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Design of a Hybrid Based Autonomous Vehicle Using IoT

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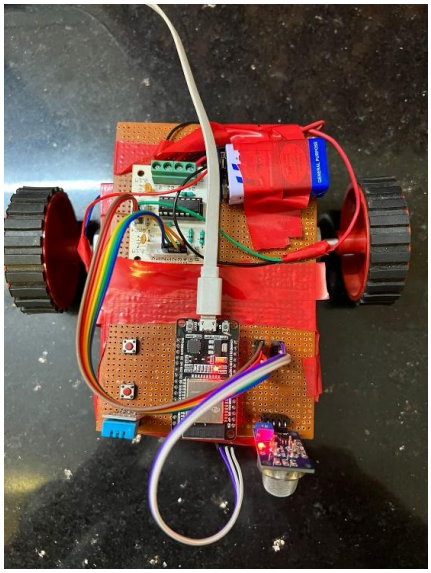
Abstract: *The world seems to constantly move forward toward technological advancements in the current century. Automation is one among the technological upgrade that the human race introduced to this phase of advancement and we are closer than never in the domain of automated vehicles. Automobile manufacturers have realized the potential and have started to pound upon this opportunity by investing in their R&D Departments. This project is also one such motive towards the development of this field by adding our innovation to it. We have tried to incorporate a few of the features that we think would be a valuable addition to the conventional automated vehicle such as alcohol detection, GPS Tracker, Road Sensing and Temperature Sensors.*

Keywords: IoT, Health Monitoring, MQ-5(Gas Sensor), Ir Sensor, L29 Motor driver, GPS Module, ESP32,DHT 11, Push button

I. INTRODUCTION

The "Smart Autonomous" is predicated on the concept of a pre-crash system. Nowadays, the increasing range of traffic accidents because of a driver's diminished vigilance stage has become a full-size issue for society.

Element of these mishaps are the after effects of the driver's medical condition. But a lion's share of these accidents is identified with driver's fatigue or hypo-vigilance. Auto crashes associated to driver drowsiness most of the instances result in fatal wounds and deaths. According to the "Global repute file on road safety 2018" which was once launched in December 2018 by way of WHO, it is highlighted that the annual quantity of deaths due to road accidents has reached to 1.35 Million and they may also occur due to alcoholic driving, surprising medical problems and over-speeding are likewise the primary reasons for avenue accidents. Traditional transportation framework is never again adequate. Researchers have deployed different techniques and quite a number technologies are being developed to solve this problem. These applied sciences are used for detecting alcohol consumption by the driver for preventing the street accidents.



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Some technologies prevent road accidents with the aid of detecting the health parameters of the driver and contacting the rescue system. Some other technologies avoid accidents by way of sensing and alerting the driver in case of over-speeding. All these systems were designed the usage of a number methods for the identical motive with varying overall performance versus cost trade-offs. This paper introduces a device that merges 4 elements i.e., alcohol consumption, monitoring the health parameters of the driver and switching the car to auto driving mode if the driver is recognized unfit to drive. The organisation of the paper is such that the work associated to evolution of Health Monitoring, Alcohol detection, Air quality checking, Speed control. Using GPS module monitoring gadget will assist to locate the stolen automobile by means of giving coordinate of area using GPS and will enlarge the threat of recovery. It serves to determine the location of the car so that it can navigate to near with the aid of strength financial institution when cost is drained off. In this paper, an IoT has been proposed which is in a position to perform exceptional kinds of features within limits of certain time, accuracy and cost. This IoT base machine is low priced and can function remotely. Biological parameters of patients is detecting through sensors. The use of sensor with ESP32 and GMS has made the affected person monitoring device extra effective [1].

II. Literature Review

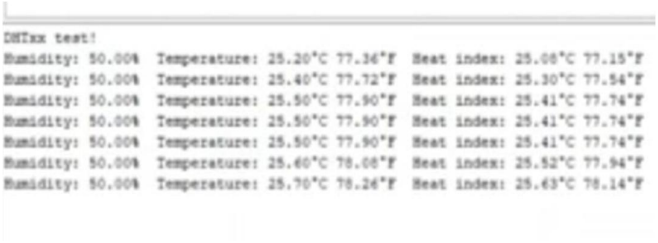
This section highlights the previous research aimed toward the development of a smart car. The literature assessment is divided into 4 parts every discussing the evolution of each of the sub-system of our project. Many researchers have implemented such techniques that are either solely workable as prototypes or are unable of providing actual time results. Some were solely alerting the driver and only lowering the after effects of crashes as those had been not environment friendly adequate in preventing the crash. No one earlier than has laboured on implementing all these duties i.e., Air pleasant, Health monitoring, alcohol detection and Speed control together inside an automobile.

III. Research Methodology

This work is break up into 4 phases to acquire the research objectives, followed via system integration.

3.1 Analysis of Body Temperature

The physique temperature is one of the most fundamental parameters of a person's health. Any fluctuations in the body temperature affects the functionality of the blood circulation consequently the heart rate. The blood circulates via the physique quicker when the temperature rises to carry the temperature again to its superior value.



The above image suggests a sample of physique temperature fluctuations whilst a patient was monitored. The representation of an make bigger in temperature of the physique. When the affected person used to be physically stressed, the temperature of the surroundings is also a factor. When the patient stopped the physical exercise and got here to rest, the body temperature started to drop to its gold standard value. So, it can be established that a full-size make bigger in recreation of the patient of due to other bodily reasons or environmental reasons, the temperature of the physique fluctuates as a result and reasons the heart to pump faster or slower for altering the blood circulation to convey lower back the temperature to its most excellent value.

3.2 Alcohol Detection

The objective right here is to graph an alcohol detection system that ensures the protection of driver, pedestrian and the vehicle under inebriated using circumstances. The machine not only issues warning alerts in case the driver's alcohol consumption raises above a positive threshold however additionally switches the vehicle to auto pressure mode in case of further liquor consumption as indicated by means of driver's Blood Alcohol Content .

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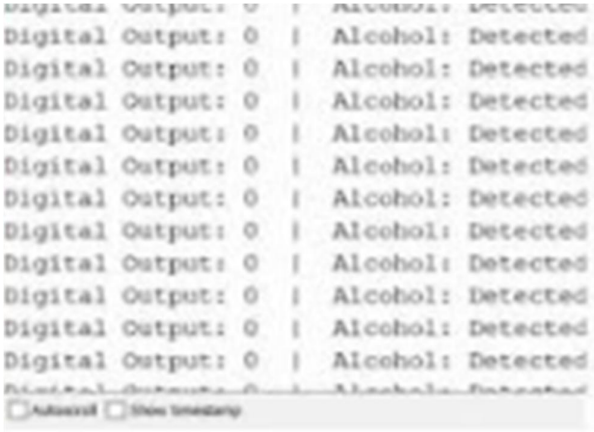
This is because MQ-5 sensor's output is analog in nature whilst ESP32 can only deal with digital inputs. Thus, to setup the alcohol sensor with Pi we want to use the ADC for era of numerical readings. The ADC reads the analog output of the sensor and converts it into a numerical value. After making terrific connections for configuration of MQ-5 sensor with ESP32, the sensor is initialized and calibrated. Now the sensor is all set for studying the alcohol content material in human breath. To precisely determine the driver's BAC through examining his/her breath, the sensor must be placed at such a function the place it can easily sense the driver's breath. For this purpose, the sensor is mounted close to guidance wheel. The sensor starts obtaining raw data. The acquired analog values after analog to digital conversion are compared with a predefined threshold. For comparison we have set two thresholds. If the character consumes alcohol all through driving, then the machine determines the route of motion primarily based on BAC threshold. Upon crossing the respective thresholds there are two stages of drunkenness to be determined. The first stage pronounces the individual to be barely under the influence of alcohol and shows warnings on IoT App. In the 2d stage, the driver is considered exceptionally under the influence of alcohol and upon detecting ethanol in this stage the automobile switches to auto-drive-mode.

3.3 Vehicle Speed Reduction Using IR Sensor

An infrared sensor is one of the essential parts of this project. An IR sensor can be used for various reasons to sense certain characteristics of its surroundings such as measuring the heat being emitted by an object and detecting motion by either emitting or detecting infrared radiation. This system is designed to detect low-speed zones such as schools or hospitals. In this system, IR Sensors are the crucial part of the circuit design that detects the Vehicle's speed. This system helps in speed reduction of the vehicle by identifying various slow zones within the map by differentiating road colours. The circuit is programmed to reduce speed every time the roads are black.

3.4 Air Quality Analysis

Air Quality detection is achieved by using a humidity sensor and by transferring data to an electronic device using an IoT system. The humidity sensor helps in reporting the moisture and air temperature of the vehicle's interior. A Humidity sensor works by detecting changes that alter electrical currents or temperature in the air and is as important as many other vehicles features as it affects comfort, overall health, and air quality.



3.5 GPS Module using IOT

GPS is a highly essential feature for any automated vehicle. In this project, we use a neo 6m GPS module to gather location data from the IoT cloud and to also map the area it works to travel from point A to point B. One of the main reasons to use an u-Blox NEO-6M global positioning system (GPS) module is because it is a highly cost-effective and high-performance GPS module that can be conveniently integrated with a broad range of microcontrollers. The location data of the vehicle is displayed on an electronic device using blynk app through the cloud which can also be used as a theft-proof system.

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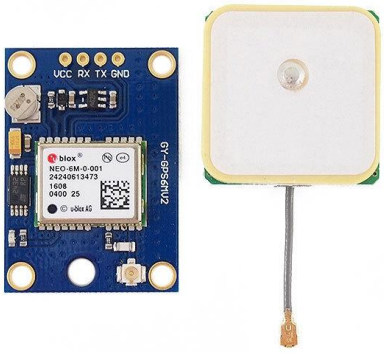
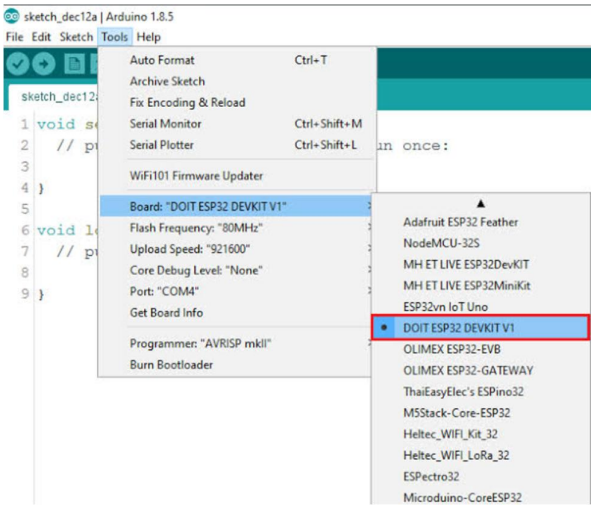


IV. SOFTWARE

4.1 Arduino

An Arduino comprises a microcontroller and an IDE (Integrated Development Environment) which are the physical programmable circuit board and a programming software respectively. This can be used to run on a PC and compose or transfer PC code to the circuit board. This can be achieved by an Arduino programming language based on Wiring, and the Arduino Software (IDE), based on Pro-cessing. The primary utility of an Arduino is that an individual can easily use a USB link rather than searching for other equipment to upload the code onto the circuit board. The IDE of an Arduino uses the rendition of C++, hence making it simpler to code. In a nutshell,an Arduino advances microcontroller into a more reliable and efficient package.



4.2 Blynk

Blynk is a mobile application that we have used to control and monitor our project. It is a platform that is used to create an interface to control any hardware project through your android or IOS devices. It is as easy as using any other organizing app making it one of the easiest ways to engage with the project. Few of the widgets include buttons, graphs, sliders and many more. It can also display data from the various sensors that have been used in the project.

4.3 Android Studio

Android Studio is the IDE for android applications. This software is available on many different platforms such as Windows, macOS and Linux based operating systems. It is a replacement for the Eclipse Android Development Tools (ADT) as the primary IDE for native Android application development. [4] Android Studio offers many features that enhance your productivity when building Android apps, such as a flexible Gradle-based build system, a fast and feature-rich emulator, a unified environment where you can develop for all Android devices, apply Changes to push code and resource changes to

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your running app without restarting your app, 3L4-Self Driving Car code templates and GitHub integration to help you build common app features and import sample code, extensive testing tools and frameworks, lint tools to catch performance, usability, version compatibility, and other problems, C++ and NDK support, Built-in support for Google Cloud Platform, making it easy to integrate Google Cloud Messaging and App Engine. Each project in Android Studio contains one or more modules with source code files and resource files.

V. CONCLUSION

The designed gadget has been tested underneath various real-time riding stipulations and has proved to be an efficient and budget friendly add-on to the vehicular technology, providing better protection elements for the drivers thereby reducing the probability of accidents. The accuracy and efficiency of the designed sub-systems is adequate, with sure limitations, however this field has a humungous scope of enhancements and additions. It ensuring the uninterrupted health monitoring system for the patients. This project used to be proposed prototype model. Our important gold was to focus on monitoring affected person fitness monitoring with wireless body area network. By the use of the system, the expert can monitor, advice and diagnose their affected person and family member before arriving to the emergency. The statistics are stored and posted online. Hence, the professional and family member can reveal their patient from a remote location at any time. Android application is used for monetizing the patient. Before commencing of the project, every sensor used to be calibrated individually. Each of the signal analysed by using taking distinct data. All the found signal was matched with the aid of experimental signal. The remaining results were transferred to the cloud via ESP32, and the users got the output from the device via a message. We can use this machine in real existence and human beings will be benefited. This system is simple and cost effective.

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