DogoRangsang Research Journal
ISSN: 2347-7180

UGC Care Group I Journal
Vol-13 Issue-01 June 2023

IoT Based Automatic Vehicle Accident Detection and Tracking System

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Abstract

Road accidents are becoming increasingly common, particularly among two-wheelers. Timely medical assistance can help save lives. This system is designed to notify a nearby medical centre about an accident in order to give urgent medical assistance. The associated accelerometer in the car detects vehicle tilt, and the heartbeat sensor on the user's body detects aberrant heartbeats to determine the severity of the accident. As a result, the system makes a judgement and communicates the information to the smartphone, which is linked to the accelerometer through gsm and GPS modules. The Android software on the phone will send text messages to the nearest medical facility and friends. The programme can also save time by sharing the specific location of the accident.

INTRODUCTION

This project describes an autonomous car accident detection and warning system that makes use of GPS and an IOT modem.

The PIC Microcontroller is interacting with a GPS receiver, an ADXL335 accident sensor, an LCD, a buzzer, and an esp8266 wi-fi module. The microcontroller will continually monitor the vehicle location from the GPS module and transfer this location to the user's mobile in the form of latitude and longitude values through the esp8266 wi-fi module, as well as show the same data on the LCD.

When an accident sensor detects a car accident, the microcontroller uses GPS to determine the position of the vehicle and sends this information, along with an alert notification, to the user's mobile application through IOT, as well as activating the buzzer for notifications. The project's status will be displayed on the LCD.

LITERATURE SURVEY:

M. Syedul Amin, J. Jalil, and M. B. I. Reaz, "Accident detection and reporting system using GPS GPRS and GSM technology", *Proc. Int. Conf. Information. Electron. Vis. (ICIEV)*, pp.640-643, May 2012

An accident detection and messaging system will be installed in the car, which will be useful during an accident since the hospital, police, and emergency contacts will be notified instantly. GPS and GSM technologies are used to operate the system. A vibration sensor detects a collision by utilising the piezoelectric effect, which is the capacity of certain materials to create an electric charge when mechanical force is applied. When a collision is detected, the GPS module locates the accident (latitude and longitude) and uses the GSM module to send a message to the hospital and the emergency contact. The ambulance comes at the GPS-tracked position, and so the sufferer is treated as quickly as possible, decreasing the help time. In the event of a small mishap, the sufferer can deactivate a switch (button) to prevent emergency contacts from being notified. This system is made up of Micro controller, GPS, IOT, and a vibration sensor that detects an accident and promptly informs authorities. It also combats false alarms by employing a switch supplied for the driver. However, because the system does not disclose the victim's medical data and history, there may be a delay in the victim's treatment. In this regard, we will improve our system.

1. SOLUTION STRATEGY

The fundamental goal of this work is to create an application that uses sensors found in mobile phones such as GPS and Accelerometer to detect collisions if there is a sudden external disruption in speed using the Sensor Fusion Based Algorithm. When there is a sudden disruption to the mobile phone, the user is warned with an alert message before sending the call for help signal using the data acquired from the Accelerometer sensor. If there is no need for an emergency, they can cancel it within 10 seconds. However, if they hit the "Call Help" button or leave the alert message ignored for more than 10 seconds, the "request for help" message will be sent to the recipient.

DETAILED DESIGN

The chapter includes the project's design specifications, block diagram, circuit diagram, and component list.

BLOCK DIAGRAM

This chapter discusses the project's block diagram as well as the design of individual modules. Figure depicts the diagram

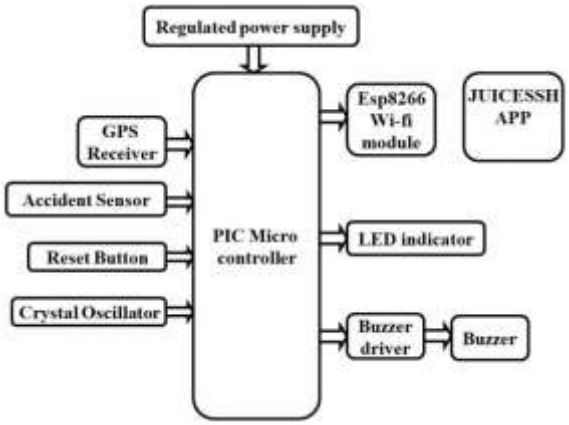

Figure: BlockDiagram

MICRO CONTROLLER

Figure 4.4 Micro-controller

A microcontroller is a self-contained device that includes a CPU, memory, and peripherals that may be utilised as an embedded system. The 16f72 microcontroller is a powerful (200 millisecond instruction execution) and simple-to-program CMOS FLASH-based 8-bit microcontroller. The PIC 16F72 is a 28-pin IC with three ports: port A (6 pins), port B (8 pins), and port C (8 pins), excluding the supply pins (four pins).

OSCILLATOR

Figure: Oscillator

An electronic oscillator is a circuit that generates a repeated electrical signal, often a sine wave or a square wave.The intrinsic clock frequency of the PIC microcontroller is 4mhz. We are providing a 20Mhz clock.

GPS Module:

Figure: GPS-Module

The position update rate is 5Hz. The cold start time is 38 seconds, while the hot start time is 1 second.Rates may be set between 4800 and 115200 Baud. (The default is 9600).SuperSense ® Indoor GPS tracking sensitivity is -162 dBm. Help with SBAS (WAAS, EGNOS, MSAS, and GAGAN).GPS antenna separated 18 x 18mm.

ACCIDENT SENSOR:

Figure: Accident-Sensor

A micromachined structure on a silicon wafer serves as the sensor. Polysilicon springs suspend the structure, allowing it to deflect smoothly in any direction when subjected to acceleration in the X, Y, and/or Z axes. The capacitance between fixed plates and plates attached to the hanging structure changes as the structure moves. This capacitance change on each axis is nverted.

Esp8266_WifiModule:

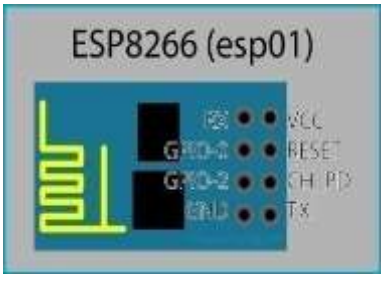

Figure: Esp8266 Wifi Module

The ESP8266 Wi-Fi Module is a self-contained SOC with an inbuilt TCP/IP protocol stack that can connect to your Wi-Fi network through any microcontroller. The ESP8266 may host an application or offload all Wi-Fi networking functionality from another CPU. Each ESP8266 module has an AT command pre-programmed. set up

LED Indicator:

Figure: LED_Indicator

Led indicators have a life expectancy of at least 10 years and use 90% less power than traditional indicators. Lead will produce varied colours (red, yellow, green, etc.) depending on the type of substance (Ga, As, p). LEDs used to generate low-intensity red light, while contemporary versions emit extremely intense visible, ultraviolet, and infrared light. LEDs are utilised as indication lights in many products and are becoming more popular for illumination. As a useful electrical component, it was introduced.

BUZZER:

Figure: Buzzer

When a voltage is supplied across the two electrodes, the piezoelectric material mechanically deforms. The movement of the piezo disc within the buzzer produces sound in the same way as the movement of the ferromagnetic disc in a magnetic buzzer or the speaker cone stated above does.

Regulated Power Supply:

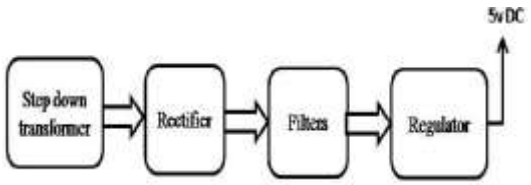

Figure: Regulated Power Supply

The circuit requires a 5v DC power supply. Because we were using low-power devices, we only needed 5v current to power the entire circuit. Because the equipment is designed for lower power receivers, the efficiency of the circuit will alter as we raise or reduce the power supply. If we modify the authority we provide, the outcome will change appropriately.

. **OPERATIONAL_CIRCUIT*:***

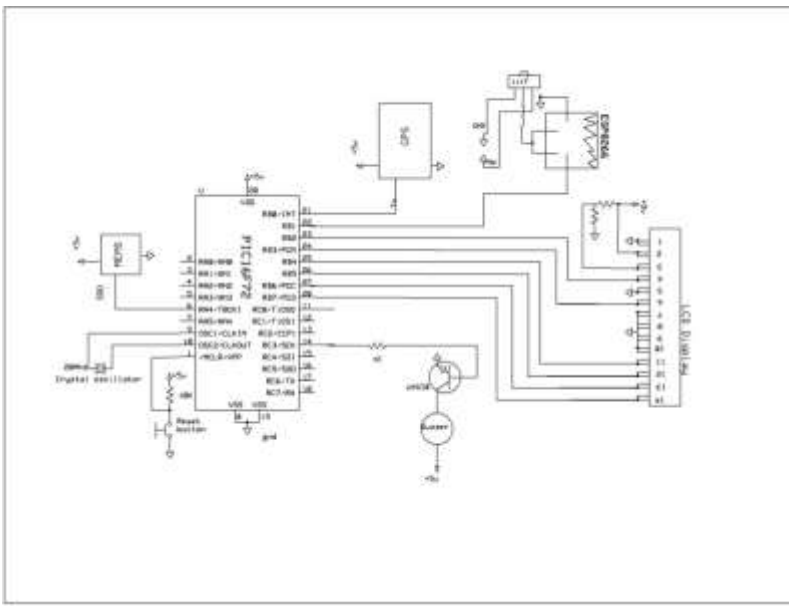

Figure: schematic diagram of IOT Based automatic vehicle accident detection and Trackingsystem

The interface between each component and the microcontroller and ESP8266WI-FI module is shown in the schematic diagram above for the location that will be determined based on the needs of the user. The microcontroller's 9th and 10th pins are used to link a crystal oscillator and a regulated power supply. LEDs are also connected to the microprocessor through resistors. RESULTS:

The "IOT Based Automatic Accident Detection and Tracking System" project was created for a GPS, ESP8266, and accident sensor-based car accident detection and warning system.

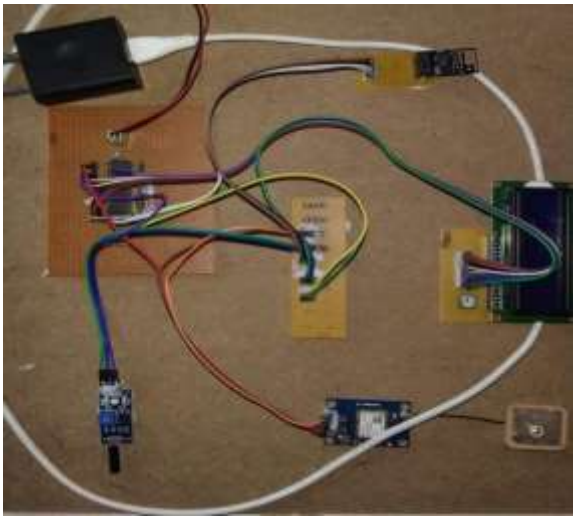

Figure: The project's interior design

CONCLUSION:

It has been created with integrating features for all the hardware parts utilised. Every module's presence has been carefully considered and arranged, which helps the unit function at its best. Second, employing cutting-edge ICs, the project has been effectively carried out with the aid of developing technology. As a result, the project's design and testing were successful.

FUTURE SCOPE:

We can save time and track vehicles easily with the help of this initiative.We may record the journey of the vehicle by connecting an MMC or SD card to the system.

REFERENCES:

1. The websites that were utilised for this assignment were: 1. www.wikipedia.com
2. 2. www.allaboutcircuits.com
3. 3. www.microchip.com

4. 4. www.howstuffworks.com

Books recommended

1. Raj Kamal — System Design, Microcontroller Architecture, Programming, and Interfacing.
2. Embedded systems for Mazidi and Mazidi.
3. David L. Jones' PCB Design Tutorial.
4. Microchip's PIC Microcontroller Manual.
5. Michael J. Pont's embedded Co