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RFID-Based Automatic Vehicle Speed Control

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***Abstract*— This study attempts to automatically regulate the speed of cars in locations with speed restrictions, such as zones around hospitals and schools. Nowadays, drivers disregard the safety of the general public and operate their cars at excessive speeds, even in zones with speed limits. They are difficult for the traffic police to fully regulate. Additionally, it is not practicable to continuously watch over these places. This research lays the path for regulating vehicle speed without interfering with drivers within a set limit in limited areas. For this, an RFID is employed. With these Zones, the RFID tag, the vehicle, and the RFID reader are all linked. When the reader approaches, these tags are configured to emit a coded signal. The speed of the cars is automatically regulated with the aid of the microcontroller unit installed within the vehicle whenever they approach specified zones. The receivers of the vehicles receive this code. The tags are put at the start and finish of the areas where the speed should be decreased.**

Key Words - RFID (Radio Frequency Identification), Over speeding, Speed control, RF (Radio Frequency).

I.Introduction

Using RFID and IoT, t automatic speed restriction system is utilized to regulate the speed of the vehicle. RFID is used by installing an RFID reader on a vehicle and an RFID tag in each zone of the smart city.

A smart city refers to a city with all the necessities, including a hospital, market, and college, in one location. If the vehicle is travelling at a high speed before entering the smart city, but once inside and if the RFID reader and card match, the speed is automatically limited since the controller, also known as the admin, has established a predefined limit. The LCD display shows all the information, including the zones that the car enters and the set speed restriction. These are managed with the aid of RFID and Arduino. The vehicle is powered by a DC motor that has been installed. The fixed speed can then be modified when it is on the administrator side by integrating IoT. The administrator will find it more helpful to know all the speed restrictions in the city's many neighbourhoods by having access to one webpage that displays them all.

II.Existing method

The existing system of two-wheelers does not have any control of speed. The vehicle can ride at any rate of speed and that may lead to accidents in important zones. The transmitter block consists of the power supply, Arduino UNO and Zigbee transmitter. In this block, the Arduino microcontroller was programmed with a predefined speed limit and transmits the signal with the help of Zigbee communication.

III.PROPOSED METHOD

The proposed system brings a solution to the disadvantages of existing system. Using RFID card and reader the speed of the vehicle is controlled and thus its speed limit is set in the keypad. In order to display the speed limit LCD is used and it is done with the Arduino board. Then by using the WIFI hotspot connection the module is automatically connected to the android and through the app the administrator can reduce and increase the speed limit in peak and normal hours.

IV.WORKING PRINCIPLE

The primary goal of this system is to reduce the number of accidents that occur in speed-restricted areas including school zones, medical clinic zones, and areas where drivers make quick u-turns because they are irresponsible about following to the posted speed limits. When a vehicle enters a speed When a vehicle reaches a speed restriction zone, a transmitter block starts to function and sends a sign to the vehicle recipient, whose microcontroller reads the signs and compares the speed of the vehicle to the predefined speed of that particular zone.

Using a microprocessor, DC motor, RFID module, and tags to implement "Automatic Speed Control of Vehicle by Using RFID Technology," where the vehicle's speed is automatically reduced. This speed control system makes sure that accidents in the vicinity of the school and other specific zones are kept to a minimum. This structure has extremely cheap costs, is strong, uses little energy, provides the best level of protection for society, and is easy to implement in the specific regions. This system also addresses days with bad weather. This method will safeguard the public from reckless drivers, heavy drinkers, and insane drivers.

By putting this system into action, we can provide a safe and secure environment for society at large.

Fig.4.1. RFID Cards

The electricity is initially turned on before being delivered to the RFID reader that has been installed in the car. The code of the tag and the reader are compared by this RFID card reader to see if they are same. There is a city-installed RFID tag reader. The keypad is used to operate this tag. Only at this keypad do we set the speed at which a vehicle shall pass through the zone. The speed may be adjusted by the administrator in the keypad module. Assume that there is no adjustment necessary if the vehicle goes at a speed that is lower than the administrator-set fixed value.

Imagine that the speed restriction automatically drops to the value specified by the administrator if the vehicle is moving faster than the value the administrator has set. Once the speed limit is established on the keypad, the ULN 2003 chip takes over as the system's control board. As a result, the project may now declare the limit value that the administrator has specified.

This is concerning the vehicle's fixed DC motor. The ULN 2003 chip's conditions are obeyed by this motor, which also controls the vehicle's speed. Therefore, this technology forces the car to go at a specific speed that is set for various city zones.

Similar to how a car enters a smart city, all of the information is recorded in a database and done so via IoT. By doing this, we may discover the owner of the car by noting their licence plate number and using certain equipment that have automated speed control. RFID (Radio Frequency Indicator) tags and readers have been installed in the city and on vehicles, respectively. In order to move the vehicle, a DC motor has been installed. The Arduino board was linked to the RFID. This Arduino board just serves as the foundation for the devices that have been linked to it.

All of these actions need a power source to be carried out. This power source is used to power an Arduino, a DC motor, an RFID reader, and a tag. The electricity is initially turned on before being delivered to the RFID reader that has been installed in the car. The code of the tag and the reader are compared by this RFID card reader to see if they are same. There is a city-installed RFID tag reader. The keypad is used to operate this tag. Only at this keypad do we set the speed at which a vehicle shall pass through the zone. The speed may be adjusted by the administrator in the keypad module. Assume that there is no adjustment necessary if the vehicle goes at a speed that is lower than the administrator-set fixed value.

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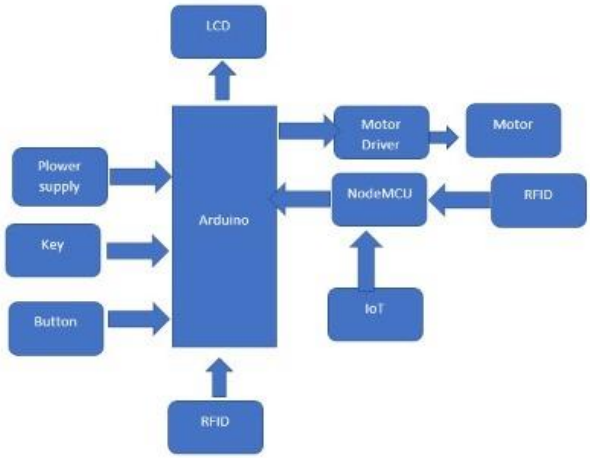

Fig. 4.2. Block Diagram

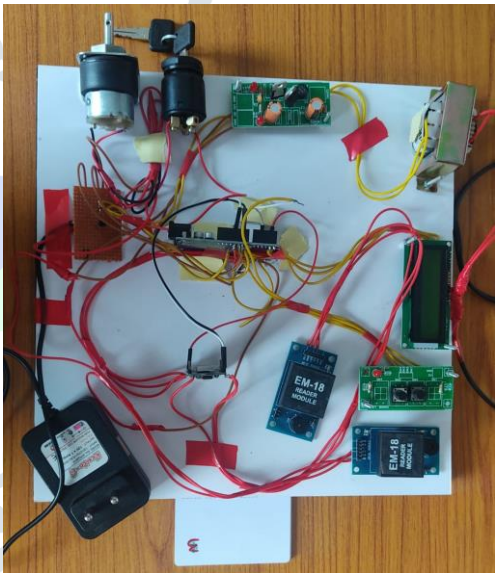

Fig.4.3. Output

V. HARDWARE DESCRIPTION

A. Arduino UNO

Arduino board opensource microcontroller based on ATmega 328p microcontroller. It is one of the most popular development boards used for experimental purposes and serves as an Internet of Things (IoT) link. The board contains other items such as a serial connection, crystal oscillator, voltage regulator etc. It contains 2 kB of RAM, 1 kB of ROM, and a flash memory of 32 kB and can be easily formatted with open-source Arduino IDE software. There are many GND pins in Arduino, and any of them can be used to grind your circuit. 5V (4) & 3.3V (5): there is one 5V pin provides 5 volts of power to Arduino UNO, and the 3.3V pin provides an influence of 3.3 volts. most straightforward the components used with the Arduino vary jubilantly from five or 3.3 volts.

ANALOG (6): subtitle space beneath 'Analog In' label (A0 to A5 in UNO) by Analog In pins ... DIGITAL (7): on the far side the analogue pins digital pins (0 to 13 in UNO). These pins are used for each digital input (such as telling once a button is pressed) and digital output (such as semiconductor diode power supply). PWM (8): These anchors act as standard digital pins, however also can be used with one thing referred to as Pulse Width breadth Variation.

Fig.5.1.Arduino UNO

B. LCD Display

LCD (Liquid Crystal Display) is a type of flat panel display which uses liquid crystals in its primary form of operation.LCD draws its definition from its name itself. It is the combination of two states of matter, the solid and the liquid. LCD uses a liquid crystal to produce a visible image. LCD technologies allow displays to be much thinner when compared to cathode ray tube (CRT) technology.

Fig5.2.LCD Display

C. NODE MCU

The Node MCU ESP8266 itself is a self-contained WiFi networking solution offering a bridge from the existing microcontroller to WiFi and is also capable of running self-contained applications. This module comes with a built-in USB connector and a rich assortment of pin-outs. With a micro USB cable, you can connect the NodeMCU devkit to your laptop and flash it without any trouble, just like Arduino. It is also immediately breadboarding friendly.

Fig5.3.Node MCU

D. Motor Driver

The Motor Driver is a module for motors that allows to control the working speed and direction of two motors simultaneously. This Motor Driver is designed and developed based on L293D IC.L293D is a 16-pin Motor Driver IC. This is designed to provide bidirectional drive currents at voltage from 5V to 36V.

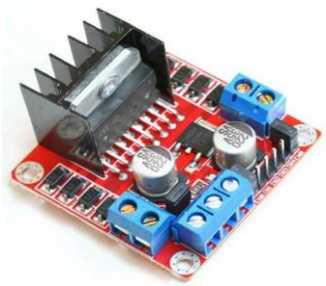

Fig.5.4.Motor Driver

E. RFID

Radio-frequency identification (RFID) uses electromagnetic fields to automatically identify and track tags attached to objects. An RFID tag consists of a tiny radio transponder; a radio receiver and a transmitter. When triggered by an electromagnetic interrogation pulse from a nearby RFID reader device, the tag transmits digital data, usually an identifying inventory number, back to the reader. This number can be used to inventory goods. There are two types. Passive tags are powered by energy from the RFID reader's interrogating radio waves. Active tags are powered by a battery and thus can be read at a greater range from the RFID reader; up to hundreds of meters. Unlike a barcode, the tag doesn't need to be within the line of sight of the reader.

so it may be embedded in the tracked object. RFID is one method of automatic identification and data capture (AIDC).

Fig.5.5RFID

VI . RESULT AND CONSLUSION

In order to enable growing vehicular applications, the issue of conducting precise vehicle overspeed detection utilizing IoT technology in urban environments is addressed in this study. The driving environment is sensed by the Smart Vehicle Over speeding Detector to achieve high detection accuracy. In order to prevent frequent accidents, the proposed system is utilised in particular to detect overspeeding vehicles and report them to the appropriate authorities.

The following are potential upgrades that could be made to the suggested system in the future using software algorithms, hardware implantations, and sensor interfaces.

This technique effectively reduces excessive speeding and unintended accidents in restricted areas. There is no autonomous speed limiter in the car with the present

technologies to prevent accidents. We will be able to apply the automatic vehicle speed control system in cars to increase the safety of passengers and other road users through further study and optimization.

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