:

Load sensor is use to check the load on the bridge and is then transmitted to Arduino Microcontroller.
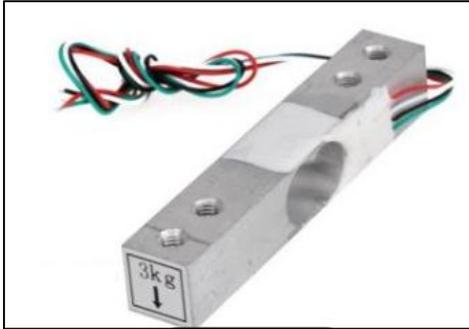

Fig. 3: Load sensor

3) Water Level Sensor:

Water level sensor is used to check the water level of the river and is then send to Arduino.
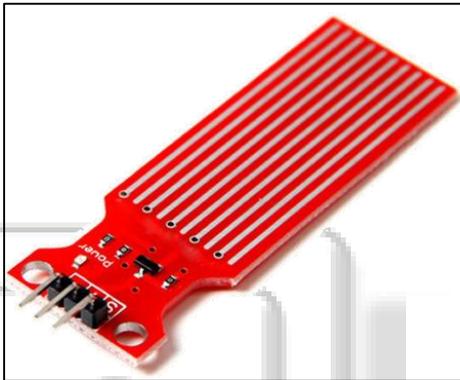

Fig. 4: Water level sensor

4) Other Hardware:

Other hardware like breadboard for connection, microcontroller ATMEGA32, Wi-Fi module through which all the sensors are connected to the internet, wires for connection ,buzzer alarm for alerting when the threshold limit is crossed, auto- barriers which gets automatically closed when there are signs of bridge collapsing.
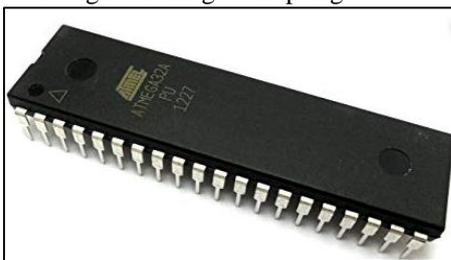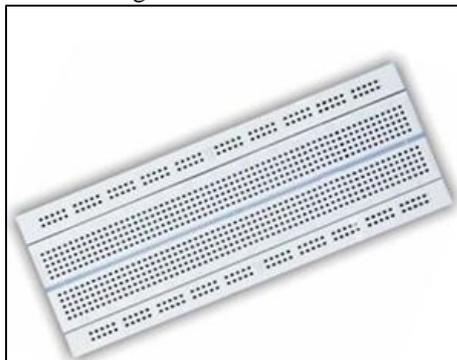

Fig. 5: Microcontroller
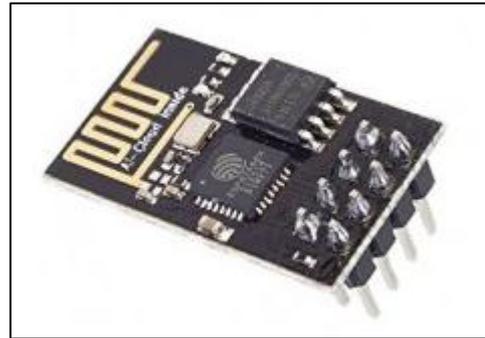

Fig. 6: Breadboard
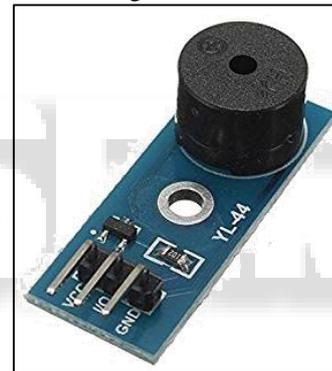

Fig. 7: Wi-Fi module

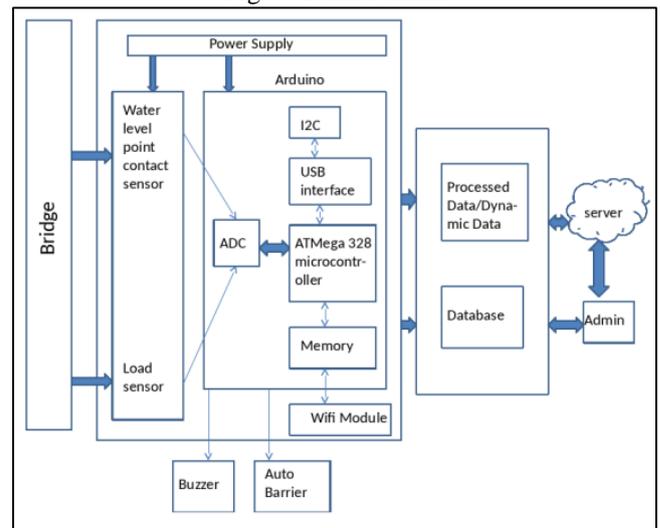Fig. 8: Wires

Fig. 9: Buzzer alarm

Fig. 10: Schematic diagram

B. Software Implementation:

In Arduino Uno, coding part is done by Arduino IDE using C++ languages and that will tell the process and location of

the affected bridge to the users, management services and rescue operators.

IV. RESULTS

Results will be shown in tabular format which will show us the location, date, water level value, which will be then send to respective areas like management services, rescue operators who will take immediate action towards it.

ID.	Status	Date Information	Water Level Value	Location
1	overwater	2018-03-31 16:40:48.0	25	null
2	overwater	2018-03-31 16:55:31.0	22	null
3	overwater	2018-03-31 16:56:47.0	27	null
4	overwater	2018-03-31 17:06:52.0	70	Unnamed Road, Vadgaon Tarf Khed, Maharashtra 410505, India
5	overwater	2018-04-02 09:51:15.0	32	null
6	overwater	2018-04-02 09:52:17.0	38	null
7	overwater	2018-04-02 09:54:38.0	23	null
8	overwater	2018-04-02 10:35:22.0	30	null

Fig. 11: Result in tabular form

V. FUTURE WORK

In future, we will built application which will be available to every other human being so they can get alert beforehand. Also to build the whole system in one component only which will be easy to handle and would be wireless so no breakage of wires can occur. Also try to use solar power so that power consumption of the application can be affordable. Will also try to install the software which will give no error and will work smoothly and will give accurate information about the water level of the river. Also the system is flexible enough to be integrated with future inventions and hence there is scope for expanding the system as well .So now we are working on it.

VI. CONCLUSION

Bridge monitoring and alerting system using IOT, to alert management and people through buzzer and auto barriers when there are signs of bridge collapsing. This application will help to reduce disaster in future. And it will also help people to get notified about the bridges which are not in good condition and thus they will not use that bridge until it gets taken care of. Still this much work is done, and app will implemented as soon as possible in future work.

REFERENCES

[1] REAL TIME BRIDGE MONITORING AND ALERT GENERATION SYSTEM USING IoT, Amrita Argade ,Sanika Chiplunkar ,Rohini Kumbhar, Varsha Kusal4,Prof.Swati A. Khodke.
[2] Smart Monitoring System For Bridge Safety,Mr.Swapnil Chavan, Mr. Prashant harade, Mr.Sagar Kulkarni, Ms.S.S. Jadhav.
[3] Ittipong Khemapech, Watsawee Sansrimahachai, and Manachai Toahchoodee,"A Real-time Health Monitoring and Warning System for Bridge Structures",IEEE Region 10 Conference(TENCON).
[4] IOT based Bridge Safety Monitoring System, Charushila D. Bhadane1, Sonali K. Borade, Priti M. Borse, Prof. R. S. Pagar, Prof. D. Y. Thorat.
[5] Jin-Lian Lee, Yaw-Yauan Tyan, Ming-Hui Wen, Yun-Wu Wu "Development of an IoT-based Bridge Safety Monitoring System" Proceedings of the 2017 IEEE International Conference On Applied System Innovation IEEE-ICASI 2017.