

SMART HIGHWAYS SYSTEMS FOR FUTURE CITIES

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ABSTRACT

Program of innovation that links a different way of looking at things with innovative ideas that apply the opportunities offered by new technologies in smart ways. Nowadays safety on road has become an important factor in our life because there is an increasing amount of accidents on the road and there are some places where accident occur frequently such as crossings, turns. Also there is a big problem of traffic jams on the road. Due to heavy rain fall, there is a possibility of water overflow on the bridges and accident may occur. In hilly area there is a possibility of landslide. so, there came a need to An intelligent Highway is an innovative concept for smart roads of future smart cities. It is a design a system which can detect these unexpected events. So we are designing a system that is “An Intelligent Highway system with (Weather Accidents Landslides and traffic) W.A.L.T.” which is an innovative concept to maintain safety on roads. The system will make use of digital sensor to acquire data of landslide, accidents traffic jams and weather condition and that will be displayed on active LED display on road, using XBee and GSM technologies.

I. INTRODUCTION

This paper proposes a system for smart highways of future cities. Common city roads have to face many problems such as traffic jams which cause loss of valuable time. And also there is no display indication on our roads for showing traffic conditions in the city. This paper proposed a wireless sensor based system which will be situated in the city roads and read the traffic data and send it to the displays or road signs which are digital led boards providing information about all data. The second part of system consist accident detection system based on the sound sensor it records the sound of accident and with the help of that it decides whether accident has happen or not depending on intensity of sound and if accident get detected it will send MSG through GSM modem to nearest police station and hospital. The next provision in this system will be of bridge overflow detection. In many areas water flows over the bridges in monsoon and that causes heavy traffic jams and kilometre long lines of vehicles. To avoid this water overflow sensor will read the water data of the river bridge and send to control station which will send this to active LED road signs where that will be displayed. The fourth provision is for the landslides happening in the hilly areas which are the cause of traffic jams and heavy loss. The areas where landslide happens are located in remote parts so very few communication devices are available there. In this using ultrasonic sensor based landslide detector sensor will be placed at such places which will detect landslide and send information to the disaster management system using GSM or XBee

II. PROPOSED SYSTEM

A Design Considerations

- ☐ Sensor arrays for detecting traffic jams

- ☐ Water detector sensors over every bridge
- ☐ Landslide detector Sensors.
- ☐ Accident detector sensors
- ☐ Active Led display boards

B. Block diagram of the Proposed System:.

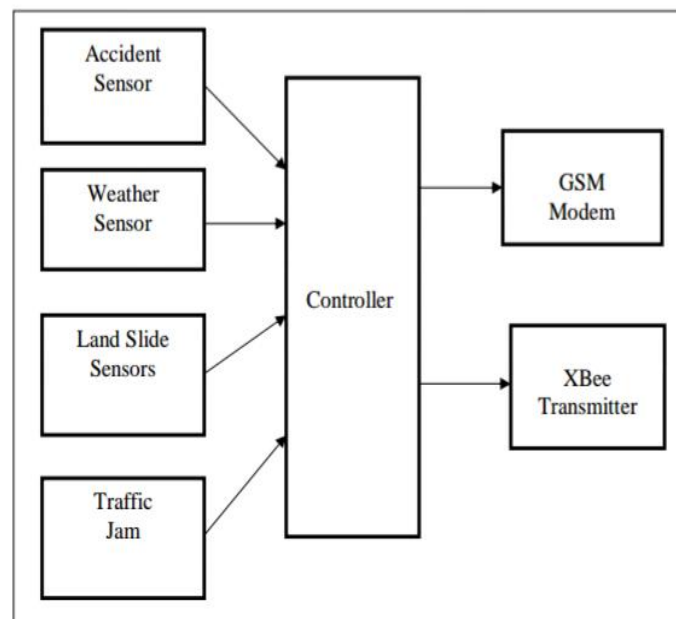


Fig.1 Block diagram of transmitter section

The block diagram of system shows all basic components of the smart highways. Various sensors that are connected to a microcontroller which is Arduino ATmega 328 an AVR core based microcontroller. All the data from sensors is read by the microcontroller and particular information is sent by GSM and XBee. As shown in the block diagram, transmitter section consist of the four sensors, one microcontroller, one GSM modem, XBee transmitter. If any condition occurs it is detected by particular sensor and information about the event is given to the microcontroller. Microcontroller is heart of the system which controls all the operation related to accident, landslide, and water overflow on the bridge and traffic jam.

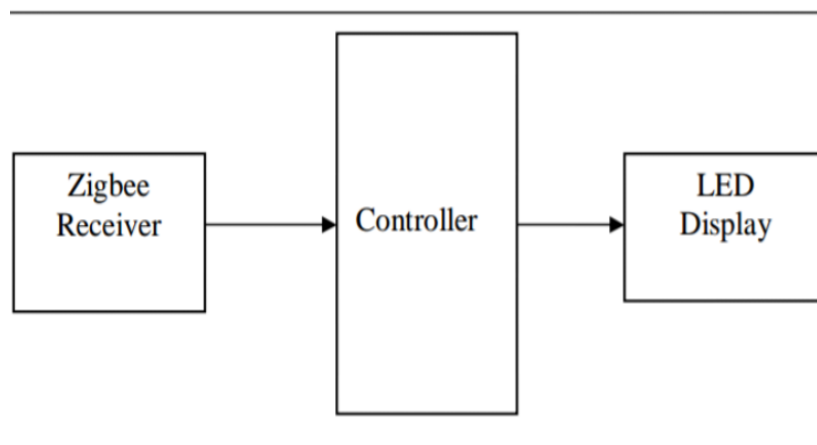


Fig. 2 Block diagram of Receiver side

The message will be received by receiver section and displayed by LED board. XBee operates in 16 channel of 2.4GHz band and provides a data of 250Kbps. It has been designed for single channel 868MHz, which provides 20 Kbps in Europe and 10 channel 915 MHz. It provides 40 Kbps in America. A XBee device can function either a node or as a coordinator.

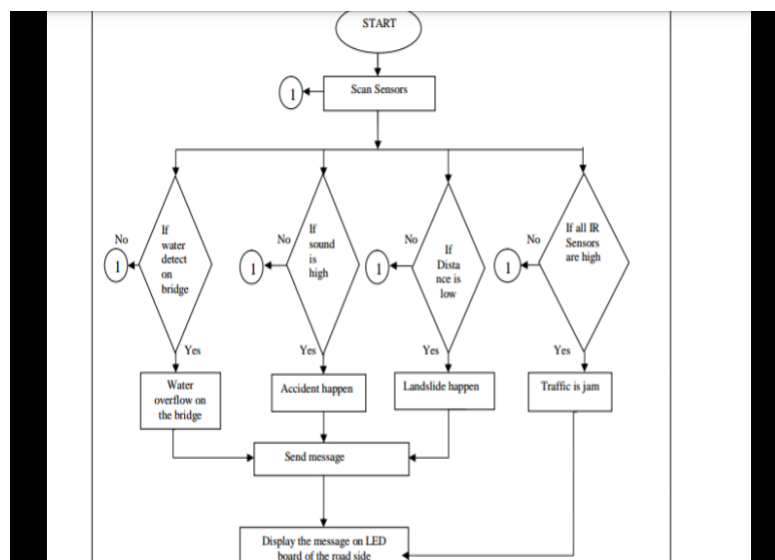


Fig.3 Flow chart

As shown in the block diagram, transmitter section consists of the four sensors, one microcontroller, one GSM modem, XBee transmitter. If any condition occurs it is detected by particular sensor and information about the event is given to the microcontroller.

III. SIMULATION RESULTS

In our simulation, sensor detects four unexpected event which is displayed on the LED board



Fig4 shows prototype model

Above pictures displays the working of proposed system. Fig shows all prototype models within normal working condition which will display welcome message on the display board.

Fig displays the working condition when there is water overflow occurs on the bridge which is sensed by the level sensor and data sent to the board through GSM and XBee which will be displayed on the board using microcontroller. In the next figure i.e. Accident detection process is shown. Accident will be detected by the MEMS sound sensors and data will be shown on display. If any landslides happen in area, it will be detected by the ultrasonic distance detecting sensor and message will be displayed on the LED board.

IV. CONCLUSION AND FUTURE WORK

In this paper, a novel idea is proposed for monitoring the accident over the road. Landslide and water overflow on bridge is detected with the help of using different sensors. Also with the help of GSM modem, message will be sent to the natural disaster management, hospital, police station and message is also displayed on the LED display. In this landslide in hill area is detected by using ultrasonic sensor, water overflow on bridge is detected by using water sensor, and accident on road is detected by using sound sensor, traffic jam on the road is detected by using IR sensor. The GSM is used to send the message. The message can be transmitted to each receiver separately using XBee technology in mesh networking. Also the message is displayed on the LED board performance.

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