

Drowsiness Identification and Speed Ideling Using Machine Learning and Arduino

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Abstract: The number of accidents in India are highest within the world as India features a large population and most of the transport is by road. The actual number of accidents happened could also be above documented. One person dies in every 4 min due to accident. Nowadays safety on roads has become a significant issue everywhere the planet. Accidents occur mainly during dawn and already dark. The accidents on highways are often prevented by employing a smart system. A smart system for accident prevention is a perfect concept for smart roads. It is a project with innovative ideas for safety on roads and highways. The data collected might be used and avoid most of the accidents

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1. Introduction

India is one among the busiest countries within the world in terms of road traffic. The automotive industry across the south Asian country became the fourth largest within the world in 2017. In 2019, there have been almost three million new car registrations within the country. The Indian road network, spanning over five million kilometres, carried almost 90 percent of the country's passenger traffic and about 65 percent of the products. With the rapid increase within the number of cars and therefore the mercilessly congested Indian roads, road safety has become an element of utmost importance for the country's citizens. While talking about workplace culture in India, India is the most overworked country in the world, work-related stress can have serious consequences. Portrayed as a 'silent killer,' stress has been reportedly termed because the root of depression and workplace anxiety in India. If we talk about stats exhausted drivers who doze off at the wheel are responsible for about 40% of road accidents, says a study by the Central Road Research Institute (CRRRI) on the 300-km Agra-Lucknow Expressway. Now, talking about project which is based on Road accident due to Drowsy driving. Drowsy driving means operating a automobile when an individual is unable to stay alert thanks to lack of sleep. We have planned to build an application which try to overcome this problem with very basic requirements and can be easily setup in every vehicles. We will build software as well as hardware to demonstrate our project.

Working-We have planned to build an application which will collect data of facial expression more precisely data of eyes of the person and using those data we will process it using Machine Learning and Computer Vision our application will predict that, the person is not Drowsy and fit to drive. For detecting that we will be using a camera that will constantly keep up the track of eyes of driver. The data collected from camera will directly be shared with the android app which relates to camera. The data will be processed with the help Machine Learning and Python. The detection will continue infinitely, and no action will be taken if the driver is not found drowsy. If the driver is found drowsy with the help of the API, we will take the course of action which includes the alarm that will be helping the user to get up, the frequency of the alarm will be 113 decibel alarm which is the frequency to wake up and heavy sleeper. This alarm will continue for a few number of times at the same frequency and an urgent message will be delivered to the taxi company as well as the customer to alert them about the same. Once the alarm is buzzed for few times an API call will be used to slow down the car with the help of Arduino, all the important measures will be taken according to condition of the road that is an alarm will be buzzed for the nearby cars. Which will be followed by the indicators that will slowly pull the car to side of the road.

2. Component Description

1) Hardware

Arduino-Arduino is just an open-source platform in which is easy to use. Simply program get written on Arduino IDE and attach the Arduino board to computer to execute the command. The Arduino Microcontroller work as a mini computer within the Project. It takes data from soil moisture sensor then deliver the data to the user via using GSM module. Then takes the command from user and gives command to water pump to get on if required. Arduino UNO R3 is the best board to start with for the beginners. It's based on AT Mega 328 (4-256 KB programming memory). It has flash memory (Electrically erasable and reprogrammable).

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Arduino UNO R3 has 20 pins in which 14 Digital I/O pins and 6 Analog I/O pins. In Digital pins 3, 5, 6, 9, 10, 11 are PWM embedded pins. It runs on mac also as windows. To use simply connect with computer using USB cable or give power by connecting to the batteries.

2) *Why Arduino?*

Arduino is easy to program as Arduino is an open software available for all. Arduino is used for small projects, it is also a class microcontroller. When it gets programmed it got the ability to take any decision related to the project. And it is very easy to operate we do not use a microcontroller here because it is used for heavy machinery and here we are just making a prototype

3) *Battery*

A battery is a device that carries charges in form of different poles positive and negative. It is mainly based on the flow of electrons. Generally, the battery in the making of prototypes could be between 50v to 100v. The battery works here as the power supplier here. As the properties of the battery are to stores charges and give supplies when it is required thus it gets discharges many while. The battery produces electricity by using an electrochemical reaction

Primary (single-use or "disposable") batteries are used once and discarded, because the electrode materials are irreversibly changed during discharge; a standard example is that the alkaline battery used for flashlights and a multitude of portable electronic devices. Secondary (rechargeable) batteries are often discharged and recharged multiple times using an applied electric current; the first composition of the electrodes are often restored by reverse current. Examples include the lead-acid batteries utilized in vehicles and lithium-ion batteries used for portable electronics like laptops and mobile phones. Batteries are available many shapes and sizes, from miniature cells wont to power hearing aids and wristwatches to small, thin cells utilized in smartphones, to large lead acid batteries or lithium-ion batteries in vehicles, and at the most important extreme, huge battery banks the dimensions of rooms that provide standby or emergency power for telephone exchanges and computer data centers.

4) *Motor*

A DC motor is any of a class of electrical motors that transform electrical energy into mechanical energy. Nearly each types of DC motors do have some internal mechanisms, they could be electromechanical or electronic types as per necessity, to periodically change the direction of current in part of the motor. DC motors were the first form of motor widely used, as they could be powered from existing DC current which we got supply for using chargers. A DC motor's speed could be controlled over a wide range, using either a variable supply voltage or by changing the supply of current in its field windings thus to obtain mechanical energy as per requirements. Small DC motors are used for various different purposes such as in tools, toys, and appliances. The universal motor can operate on DC voltage but it is a lightweight motor used for the portable power tools, small home making accessories and appliances. Heavy DC motors are currently used in the propulsion of electric vehicles, elevators and hoists, and in

drives for steel rolling mills. But now a days DC motors have been replaced by AC motors as AC motors have wide range of applications, availability and easy to use than DC motors

3. Software

1) *Opencv*

OpenCV is an open source computer vision and ML software library which could be used as per our requirement. OpenCV was built to provide an infrastructure for both computer vision applications and to accelerate the use of machines diversified use in commercial products. Being a BSD-licensed product, OpenCV becomes easy to use for businesses and to utilize and modify the code, it is one greatest advantage of using it. The library has many optimized algorithms approximately more than 2500 types, which includes various revision sets of both classic and state-of-the-art computer vision and machine learning algorithms for proper practice for implementations. The algorithms could be used for multiple purposes such as to recognize multiple faces, identify different objects, classify human actions in videos, track camera movements, track moving objects, extract 3D models of objects, produce 3D point clouds from stereo cameras just for more accuracy, stitch images together to produce a high-resolution image of an entire scene, find similar images from an image database, remove red eyes effect from images taken using flash, follow eye movements with very accurate Imaging, recognize scenery and establish markers to overlay it with augmented reality, etc as per the command of the operator or as per the algorithm is designed. OpenCV has a large user community of more than 47 thousand and as per estimation number of downloads exceeding 18 million. The library is used in companies, research groups, and governmental bodies for different benefiting purposes. Some most popular companies like Google, Yahoo, Microsoft, Intel, IBM, Sony, Honda, Toyota, etc. employ the library, such as Applied Minds, VideoSurf, and Zeitera that make extensive use of OpenCV and make it widely used software. OpenCV's deployed uses wide the ranging from stitching street view images together, detecting intrusions or unwanted activities in surveillance video in Israel, monitoring mine equipment in the People's Republic of China, helping robots navigation and detection of swimming pool drowning accidents in Europe, and many more countries, running interactive art in Spain and New York, checking runways for debris in Turkey, inspecting labels on products in so many factories around the world on to rapid face detection in Japan. It has C++, Python, Java, and MATLAB interfaces and supports Windows, Linux, Android, and Mac OS. OpenCV depends mostly on real-time vision applications for surveillance and takes advantage of MMX and SSE instructions when available. A full-featured CUDA and OpenCL interfaces are being actively developed in many parts of the world by making small changes in it right now. There are more than 500 algorithms and about 10 times as many functions that compose or support those algorithms in many circumstances. OpenCV is written mainly in C++ and has an interface that works very smoothly with STL containers.

2) *Machine learning*

Machine Learning is that the field of study that provides

computers the potential to make decisions in any circumstances without being explicitly programmed. ML is one of the best technologies that has ever developed. Because it is clear from the name, it gives the pc that creates it more almost like humans: the power to find out. Machine learning is actively getting used today, perhaps in more places than one would expect. Supervised learning is that the sorts of machine learning during which machines are trained using well "labeled" training data, and on basis of that data, machines predict the output. The labeled data means some input file is already tagged with the right output. In supervised learning, the training data provided to the machines work because the supervisor teaches the machines to predict the output correctly. It applies an equivalent concept as a student learns within the supervision of the teacher. Supervised learning may be a process of providing input files also as correct output data to the machine learning model. The aim of a supervised learning algorithm is to seek out a mapping function to map the input variable(x) with the output variable(y).

4. Future Scope

Drivers are the apparent target marketplace for anti-sleep alarms. Truck drivers with their schedules often find themselves hauling freight overnight. An alarm near the ear and a thermos of coffee might be enough to stay drivers alert without resorting to pharmaceuticals. Even the casual respite road tripper could use a sleep alarm. Over-the-ear alarms have uses near the driver's seat. A student cramming through the night could skip the standard chemical ways to remain awake and slip an alarm over his or her ear instead. Night security guards, especially those that add stationary posts AND circuit houses, could also make use of this easy technology. While these alarms can keep tired eyes open and alert to your brains, driving while sleepy is

dangerous. Having a sleep alarm either built into within the car or worn on the ear may give tired drivers a false sense of security. Anti-sleep alarms would help travelers who'd rather hit the road than the hay, but the simplest and safest remedy for a driver's drooping eyelids is to prevent and take a nap.

5. Conclusion

We have planned to build an application which will collect data of facial expression more precisely data of eyes of the person and using those data we will process it using Machine Learning and Computer Vision our application will predict that, the person is not Drowsy and fit to drive. We will If he fails in this test we have planned to set API call which will give signal to speaker to act as a alarm for 5sec to aware fellow passengers and Driver as well, after this attempt if driver is still in drowsy condition we have planned create an another API call to give signal to car to stop but by decreasing the speed of car with proper indicator such that cars behind this car will react accordingly. We will use OpenCV library to create a facial detection application in python and for demonstration purpose we will use IOT devices like Arduino to create a mini car which can be create connection with a mobile device using by Bluetooth using an Application. We will also create an Application which can built connection with our IOT based car this Application will be build using Python.

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