Renewable Energy Based System Using IoT

1Visvesvaran C, 2Siddharthraju K, 3Durgashree M, 4Janani J, 5Indhumathi G and 6Kaavya JS
1, 2, 3, 4, 5, 6 Department of Electrical and Electronics Engineering
1, 2, 3, 4, 5, 6 Sri Krishna College of Engineering and Technology, India

Abstract - Bridge safety monitoring system based on IOT this is a wireless technology. In this system we can install the monitoring devices in the bridge. This monitoring device helps to connect the communication devices to a cloud-based server. We use cloud-based server here because it helps to calculates and analyses the data which sent to monitor. Bridge monitoring system can monitor, analyse bridge conditions and their environment and also detect the nearby water levels, vibration and other safety features. Through the telecommunication devices information obtained is transferred to user. In our cities many of the bridges are built on the river that can be reduced their lifetime has expired but it's still in use.

Keywords - Monitoring, Arduino UNO, Servo Motor, Wireless Sensor Network

1. Introduction
For bridge security already several traditional methods are there but those methods have some problems like following:
1) Progressively, customary strategies neglects to gather the information or screen site conditions and neglects to completely record or examining the neighborhood information, this issue prompts genuine calamity recuperation [1].
2) Monitoring results are inaccurate, high-cost problem and high-power consumption these problems are happened by data collection by visual inspection or the use of large technological devices. To overcome these problems, we create a device which is called as Bridge safety monitoring system based on IOT [2].

In the Pacific Rim of Fire, because of Taiwan's flighty atmosphere numerous issues are accounted for yearly like episodes occurred in spans, pipelines are harmed seriously by floods and seismic tremors. Notwithstanding floods, quakes, typhoons they can likewise unleash destruction on flames, gas breaks and blasts. So as to accomplish the best outcomes in the calamity and harmed territories require an alternate kind of data and assets [3]. In the harm zones absence of data may interface with the administration of the information at the salvage office and to conquer the activity which implies recuperation activity, which has led to better recuperation or preventable reason. These days Industries are created from multiple points of view IOT and brilliant developments like extension wellbeing framework the worldwide patterns as well as the serious wellsprings of Taiwan future turn of events.

Along these lines in this framework, we utilize IOT, Wireless Sensor Network (WSN) and shrewd development advancements due to tackling the previously mentioned issues of overseeing data and communicating the data about the scaffold security by making a Bridge wellbeing checking framework dependent on IOT [4]. This framework can screen and move the scaffold information to cell phones. Connect wellbeing the executive’s officials to acquire the reference and documentation since this data can be utilized for debacle recuperation. Remote innovation utilized for observing and imports the data [5]. This innovation can be portrayed by low force utilization, high security and the enormous number of organizations

2. Reason And Evaluation Of Work
The primary goal of our Project is to screen this Bridge and guarantee security. The Microcontroller unit utilized by Arduino is an amazing method to screen constant execution. IoT connection has three measurements: time, area and item. It very well may be close to home, man-to-individual correspondence and customized correspondence through the transmission of data on IoT. Arduino controls a servo engine that goes about as an actuator to control the Barrier Gate. Node MCU is utilized to communicate Sensor Values to the Cloud and gives Notification to the Mobile App.

3. Existing System
In the current framework, the wellbeing the executives of the Bridge have the accompanying issues:
1) Inability to gather information or screen site conditions progressively and inability to completely record or dissect neighbourhood information gathered
2) 1, bringing about better debacle execution Data assortment through visual evaluations or utilization of huge size electronic gear, regularly bringing about off base checking results or greater expenses and higher force utilization.

4. Proposed System
As shown in Figure 1, the advanced framework is aimed on IoT and Wireless technology. In the framework overhaul program Hardware Module comprises of a weight sensor, Vibration sensor, water power sensor, Wi-Fi module, and Arduino microcontroller.
Fig. 1: Bridge Monitoring System Diagram for Proposed System

5. Hardware Details
- Arduino UNO Microcontroller
- Power supply unit / Battery 12V 1.3 Ah
- Force Sensor
- Vibration Sensor
- Load Cell
- LCD
- Logic Level Converter
- Node MCU
- Servo Motor

Arduino UNO
Arduino UNO depends on ATmega328P microcontroller. There are two variations of the Arduino UNO: one which comprises of through gap microcontroller association and other with surface mount type. Through-gap model will be helpful as we can take the chip out in the event of any issue and trade in with another one. Arduino UNO accompanies various highlights and capacities [6]. As referenced before, the microcontroller utilized in UNO is ATmega328P, which is an 8-bit microcontroller dependent on the AVR architecture. UNO has 14 advanced information – yield (I/O) pins which can be utilized as either information or yield by interfacing them with various outer gadgets and parts. Out of these 14 pins, 6 pins are equipped for creating PWM signal. All the advanced pins work at 5V and can yield a current of 20mA. By default, all the simple pins can quantify from ground to 5V. Arduino UNO has an element, where it is conceivable to change the upper finish of the range by utilizing the AREF pin however the worth ought to be under 5V. Additionally, some simple pins have specific usefulness. Pins A4 and A5 are utilized for I2C communication. There are various manners by which we can control the Arduino UNO board. The USB link, which is utilized to program the microcontroller, can be utilized as a wellspring of intensity.

Force Sensor
A Force-detecting resistor is a material whose opposition changes when a power or weight is applied. They are otherwise called power delicate resistor and are now and again alluded to by the initialize FSR. Power detecting resistors comprise of a conductive polymer, which changes opposition in an anticipated way following use of power to its surface. They are typically provided as a polymer sheet or ink that can be applied by screen printing [7]. The detecting film comprises of both electrically leading and non-directing particles suspended in framework. The particles are sub-micrometer estimates, and are defined to decrease the temperature reliance, improve mechanical properties and increment surface toughness. Applying a power to the outside of the detecting film makes particles contact the leading anodes, changing the obstruction of the film.

Load Cell
Resistive burden cells chip away at the guideline of Piezo-resistivity. At the point when a heap/power/stress is applied to the sensor, it changes its obstruction. This adjustment in obstruction prompts an adjustment in yield voltage when an info voltage is applied. The burden or power cell takes numerous structures to oblige the assortment of employments all through exploration and mechanical applications. Most of today’s plans use strain measures as the detecting component, regardless of whether foil or semiconductor [8]. Foil checks offer the biggest decision of various kinds and in result will in general be the most utilized in load cell plans. Strain check designs offer estimation of pressure, pressure and shear forces. Semiconductor strain measures arrive in a little scope of examples however offer the benefits of being tiny and have enormous check factors, bringing about a lot bigger yields for a similar given pressure.

Servo Motor
Servo Motors are DC Motors with a servo component to flexibly a chose rakish movement. Heartbeat width tweak (PWM) strategy is utilized to line the edge of pivot. By and large RC servo engines have a turn cutoff of 900 to 1800 yet servos with high revolution edges additionally are accessible. A servo engine is one among the broadly utilized variable speed drives in mechanical creation and cycle mechanization and building innovation around the world. Albeit servo engines are anything but a chose class of engine, they’re expected and intended to use moving control applications which require high exactness situating, brisk turning around and excellent performance. A servo engine is a gadget which may push or pivot an item with incredible accuracy. On the off chance that you'd wish to turn and
item at some particular points or separation, at that point you utilize servo engine. It's simply produced using basic engine which go through servo instrument. In the event that engine is utilized is DC controlled, at that point it's called DC servo engine, and in the event that it's AC fueled engine, at that point it's called AC servo engine. We'll get an extremely high force servo engine during a little and lightweight weight bundles.

**Arduino IDE**

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a content manager for composing code, a message territory, a book comfort, a toolbar catches permitting you to check and transfer programs, make, open, and spare portrays, and open the sequential screen. The toolbar catches permit you to check and transfer programs, make, open, and spare portrays, and open the sequential screen.

**Node MCU Wifi Module**

NodeMCU is an open-source advancement board and firmware situated in the generally utilized ESP8266 - 12E WIFI module. It permits you to program the ESP8266 WIFI module with the straightforward and ground-breaking LUA programming language or Arduino IDE.

With only a couple of lines of code you can build a WIFI association and characterize input/output pins as indicated by your requirements precisely like Arduino, transforming your ESP8266 into a web worker and much more [11]. It is what might be compared to ethernet module. Presently you have web of things genuine instrument [12].

With its USB-TTL, the NodeMCU Dev board bolsters legitimately blazing from USB port. It consolidates highlights of WIFI access point and station + microcontroller [13]. These highlights make the NodeMCU extremely incredible asset for WIFI organizing. It very well may be utilized as passageway and additionally station, have a webserver or associate with web to get or transfer information.

**Buzzer**

A bell takes a type of info and produces a sound in light of it. They may utilize different intends to deliver the sound; everything from metal clappers to electromechanical gadgets [14]. A ringer needs to have some method of taking in vitality and changing over it to acoustic vitality. Numerous bells are important for a bigger circuit and take their capacity straightforwardly from the gadget's capacity source. In different cases, nonetheless, the ringer might be battery controlled so it will go off in case of a mains blackout [15].

6. Results And Discussion

**Arduino IDE**

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a content manager for composing code, a message territory, a book comfort, a toolbar catches for basic capacities and a progression of menus. It interfaces with the Arduino and Genuine equipment to transfer programs and speak with them.

**Piezoelectric Sensor**

Piezoelectric sensors are used in different endeavors, machines and applications. Whether or not you're attempting to vehicle speed, or to quantify the force of a moving toward quake, the contraption you're most likely using is seen as a vibration sensor. Some of them work toward quake, the contraption you're most likely using is seen as a vibration sensor. Some of them are isolated, and others require their own ability source. Various machine working conditions concerning temperature limits, appealing fields, vibration expand, repeat run, electromagnetic closeness and static delivery (ESD) requirements and the essential sign quality require the necessity for a combination of sensors.

**LCD**

Fluid precious stone cell shows (LCDs) used to show off show of numeric and alphanumeric characters in spot grid and segmental displays. They are surrounding us in PCs, tickers and watches, microwave, CD players and numerous other electronic gadgets. LCDs are regular since they offer some genuine points of interest over other presentation innovations [9]. LCDs devour significantly less force than LED and gas-show shows since they chip away at the standard of obstructing light instead of transmitting it. An LCD is made with either an inactive framework or a functioning lattice show network [10]. A functioning grid has a semiconductor situated at every pixel crossing point, requiring less current to control the luminescence of a pixel. Therefore, the current in a functioning lattice show can be turned here and there more often, improving the screen revive time. Passive framework LCD's have double filtering, implying that they check the matrix twice with current in the equivalent.

**Piezoelectric Sensor**

Piezoelectric sensors are used in different endeavors, machines and applications. Whether or not you're attempting to vehicle speed, or to quantify the force of a moving toward quake, the contraption you're most likely using is seen as a vibration sensor. Some of them work toward quake, the contraption you're most likely using is seen as a vibration sensor. Some of them are isolated, and others require their own ability source. Various machine working conditions concerning temperature limits, appealing fields, vibration expand, repeat run, electromagnetic closeness and static delivery (ESD) requirements and the essential sign quality require the necessity for a combination of sensors.

**Node MCU Wifi Module**

NodeMCU is an open-source advancement board and firmware situated in the generally utilized ESP8266 - 12E WIFI module. It permits you to program the ESP8266 WIFI module with the straightforward and groundbreaking LUA programming language or Arduino IDE.

With only a couple of lines of code you can build a WIFI association and characterize input/output pins as indicated by your requirements precisely like Arduino, transforming your ESP8266 into a web worker and much more [11]. It is what might be compared to ethernet module. Presently you have web of things genuine instrument [12].

With its USB-TTL, the NodeMCU Dev board bolsters legitimately blazing from USB port. It consolidates highlights of WIFI access point and station + microcontroller [13]. These highlights make the NodeMCU extremely incredible asset for WIFI organizing. It very well may be utilized as passageway and additionally station, have a webserver or associate with web to get or transfer information.

**Buzzer**

A bell takes a type of info and produces a sound in light of it. They may utilize different intends to deliver the sound; everything from metal clappers to electromechanical gadgets [14]. A ringer needs to have some method of taking in vitality and changing over it to acoustic vitality. Numerous bells are important for a bigger circuit and take their capacity straightforwardly from the gadget's capacity source. In different cases, nonetheless, the ringer might be battery controlled so it will go off in case of a mains blackout [15].
the crisis conditions like tremor, flood, and so forth the office of broadcasting the message is added. Framework is special in its capacity to screen the extension climate, it sends ecological information through remote correspondence and sends alarms to the extension, the executive’s staff for example checking centre progressively for brief activity additionally to users. The fundamental target of Extension Monitoring System utilizing IOT is to spare the lives of the individuals, to shield from mishap.

References

[1]. Y. Sun, “Research on the Railroad Bridge Monitoring Platform Based on the Internet of Things,” International Journal of Control and Automation, vol. 7, no. 1, pp. 401–408, 2014.
[2]. P. Kinney, “ZigBee technology: Wireless control that simply works”, 2003.
[3]. K. Gill, S.-H. Yang, F. Yao, and X. Lu, “A ZigBee-based home automation system,” IEEE Transactions on Consumer Electronics, vol. 55, no. 2, 2009.
[4]. M. Wiser, “The Computer for the 21st Century —Scientific American Special Issue on Communications,” Computers, and Networks, no. 1, pp. 94–104, September 1991.
[5]. M. Weiser, “Hot topics-ubiquitous computing,” Computer, vol. 26, no. 10, pp. 71–72, 1993.
[6]. K. Siddharthraj, R. Dhivyadevi, T. Shanmugaraja, S. Mithunraj, S. Sophia,”Smart Infotainment System For Vehicular Network”, in International Journal of Engineering & Technology, Vol 7 No.3.27 (Scopus) Aug 2018, P.no, 368-370.
[7]. C. Alippi, R. Camplani, C. Galperti, and M. Roveri, “A robust, adaptive, solar-powered WSN framework for aquatic environmental monitoring,” IEEE Sensors Journal, vol. 11, no. 1, pp.45–55, 2011.
[8]. M. T. Lazarescu, “Design of a WSN platform for long-term environmental monitoring for IoT applications,” IEEE Journal on Emerging and Selected Topics in Circuits and Systems, vol. 3, no. 1, pp. 45–54, 2013.
[9]. S. Misra, V. Tiwari, and M. S. Obaidat, “LACAS: learning automata-based congestion avoidance scheme for healthcare wireless sensor networks,” IEEE Journal on Selected Areas in Communications, vol. 27, no. 4, 2009.
[10]. Y. Zhang, L. Sun, H. Song, and X. Cao, “Ubiquitous WSN for healthcare: Recent advances and future prospects,” IEEE Internet of Things Journal, vol. 1, no. 4, pp. 311–318, 2014.
[11]. J. M. Corchado, J. Bajo, D. I. Tapia, and A. Abraham, “Using heterogeneous wireless sensor networks in a telemonitoring system for healthcare,” IEEE transactions on information technology in biomedicine, vol. 14, no. 2, pp. 234–240, 2010.
[12]. M. Siddharthraj K, Ms.Monisha B, Ms.Karthika , “IoT Based Patient Fall Detection” in International Journal of Advanced Science and Technology, vol.29, Aug 2020, ISSN : 2005 – 4238 IJAST. pp. 1496 – 1505.
[13]. J. Zhang, G. Song, H. Wang, and T. Meng, “Design of a wireless sensor network-based monitoring system for home automation,” in Future Computer Sciences and Application (ICFCSA), 2011 International Conference on, 2011, pp. 57–60.
[14]. B. Zhou, J. Cao, X. Zeng, and H. Wu, “Adaptive traffic light control in wireless sensor network-based intelligent transportation system,” in Vehicular technology conference fall (VTC 2010-Fall), 2010 IEEE 72nd, 2010, pp. 1–5.
[15]. M. Tabaisat, Q. Qi, Y. Shang, and H. Shi, “Wireless sensor-based traffic light control,” in Consumer Communications and Networking Conference, 2008. CCNC 2008. 5th IEEE, 2008, pp. 702–706.