DESIGN THINKING BASED ENVIRONMENTAL MONITORING THROUGH IOT INTELLIGENT ACCIDENT TRACKING AND DETECTION SYSTEM

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ABSTRACT

Road accident and traffic congestion are the major problem in urban areas. Currentlythere is no technology for accident detection. To overcome the drawback, we are in need of implementing an accident detection of accident through sensors provided in vehicle. A GPS and IOT module inthe concerned vehicle will detect the information about the person's health and car conditions. This system is fully automated thus it finds the accident spot and also help us to reach the hospital in time at the point when an accident will happen, the location of the accident is detected by a GPS module and an alert message will be sent with location via GSM module to the registered mobile numbers. This alert message will help in giving quick assistance to the victim. The response time of the proposed device is toolittle, it implies when the vehicle meets mishap, within a couple of moments the message is transmitted, hence helps in saving the lives of a large number of people.

1. INTRODUCTION

Disaster is referred to a student event, such an accident or a natural catastrophe that causes great damage or loss of life. Scientists always tried their best to facilitate humans with several products, strategies and methodologies. As far as there is a concern of the human health issues, lots of way have been carved to accommodate humanity. From emergency actions to a long-time patient care quick response action is necessary to avoid a lot of damage taking place in humanlife. In developing countries like Pakistan, a huge number of people die in road accident than any other reason. The major causes are not just accidents but unknown crash spots play significant role.

Even after a couple of hours of the tragedy, spot cannot to be located to start rescue operation. In consequences, a lot of precious lives cannot save in time. After keeping human life in mind, this workpresents an automatic accident detection system has which is a savior in life. The proposed system has the capabilities to automatically detect an accident and quickly inform to the emergency or concerned family member with precise location through short message service (SMS).

The contacted one can are a lot of occasions on which people have no access to any nearby hospital to get quick assistance before the severe loss. In that situation, system consists of hardware and software modules. The hardware module is based on the Arduino board with vibration sensor and accelerometer is deployed in vehicle. On the other hand, software part comprises an Android application that is installed on a person mobile that is driving the vehicle.

2. LITERATURE SURVEY

2.1 Smart accident detection system using PIC16f877a was proposed by Fizzah Bhatti, Munam Ali Shah, Carsten Maple, Saif UI Islam in the year 6 May 2019, the proposed approach aims to take advantage of advanced specifications of smart phones to design and develop a low-cost solution for enhanced transportation systems that is deployable in legacy vehicles. In this context, a customized Android application is developed to gather information regarding speed, gravitational force, pressure, sound, and location

2.2 Smart accident detection system using GPS was proposed by N. Shankar, B. Indurani, in the year December 2018 from statistics it is also evident that people who face accident die mainly due todelayed rescue operation [2]. Thus, to overcome this problem our proposed system tracks the vehicle location and monitors it using GPS & GSM. When a vehicle meets with an accident, the installed Vibration sensor detects it and the location of the vehicle sent to respected authorities. Alcohol Detection unit switches off the engine when a person influenced by alcohol tires to drive the vehicle.

2.3 Accident detection Internet Of things was proposed by Swetha Bergonda, Shruti, Sushmita in the year April 2017 this system is proposed with the vibration sensors that we are using in our project sense the obstacle, and then it sends interrupt to Raspberry Pi.The GPS receives the location of the vehicle that met with an accident and gives the information back. This information will be sent to a mobile number through a WhatsApp message. This message will be received using internet present in the circuit. The message will give the information of longitude and latitude values.
Using these values, the position of the vehicle can be estimated

3. EXISTING SYSTEM

3.1 After keeping human life in mind, this work presents an automatic accident detection system which is a savior of life. The proposed system has the capabilities to automatically detect an accident and quickly inform to the emergency services or concerned family member with precise location through Short Message Service (SMS). The contacted one can send rescue services as soon as possible. Since, there are a lot of occasions on which people have no access to any nearby hospital to get quick medical assistance before the severe loss. In that situation, system wills fulfill the gap between identification and alert.The proposed system consists of hardware and software modules. The hardwaremodule is based on the Arduino board with vibration sensor and accelerometer is deployed in vehicle. On the other hand, software part comprises an Android application that is installed on a person’s mobile that is driving the vehicle.

4. PROPOSED SYSTEM

Proposed system is used to analyze and solve the difficulty in accident detection and tracking using IoT (Internet of Things). It plays vital role in collecting information. IoT has been already in raising with novel multiple techniques.Internet of Things (IoT) is the emerging paradigm, which contains huge amount of smart object and smart devices connected to the internet for communicating with each other. IoT devices are used in many fields which make the users' day to day life more comfortable. The reason for AI to overcome IOT is it transfers data without or with human intervention. It is nothing about human to human or computers interaction as it has UIDs (unique identifiers). AI is about making your system behave smarty according to humanbehavior, whereas IOT is all about the sensors of devices**.**

4.1 Object Tracking and System Detection

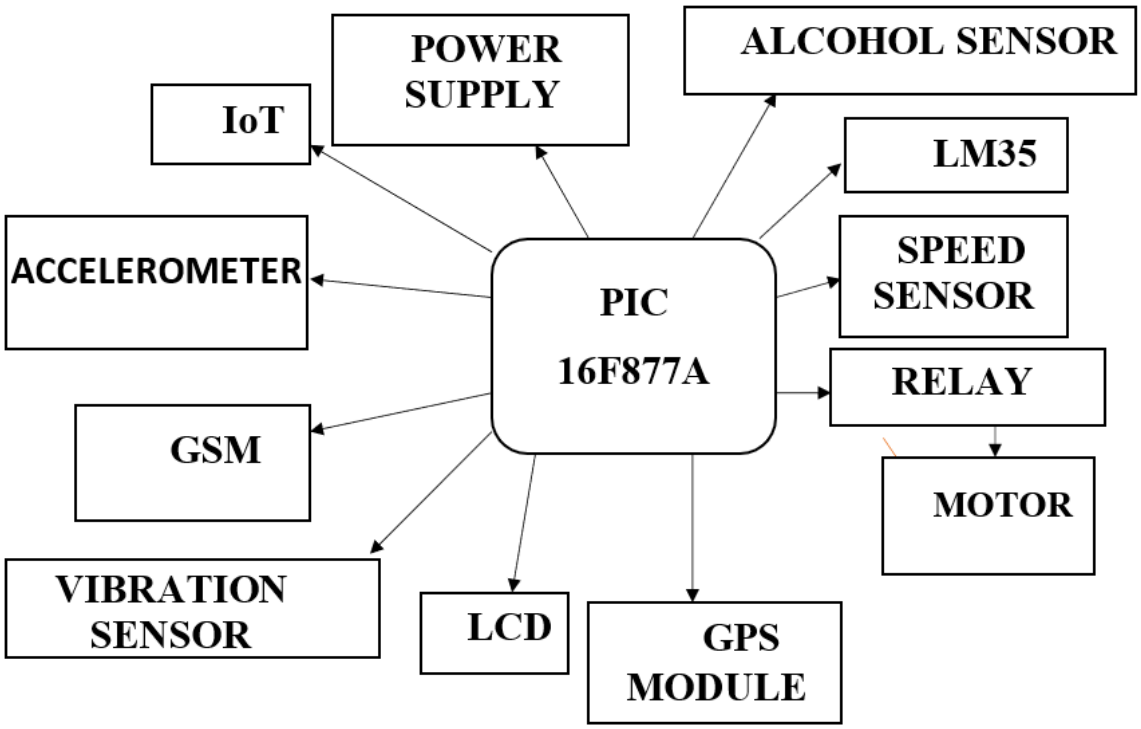
Face tracking can be considered to be a special category of object tracking. Most scientists implement object tracking methods for face tracking as control experiments. In the beginning, an initial state such as a bounding box of a target object is given, and then, feature extracting and pattern matching methods are conducted in all the subsequent frames. Object tracking has been progressing all the time, as the release of many benchmark datasets and competitions including RGB-T , MOT16 , and Lasot , as well as the development of deep learning. CF has been widely used and inspired a lot of good work in tracking missions. It proved, for the first time, that there is a connection between ridge regression and classical correlation filters. The work accelerated the cost expensive matrix algebra to fast Fourier transforms with computational complexity.

In the meantime, the KCF was first presented and a solution of computing kernels on shifts was proposed as well based on radial basis and dot product. proposed MOSSE which greatly improved the performance of tracking methods with respect to CF. It reduced the computational complexity, and the accuracy increased at the same time. However, it only concerned gray-scale features that this kind of low dimension feature space does not have a good representation. On the other hand, it is unable to adapt object scale variance as it concentrates on translational motion of the center point of the target object between frames and does not take into consideration the scale change of the target object reflected on the screen in the process of moving scale variance. To this end, Danelljan et al. proposed DSST [59] making an improvement on MOSSE by deploying fHOG features instead of gray-scale features to increase the dimension of features from 2 to 28. What is more, the object scale variance is concerned in DSST.

Apart from traditional object tracking methods, CNN-based methods have had great progress and outperform traditional methods a lot on the public benchmarks. [60] introduced a generic object tracking network using a regression mechanism by watching videos offline of objects moving in the world.

To be specific, the regression-based tracking network only requires a single feed-forward pass through the network to directly regress the location of the target object. Zhu et al. [61] made progress on Siamese networks, which conduct tracking through similarity comparison strategy, by learning distractor-aware Siamese networks for accurate and long-term tracking. MDNet is one of the most successful generic object tracking methods.

It consists of a shared CNN, which is trained on a large set of videos with tracking ground truths, for feature representation extraction. After training, all the branches of domain binary classification layers are replaced. Then, the model was fine-tuned online during tracking to adapt to the new domain. Regarding bounding box regression, they set up an online training linear model to generate the final bounding box.



5. HARDWARE REQUIREMENT

With the development of AI technology [1–3], IoT [4–7] is receiving more and more attention from academia. It emphasizes that all objects connected to the internet (including people and machines) have unique addresses and communicate through wired and wireless networks and have been deeply integrated into humans' daily life. For example, a doctor can conduct the diagnosis remotely or even complete the surgery via a telemedical system [8, 9]; by collecting personal information, smart devices may provide personal recommendations which are most suitable for him/her [3, 10]; and even the satellite in the universe can be utilized more efficiently for better serving mankind [11]. However, the smarter the humans' life is, the more dangerous the privacy is. Every smart device is "monitoring" you, so personal data protection and privacy-preserved problems should be paid more attention to. Especially the release of GDPR in EU and EEA in 2016, more and more researchers have been digging into privacy-related works.

The development of IoT-based MCS drives a sharp increase of human face-related techniques, such as face detection, face tracking, and face recognition. Applications of beauty cameras, security access, surveillance and tracking suspect, etc., have been widely used around people's life, for example, smart city and smart campus. It is with no doubt that accurately detecting and tracking faces are essential steps for the aforementioned missions.

Additionally, stably and smoothly tracking face bounding boxes from a sequence of continuous images is also required for some special missions in the field of IoT-based MCS, e.g., face biological signal extraction, silent face antispoofing, and facial expression analysis, as stable and smooth face bounding boxes captured along frames can reduce the signal noise significantly.

Regarding the traditional visual methods, a lot of prior face tracking methods take tremendous spirits on feature engineering and color spaces. For the long-term tracking of human faces in the unconstrained video, face tracking has been generally treated as common object tracking, e.g., is a typical method which comes from TLD and also is one of the earliest attempts to apply the tracking-by-detection diagram for the face tracking task. Although common TLD can also deal with face tracking work, [26] upgraded it to be more robust even when viewpoints change. In detail, it adapted a frontal face detector from , which is the state-of-the-art method at that time. A validator was deployed on the top of the detector outputting confidence that is how the current image patch corresponds to a face. [30] proposed a face tracking approach where optical flow information is incorporated into the *Viola-Jones* face detection algorithm . Its outputs proceed to build a likelihood map where face bounding boxes are extracted. FT-RCNN is an efficient face tracking method based on Faster R-CNN [33]. A tracking branch is conducted into Faster R-CNN and jointly performs face detection and tracking, but its running time cost is expensive.

Face detection methods are eligible to do face tracking. However, face tracking turns to more concentrate on frame-wise face pattern connection. Thus, as for face tracking, the relationships of the patterns between frames are taken into consideration rather than detecting faces in each individual frame naively.

In this paper, we present a novel method for super real-time and long-term face tracking by combining CNN and optical flow (see Figure 1). There are three principal components: a cascade lightweight face detector that takes responsibility for generating an initial face bounding box, a face tracker based on optical flow [28], and a face identifier (a very shallow FCN) who provides face confidence for binary classification. The face identifier guarantees that the face tracker does not focus on nonface patch. The optical flow field is always continuous and uniform; the face bounding boxes generated from our method are extraordinarily stable and smooth. Additionally, C-OF can be easily transferred to any other missions which meet the stable tracking requirement, such as object tracking and person reidentification. Overall, we make five main contributions:

5.1 PIC 16F877A

The architectural decisions are directed at the maximization of speed-to-cost ratio. The PIC architecture was among the first scalar CPU designs, and is still among the simplest and cheapest. The Harvard architecture—in which instruction and data come from separate sources simplifies timing and microcircuit design greatly, and this benefits clock speed, price, and power consumption. The PIC instruction set is suited to implementation of fast lookup tables in the program space.Such lookups take one instruction and two instruction cycle

Fig 5.1

5.2 ALCOHOL SENSOR

The alcohol sensor is technically referred to as a MQ3 sensor which detects ethanol in the air. When a drunken person breathes near the alcohol sensor it detectsthe ethanol in his breathe and provided an output based on alcohol concentration. If there is more alcohol concentration more LEDs would light. The module has a built-in potentiometer for calibrating the digital output (DO). By during the no of the potentiometer, you can set a threshold. So that when the alcohol concentrationexceeds the threshold value, the Status LED will light up and the module will output HIGH

Fig 5.2

5.3 TEMPERATURE SENSOR

Temperature sensors work by providing readings via electrical signals. Sensors are composed of two metals that generate an electrical voltage or resistance when a temperature change occurs by measuring the voltage across the diode terminals. When the voltage increases, the temperature also increases.

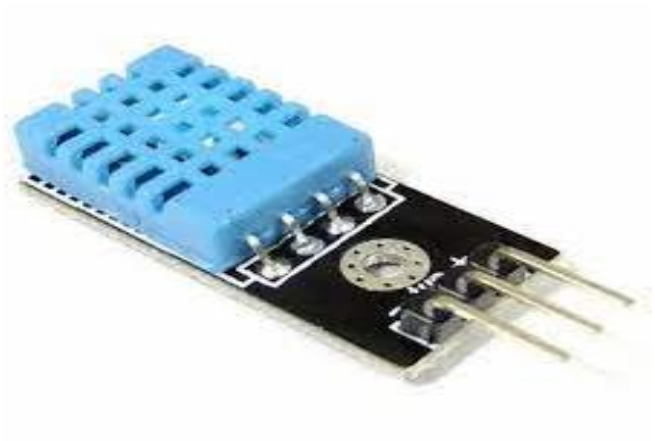


Fig 5.3

5.4 DC MOTOR

DC motor converts direct current electrical power into mechanical power. DC or direct current motor works on the principal, when a current carrying conductor is placed in a magnetic field, it experiences a torque andhas a tendency to move. This is known as motoring action. When magnetic field and electric field interact, they produce a mechanical force. Thus, a DC motor can be used at voltage lower than the rated voltage in a motor. But, below 1000 rpm, the speed becomes unstable, and the motor will not run smoothly. However, using the motoroutside this range will result in high temperature rises and deterioration of motor parts.

Fig 5.4

5.5 VIBRATION SENSOR

This module features an adjustable potentiometer, a vibration sensor, and a LM393 comparator chip to give an adjustable digital output based on the amount of vibration. The potentiometer can be adjusted to both increase and decrease the sensitivity to the desired amount. The module outputs a logiclevel high (VCC) when it is triggered and a low (GND) when it isn't. Additionally, there is an onboard LED that turns on when the module is triggered.

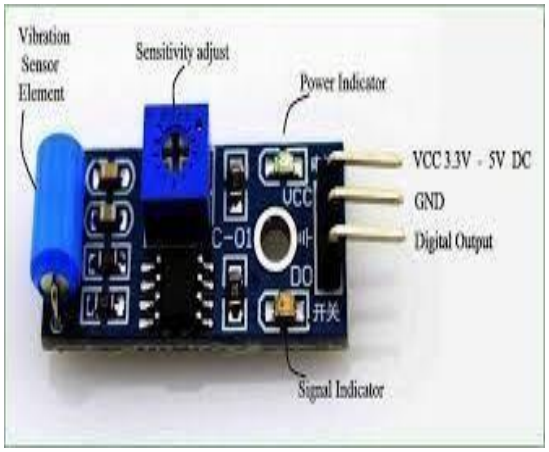


Fig 5.5

5.6 SPEED SENSOR

The speed sensor is made up of a toothed metal disk that is basically mounted onto the crankshaft and a stationary detector that functions to cover a magnetic coil through which the current passes through. Now as these metal teethbegin moving past the coil, the magnetic field is likewise distracted. Hence, a wave of pulse in the current is created. The computer readily calculates the speed at which the engine is travelling through by means of the numbers of the crankshaft's rotation

Fig 5.6

5.7 ACCELEROMETER

An accelerometer is a tool that measures proper_acceleration. Proper acceleration is the acceleration (the rate of changes of velocity) of a body in its own instantaneous rest frame; this is different from coordinate acceleration, whichis acceleration in a fixed coordinate system. Accelerometers have many uses in industry and science. Highly sensitive accelerometers are used inertial navigational systems for aircraft and missiles. Vibration in rotating machines is monitored by accelerometers.

Fig 5.6

6. SOFTWARE REQUIREMENTS

The Arduino UNO is programmed using the ARDUNIO IDE, our Integrated Development Environment common to all our boards and running both online and offline. The Arduino Integrated Development Environment (IDE) is a cross platform application (for Windows, macOS, Linux) that is written in functions from C and C++.

7. RESULT AND DICUSSION

Based on the studies our project is proposed with a result as proposed system has the capabilities to automatically detect an accident and quickly inform to the emergency or concerned family member with precise location through short message service (SMS). The contacted one can are a lot of occasions on which people have no access to any nearby hospital to get quick assistance before the severe loss. In that situation, system consists of hardware and software modules. The hardware module is based on the Arduino board with vibration sensor and accelerometer is deployed in vehicle. On the other hand, software part comprises an Android application that is installed on a person mobile that is driving the vehicle.

8. CONCLUSION

An automatic accident detection system is presented in this work to reduce the death casualties caused by the road accidents. The proposed system consists of hardware and software components. The hardware unit comprises of accident detection sensors that are controlled by Arduino board and is fitted in the vehicle. On the other hand, software component is Android mobile application installed indrivers Smartphone. So, in case of an accident the notification along with precise location of accident is automatically sent to concerned family member or rescue service within a few seconds.

9. REFERENCES

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