IJFANS INTERNATIONAL JOURNAL OF FOOD AND NUTRITIONAL SCIENCES
ISSN PRINT 2319 1775 Online 2320 7876
 Journal Volume 14, Iss 04, 2025

THE PROTOTYPE SPECIFICATIONS FOR GENERATING POWER USING A SPEED BREAKER

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ABSTRACT

It is very significant to design pollution free energy generation system. Speed breaker Power Generator (SBPG) is the most emerging technique which produces electrical power with minimum input. An experimental study to generate the electricity by SBPG is described in this paper. In this system, a rack and pinions mechanism is used for the production of electricity. When a car reaches on the speed breaker, the rack moves downward to generate linear to rotary motion using pinions. The rotary motion is transferred to DC generator which generates DC power which is stored in batteries same as in solar technology. The generated power can be used for the domestic purpose or commercially, which are present near the speed breaker. This examined that SBPG is generating 273.24W on single push under the application of 400kg. In an hour, passing 100 cars of 400kg can generate 54.59 kWh. This mechanism utilizes both downward as well as the upward motion of the rack.

1.INTRODUCTION

During last few decades, electrical energy is the basic requirement of human beings. The ratio of electricity requirement is increasing day by day. But we know that the resources for power generation are limited, and this has caused the energy crisis. The increasing power demand results reduce in conventional resources for power generation and increase the pollutants emissions. It is a need of time to think about non-conventional energy resources or renewable energy resources which are eco-friendly to the environment. In order to minimise the emission of greenhouse gases, renewable energy technologies are widely used for electricity generation. Solar and wind technologies are frequently used for electricity generation. Fig. 1 is rearranged in MS Excel that shows power generation in Pakistan by each sector [1]. Speed-breakers are movement quieting devices generally introduced to decrease speed related mischances [2]. Speed breakers are intended to be rolled over at a foreordained agreeable rate while bringing on surpassing inconvenience at higher rates. The diminishment in normal vehicular speed essentially enhances the security of individuals in the neighbouring territories. These devices are most common in developing countries [3]. Consequently, speed-breakers are regular in numerous

developing countries, including India, Chile, Egyptian Empire, Ghana and Pakistan [4]. The flow of traffic on rushed load is control by the use of Speed Breakers. The annual rate of motor vehicle growth in Pakistan is increasing day by day. The weight of vehicles in term of potential energy can be utilized for electricity generation purposes [5]. In this paper, we developed a method of generating electricity using speed breaker on the roads. To obtain maximum power, the flow of moving vehicles is very important. In this mechanism, a rack and pinions are used. This mechanism converts the kinetic energy of moving vehicles into electric energy with the help of speed breaker on the roads. This is generating many kilowatts of power by using downward as well as the upward motion of rack. Downward motion is caused by load and upward motion is due to restoring force utilizing store power in springs. When a car reaches on speed breaker, rack moves downward to generate linear motion [6]. Two pinions are attached to a rack which converts the linear motion of rack into rotary motion. Both pinions have unidirectional motion, like as bicycle sprocket. Two gears are mounted on pinion shaft's to transfer mechanical power to the common shaft having one gear. At final shaft, a flywheel is used to provide uniform motion. A belt is used to transfer mechanical motion of the common shaft to DC generator. The complete gear box is dipped in lubrication oil sump to minimize frictional losses. There are no chances of slipping between rack and pinions due to guide slots. DC generator generates DC power which is stored in batteries same as in solar technology [7]. The generated power can be used for the domestic purpose or commercially, which are present near the speed breaker.

2.LITERATURE SURVEY

You-Ren Chen, Keng-Pin Chen, and Pao-Ann Hsiung presented the "Traffic Light Optimization and Control System" published in 19th International Conference on Intelligent Transportation System (ITSC) IEEE2016.

Over speeding vehicle make lot of nuisance sometimes also leading to loss of lives and other damages . Also imposing speed restrictions through sign boards have been rendered fruitless wherein the vehicle drivers do not comply with it and resulting catastrophic. Vehicle Speed Limit Controller Project is a great solution to this problem as it not only provides speed limitations, it also implements it through a controlling mechanism . This, this system greatly helps in curbing the speed of over speeding vehicles ensuring safety of vehicles on accident prone road ways. Now days road accidents are the greatest health burden in the world. People are driving very fast , Accidents occurs frequently. We lost our valuable life by making small mistake while driving.Speed has been identified as the cofactor in these road accidents. IoT based "Dynamic Vehicle Speed Control System " is the best solution. In this proposed system, the main components are RFID Reader and Tag, Arduino Uno, Nodemcu, Dc motor,L293d Motor driver ,Push buttons , IR sensor, LCD .It can control the speed limit of vehicle using Radio Frequency Identification (RFID) Technology . By using this RFID Technology ,if the user tries to

increase the speed, the system does not allow it to do so till it is in the range of RF speed sign post. This system uses Blynk app application which sends the information to user mobile using Nodemcu system.It consists different sensors with which the vehicle detects the speed restriction of that zone and maintains that particular speed.

Himesh Gupta and Aditya Pundir presented the "RF Module BasedSpeed Check and Seat Belt Detection System" published in Second International Conference on Computational Intelligence & Communication Technology IEEE2016.

A very big problem facing by the big-big cities are traffic control, vehicle safety and safety for passengers. Most of the vehicles get accident because no proper safety measures are taken especially at curves and hair pin bends humps and any obstacles in front of the vehicle. In this system we can be used for the prevention of such problems by indicating a pre indication and also reducing the speed of vehicles by reducing the fuel rate of vehicle. As the action is in terms of fuel rate so the vehicle automatically goes to control and avoids the accidents. In the curves the line of sight is not possible for the drivers the special kind of transmitter which is tuned at some frequency are mounted as these transmitters continuously radiate a RF signal for some particular area. As the vehicle come within this radiation the receiver in the vehicle gets activate. The arrangement at vehicle side is master receiver, which receives the RF signal when the transmitter frequency is interacting. The transmitter sends an encoded signal to the master receiver placed in the vehicle and receiver decodes it and it is interfaced with 89C51 microcontroller. The same kind of method is implemented for the detection of humps and any obstacle on the roads with the help of IR LED and photo diode technique, the vehicle can be further avoided with accidents by alerting driver when the driver feels drowsiness during long driving or night driving. The road steep edge detection can be done with the help of same technique, photo diode will be placed in the vehicle and IR LED's at the edge of the roads. Some other important functions also controlled automatically by our speed reduction system, some of them are headlight control during night time and horn enable and disable in public areas like schools or colleges. We are using here the solar panels which generate a electrical energy from natural resources like solar light. In this system, we are using microcontroller, IR LED and photodiodes technique, transmitter and receivers. Now the technology is developing that on electronic system replaces manual operations. Many such applications we are considering here. Vehicle safety and safety of passengers in vehicle are very important parameters. Most of the vehicles gets accident because no proper safety measures are taken especially at curves and hair pin bends humps and any obstacles in front of the vehicle. Our intention is to avoid such problems while driving a vehicle. The main objective of this project is to develop a safe and secure method of developing a new technology of vehicle safety on road and it can be implemented in real-time situations, with low cost and very easy to adopt. Figure

1 shows the preview of speed reduction system. In this paper, embedded system and IR Photodiode sensor are used. The embedded system performs the very important tasks to reduce traffic abnormalities. Each applications provided in this project are very useful to prevent accidents and to maintain a non-violent nature in the environment. Each block connected to the microcontroller have different functions to control the vehicle as well as the driver. This project uses a fixed transmitter in a particular area and a master receiver is placed in the vehicle. The encoding and decoding is done between the transmitter and receivers when both are come in contact. The main block used in our speed reduction system is microcontroller (89C51). Several road safety literature databases were searched for articles on speed limiting for cars. Very few articles on this specific subject were found. To reduce traffic problems like accidents and many other problems in India there should be an advanced technical implementations are to be followed and that must be ordered by the government. This system can be used for the prevention of accidents by indicating a pre indication and also reducing the speed of vehicles by reducing the fuel rate of vehicle. As the action is in terms of fuel rate so the vehicle automatically goes to control and avoids the accidents At the curves and hair pin bends, the line of sight is not possible for the drivers. So, the special kind of transmitter which is tuned at a frequency of 433MHZ are mounted, as these transmitters continuously radiate a RF signal for some particular area. As the vehicle come within this radiation the receiver in the vehicle gets activate. The transmitter used here is ASK type (amplitude shift keying) which emits the RF radiation. The arrangement at vehicle side is shown above a 433MHZ receiver which receives the RF signal when the transmitter frequency is interacting. The decoded data is interfaced to microcontroller and the controller is so programmed that it now driving system drives the signal to a suitable level that which controls the action of electromechanical valve or pump. The valve regulates the fuel rate when the RF frequency is interacting with receiver. The fuel rate goes to low level which reduces the speed of vehicle so the accidents can avoided.

Christoph Kandler and Tim Koenings presented the "Stability Investigation of an Idle Speed Control Loop for a Hybrid Electric Vehicle". This article has been accepted for inclusion in a future issue of this journal. Content is final as presented, with the exception of pagination. IEEE2015.

The main objective of this paper is to control the speed of Nonlinear Hybrid Electric Vehicle (HEV) by controlling the throttle position. Various control techniques such as well known Proportional-Integral-Derivative (PID) controller in conjunction with state feedback controller (SFC) such as Pole Placement Technique (PPT), Observer Based Controller (OBC) and Linear Quadratic Regulator (LQR) Controller are designed. Some Intelligent control techniques e.g. fuzzy logic PD, Fuzzy logic PI along with Adaptive Controller such as Self Organizing Controller (SOC) is also designed. The design objective in this

research paper is to provide smooth throttle movement, zero steady-state speed error, and to maintain a Selected Vehicle (SV) speed. A comparative study is carried out in order to identify the superiority of optimal control technique so as to get improved fuel economy, reduced pollution, improved driving safety and reduced manufacturing costs. In recent years increasing concern of environment and economy has made the use of electric vehicle indispensable and ubiquitous in nature. The exhaust emissions of the conventional internal combustion engine vehicles (ICEVs) are the major source of urban pollution that causes the green house effect, which in turn leads to global warming. Even from the economic standpoint that is inherent in the poor energy conversion efficiency of the internal combustion (IC) engines, electric vehicle is more viable. Though efficiency calculated on the basis of conversion from crude oil to traction effort at wheels for electric vehicles (EVs) is not significantly higher yet, it does make a difference. The regulation of emission due to power generation at remotely located plant is much easier than those emanating from IC engine vehicle that are individually maintained and scattered all over the world. Furthermore, electric power used for the battery of EVs can also be generated using non conventional sources which are environment friendly [1], [2]. Electric vehicles have no emissions and therefore are capable of tackling the pollution problem in an efficient way. Consequently electric vehicles are the only zero emissions vehicles (ZEVs) available now days. The limited range of battery powered electric vehicles led the researchers and auto industry players to search for alternatives. The assiduous and aggressive efforts by the industry led to the prodigious development of hybrid electric vehicles (HEVs).The HEVs use both electric machines and an IC engine for delivering the propulsion power [1], [2]. With the burgeoning popularity of EVs and HEVs in the market bewildering varieties of energy management system in the hybrid drive train is devised. As pioneers of intelligent energy management in HEVs some authors have proposed an extensive classification and overviews of state of the art control strategies for the same [2]–[7]. The modern electric vehicle performance depends very much on automation systems applied. The conventional control methods have been found not so adequate and many control problems have come up due to imprecise input output relation and unknown external disturbances. Many new controllers such as fuzzy logic controller (FLC) have been suggested in near past to address such problems. FLC provides an efficient method to handle inexact information on a basis of reasoning. With FLC it is possible to convert knowledge expressed in uncertain form to an exact algorithm. Application of FLC and self tuning fuzzy PID controller have been used for the design of four wheeled drive EV yaw stability and industrial hydraulic actuator respectively [8], [9]. A new scheme known as self organizing fuzzy logic controller for wheeled mobile rotor using evolutionary algorithm has been suggested by Kim et. al [10]. As fuzzy controller alone was not able to provide many features of adaptive controller both were together used for different control problems [11]–[14]. Next

the state feedback control technique such as LQR controller of optimal control segment came up with beautiful features to improve dynamic as well as steady state performance [15]–[22]. The speed control in HEVs are mainly achieved controlling the servo motor which in turn controls the throttle position for smooth torque and speed control of HEVs. In controlling the throttle position by the proposed LQR controller, optimal current is drawn by the electric machine and drive which in turn optimizes the speed of the vehicle. Even as some authors have suggested the application of optimal control for other systems, some other authors have proposed other control technique for electric vehicle [23]–[28]. In this paper a comparative performance of controllers for HEVs are presented in order to identify the superior controller over other controllers designed in this paper.

Martin Treiber and Arne Kesting2 presented the "Automatic and efficient driving strategies. While approaching a traffic light" published in 17th International Conference on Intelligent Transportation Systems (ITSC) IEEE2014.

A very big problem facing by the big-big cities are traffic control, vehicle safety and safety for passengers. Most of the vehicles get accident because no proper safety measures are taken especially at curves and hair pin bends humps and any obstacles in front of the vehicle. In this system we can be used for the prevention of such problems by indicating a pre indication and also reducing the speed of vehicles by reducing the fuel rate of vehicle. As the action is in terms of fuel rate so the vehicle automatically goes to control and avoids the accidents. In the curves the line of sight is not possible for the drivers the special kind of transmitter which is tuned at some frequency are mounted as these transmitters continuously radiate a RF signal for some particular area. As the vehicle come within this radiation the receiver in the vehicle gets activate. The arrangement at vehicle side is master receiver, which receives the RF signal when the transmitter frequency is interacting. The transmitter sends an encoded signal to the master receiver placed in the vehicle and receiver decodes it and it is interfaced with 89C51 microcontroller. The same kind of method is implemented for the detection of humps and any obstacle on the roads with the help of IR LED and photo diode technique, the vehicle can be further avoided with accidents by alerting driver when the driver feels drowsiness during long driving or night driving. The road steep edge detection can be done with the help of same technique, photo diode will be placed in the vehicle and IR LED's at the edge of the roads. Some other important functions also controlled automatically by our speed reduction system, some of them are headlight control during night time and horn enable and disable in public areas like schools or colleges. We are using here the solar panels which generate a electrical energy from natural resources like solar light. In this system, we are using microcontroller, IR LED and photodiodes technique, transmitter and receivers. Now the technology is developing that on electronic system replaces manual operations. Many such applications we are

considering here. Vehicle safety and safety of passengers in vehicle are very important parameters. Most of the vehicles gets accident because no proper safety measures are taken especially at curves and hair pin bends humps and any obstacles in front of the vehicle. Our intention is to avoid such problems while driving a vehicle. The main objective of this project is to develop a safe and secure method of developing a new technology of vehicle safety on road and it can be implemented in real-time situations, with low cost and very easy to adopt. Figure 1 shows the preview of speed reduction system. Several road safety literature databases were searched for articles on speed limiting for cars. Very few articles on this specific subject were found. To reduce traffic problems like accidents and many other problems in India there should be an advanced technical implementations are to be followed and that must be ordered by the government. This system can be used for the prevention of accidents by indicating a pre indication and also reducing the speed of vehicles by reducing the fuel rate of vehicle. As the action is in terms of fuel rate so the vehicle automatically goes to control and avoids the accidents At the curves and hair pin bends, the line of sight is not possible for the drivers. So, the special kind of transmitter which is tuned at a frequency of 433MHZ are mounted, as these transmitters continuously radiate a RF signal for some particular area. As the vehicle come within this radiation the receiver in the vehicle gets activate. The transmitter used here is ASK type (amplitude shift keying) which emits the RF radiation. The arrangement at vehicle side is shown above a 433MHZ receiver which receives the RF signal when the transmitter frequency is interacting. The decoded data is interfaced to microcontroller and the controller is so programmed that it now driving system drives the signal to a suitable level that which controls the action of electromechanical valve or pump. The valve regulates the fuel rate when the RF frequency is interacting with receiver. The fuel rate goes to low level which reduces the speed of vehicle so the accidents can avoided.

Aamir Sarwar Jahan, and Imdadul Hoq, presented the "GPS Enabled Speed Control Embedded System Speed Limiting Device with Display and Engine Control Interface" published in 2013.

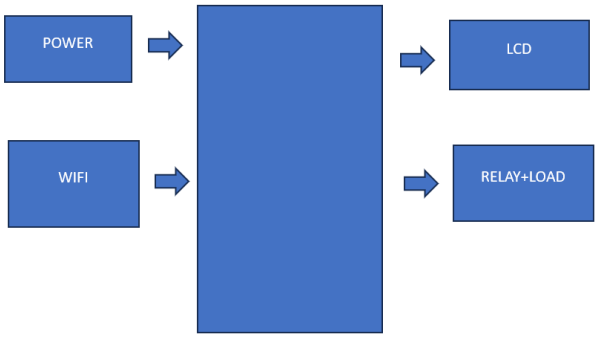
This paper aims to ofer simple and efective solution for controlling the speed of the vehicle automatically. The framework makes utilization of ARM microcontroller which is the core device. An expansion to the current system was enhanced in this paper which naturally controls the speed of the vehicle based on its location determined by the GPS coordinates and a switch initially present in on state enters into of state where the user uses this in crisis situation allotted by sending a message to nearby traffic control unit with usage of GSM. INDIA is the second most extreme crowded nation and is a fast growing economic body. Intelligent Traic control framework is utilized to lessen the negative efect of the congestion. ISA (Intelligent Speed Adaptation)1 technology guarantees that vehicle speed does not cross a safe or lawfully enforced speed. In general, there are two types of ISA systems: passive as well as active. hese two sorts of

ISSN PRINT 2319 1775 Online 2320 7876
 Journal Volume 14, Iss 04, 2025

ISA frameworks difer in that passive systems basically caution the driver of the vehicle to regulate the given instructions which are in form of visual display or auditory advises, while active bodies involve and naturally adjust the vehicle's speed to a particular limit2 . his method utilizes data about the roads to decide the required speed and data can be acquired from the vehicles position, considering the speed limit known form the location. GPS technology is a method of speed adaptation where the position of the vehicles can be determined based on its location. he position can be identiied by using the GPS receiver. GPS radio receivers get these transmissions and, by comparing the signals from a few satellites, can be able to identify the receiver's location by using a process called Trilateration3 . his paper aims to ofer simple and efective solution for controlling the speed of the vehicle automatically within the given geographical limit based on its GPS coordinates and a switch which helps in emergency condition by communicating with the GSM module.

3.IMPLEMENTATION

BLOCK DIAGRAM



BLOCK DIAGRAM DESCRIPTION

REGULATED POWER SUPPLY:

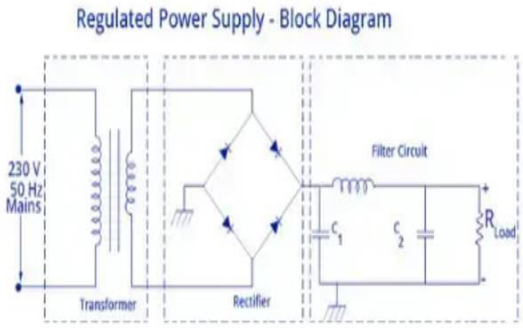


Fig: Regulated Power Supply Diagram

A regulated power supply provides a stable DC output by transforming variable AC input.

Component Overview: The essential components of a regulated power supply consist of a transformer, rectifier, filter, and regulator, each vital for ensuring a stable DC output.

The rectification process involves diodes transforming alternating current (AC) into direct current (DC), sometimes using full-wave rectification to optimize efficiency.

Filter Function: Filters, including capacitor and LC kinds, mitigate ripple and stabilize the DC output voltage.

Regulatory Mechanism: Regulators modulate and stabilize output voltage to safeguard against input fluctuations or load variations, crucial for a dependable power supply.

MICRO CONTROLLER

ARDUINO

ISSN PRINT 2319 1775 Online 2320 7876
 Journal Volume 14, Iss 04, 2025

The Arduino is a series of microcontroller boards designed to facilitate electrical design, prototyping, and experimentation for artists, hackers, amateurs, and even professionals. Individuals use it as the cognitive component for their robots, to create innovative digital musical instruments, or to develop a system that enables houseplants to notify you via Twitter when they want water. Arduino boards, namely the basic Arduino Uno, are constructed around an ATmega microcontroller, which functions as a comprehensive computing unit including a CPU, RAM, Flash memory, and input/output ports, all integrated into a single chip. In contrast to a Raspberry Pi, it is designed to connect various sensors, LEDs, tiny motors, speakers, servos, and similar components directly to these pins, which may read or output digital or analog voltages ranging from 0 to 5 volts. The Arduino interfaces with your computer by USB, allowing you to program it in a straightforward language (C/C++, akin to Java) using the complimentary Arduino IDE by uploading your developed code to the board. Once programmed, the Arduino may operate via a USB connection to your computer or independently without it—requiring just a power source, devoid of a keyboard or display

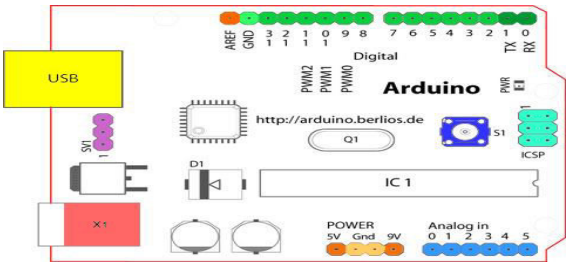


Fig: Structure of Arduino Board

SENSOR

A sensor is a device that identifies and reacts to certain stimuli from the physical world. The input may consist of light, heat, motion, moisture, pressure, or several other environmental phenomena. The output is often a signal that is either translated to a human-readable format at the sensor site or transferred electronically via a network for interpretation or further processing.

ESP8266 WI-FI MODULE:

In 2014, an ESP8266 Wi-Fi module was introduced and developed by third-party manufacturers like AI thinkers, which is mainly utilized for IoT-based embedded applications development. It is capable of handling various functions of the Wi-Fi network from another application processor.

It is a SOC (System On-chip) integrated with a TCP/IP protocol stack, which can provide microcontroller access to any type of Wi-Fi network. This article deals with the pin configuration, specifications, circuit diagram, applications, and alternatives of the ESP8266 Wi-Fi module.

What is the ESP8266 Wi-Fi Module?

An ESP8266 Wi-Fi module is a SOC microchip mainly used for the development of end-point IoT (Internet of things) applications. It is referred to as a standalone wireless transceiver, available at a very low price. It is used to enable the internet connection to various applications of embedded systems.

ISSN PRINT 2319 1775 Online 2320 7876
 Journal Volume 14, Iss 04, 2025

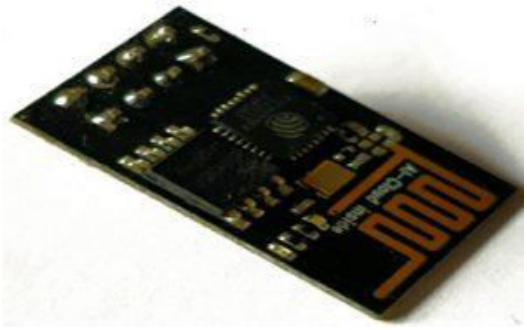


Fig ESP8266 Wi-Fi Module

CONCLUSION:

The discussed system can be designed to control the speed of vehicle in specific zones to avoid the accidents in the low speed areas. The vehicle will get detected in the low speed zone by the help of IR Transmitters and IR Receivers. As soon as the IR Receivers in the vehicle detects in the low speed zone the throttle valve in the speed limiting mechanism will closed and the flow of the petrol will decreases gradually. So hence the vehicle speed automatically lowers and therefore this system has a impacts to reduces the lives of people by accidents.

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[3]. Christoph Kandler and Tim Koenings presented the "Stability Investigation of an Idle Speed Control Loop for a Hybrid Electric Vehicle". This article has been accepted for inclusion in a future issue of this journal. Content is final as presented, with the exception of pagination. IEEE2015.

[4]. Martin Treiber and Arne Kesting2 presented the Figure 7. Deactivated zone of 60rpm "Automatic and efficient driving strategies. While approaching a traffic light" published in 17th International Conference on Intelligent Transportation Systems (ITSC) IEEE2014.

[5]. Aamir Sarwar Jahan, and Imdadul Hoq, presented the "GPS Enabled Speed Control Embedded System Speed Limiting Device with Display and Engine Control Interface"