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ELECTRONIC BRAKING SYSTEM ENHANCED WITH VISIBLE LIGHT COMMUNICATION

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Abstract

Roads accidents account for the highest percentage of fatalities in the world. So, A new technology for next generation vehicle communication, Visible Light Communication (VLC) is the one of the advanced technology where we can communicate in the better way. vehicles are connected anywhere and anytime by optical signal and light signal. Here visible light communication. The major instructions like braking system are communicated, therefore the risk and danger can be avoided. Thus a braking system is always needed to ensure the safety of the drivers and passengers innumerable valued lives. Automotive vehicles are increasingly being equipped with collision avoidance and warning systems for predicting the potential collision with an external object, such as another vehicle or a pedestrian. In this system we have designed the microcontroller based automatic disc brake system, which will apply the instant brake to avoid the collision.

***Key Words*:**Lifi module, Pic16f887, Pressure sensor, Stepper motor, Ultrasonic sensor

1 PROLOGUE

A life is lost every four minutes due to a road accident in India. In 2015, a Government report uncovered certain concealed truths about road accidents that more than 400 people were killed in road accident[10]. Pedestrians are the main victims in these accidents. So an advanced electronic braking system can be implemented to avoid collision and road accidents. By the use of visible light communication which consumes low power, the data is transferred to the drive circuit in the motor so that speed of the motor is automatically reduced. by the use of lifi module the data transmission and detection takes place in the system. For data processing we need controller, here pic microcontroller pic16f887 is used.

2 CONCISE HISTORY

In ancient times, light was used to convey messages using methods such as fire and smoke signals. The Roman used polished metallic plates for sunlight reflection to carry out long distance signaling . Semaphore lines based Optical Communication (OC) systems were developed in the 1790 s. The first visual telegraphy system was developed by the Claude Chappe in 1792 in France [2].

A series of towers equipped with semaphores were used for information transfer between the cities. Heliograph, a wireless solar telegraph developed by the US military in the early 1800s was based on Morse code flashes of reflected sunlight by a mirror [3]. The flashes were established by either interruption of the beam with a shutter or momentary mirror pivot. In 1880, Graham Bell introduced his photo phone that was based on transmitting voice signal on a light beam [4]

The voice signal is projected toward a mirror which causes vibrations on the mirror. The mirror was then bounced by sunlight and thus, the vibrations are caught by the sunlight. At the receiver side the sunlight was received and converted back to a voice signal. The major drawback of this device is that it does not work well in

cloudy weather. Optical communication did not gain much popularity till the development of Light Amplification by Stimulated Emission of Radiation (LASER). In 1970, Corning Incorporated successfully developed optical fibers for commercial purposes with low attenuation [5].

An interleaved connection of resonant converter with snubber to drive multiple port light emitting diodes(LEDs) to achieve constant voltage. A Fuzzy logic control is a critical thinking control framework strategy utilized for keeping up the LED driver voltage constant with a power factor of 0.987[7].

Though protection is provided for ATM machine, cases of burglary are spreading. So there is new technology which can defeat this problem and the technology is Gsm vigilance for electronic banking[6].

GaAs semiconductor laser was also developed at that time for use in optical fiber cables for long distance communication. The invention of the in-fiber Bragg grating (1990) and Optical Fiber (OF) amplifier (1980) was the basis of the revolution in the field of telecommunication in the late 20th century. VLC is a type of optical communication that transmits the data the range of frequencies from 430THz to 790 THz. In 2003 at the Nakagawa Laboratory at Keio University, Japan, transmission of data was carried out using LEDs [8].

Sensor and image (fusion) based obstacle avoidance as a means for UAV to quickly and safely reach an accident site. decision command by fusing an image with ultrasonic sensor data, which is used for controlling the UAV to avoid obstacles. The serial data from the Arduino is sent to the LabVIEW[1].

Previous work at the Massachusetts Institute of Technology has shown the use of a laser range-finder sensor to empower a UAV to independently investigate and map an unknown environment used on-board sensors to assess the position of the UAV and utilized Simultaneous Localization And Mapping (SLAM) algorithms to create a map of the environment around the vehicle[10].

The motion estimation of project contains two unique issues: motion estimation using laser scan and height estimation with the on-board Inertial Measurement Unit (IMU). Sonar technology is used in field mapping with UAVs [11].

One of the alternative ways for detecting images and avoiding

obstacles can be accomplished by using a technology that does not rely on propagation waves .But instead it can use light as medium to recognize objects: optical cameras. Eco-friendly data communication through visible light which transmit audio signals to the receiver. The receiver circuit consists of solar panel connected with the amplifier and speakers to recover back the amplified version of original input signal[9].

3 DESCRIPTION

Actually we are doing for the vehicles, Whenever an obstacle is detected the ultra sonic sensor detects and given to the micro controller. it controls and process the signals and brake is applied by man in the car1 physically so that the pressure on the wheels are calculated and given to the micro controller. so the input from the ultrasonic sensor and pressure sensors both the value are calculated and given to the microcontroller now it controls and give data control to the lifi transmission module. The lifi detector in the other car detects and gives the data to control to the micro controller it transfers the data and given to motor of drive circuit in the other car so that the speed of the motor in car reduces automatically.

From the fig.1 whenever the ultrasonic sensor detects the obstacle less than 300cm and the atmospheric pressure is increases to 50

A. STEPPER MOTOR:

To implement prototype stepper motor is used because it has high torque at startup and low speeds, high reliability, motor has full torque at stand still(if the windings are energized), precise positioning and repeatability of movement since good stepper motor have a accuracy of 3-5

B. PIC16F887:

It is an RISC architecture which has only 35 instruction and software selection frequency range of 8MHZ to 31KHZ, chip can be reprogrammed up to 100,000 times, data can be written more than 1,000,000 times. it is 368 bytes EEPROM memory with 14 channels and 10-bit resolution. It supports RS-485, RS-232 and LIN2.0 AND master synchronous serial port(MSSP). Analogue comparator module with two analogue comparators, fixed voltage(0.6v),

programmable on-chip voltage reference. A 8k ROM memory in flash technology. 35 input/output pins which has high current source/sink for direct LED drive, software and individually pill-up resistor, interrupt-on-change-pin. Power-saving sleep mode, brown-out reset(BOR) with software control option. It is an ideal solution in applications such as control of different processes in industry, machine control devices, measurement of different values etc.

Fig. 1. Flowchart of Electronic braking system.

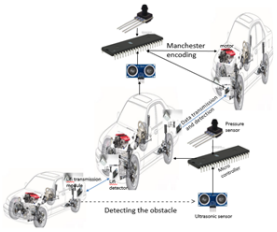
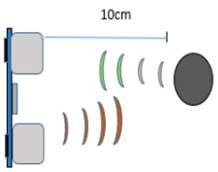


Fig. 2. Proposed design of braking system

From fig.2 the front car is the obstacle to the next two cars so the ultrasonic sensor detects the obstacle and transmits the data accordingly given in the flowchart which is from fig.1 in the previous lines.

C. ULTRASONIC SENSOR:



An Ultrasonic sensor is a device that can measure the distance to an object by using sound waves. It measures distance by sending out a sound wave at a specific frequency and listening for that sound wave to bounce back. So by measuring the distance, time can be calculated through sound wave

speed of sound = 340m/s = 0.034cm/micro sec Time(t) = distance(s)/speed(v) (1) = 10/0.034 t = 294 micro sec

Ultrasonic sensors have an acoustic transducer which is vibrating at ultrasonic frequencies. The pulses are emitted in a cone-shaped beam and aimed at a target object. Pulses reflected by the obstacle to the sensor are detected as echoes. This device measures the time elapsed between each emitted and echo pulse to accurately determine the sensor-to-target distance.

D. PRESSURE SENSOR:

A pressure sensor is a device used to measures the pressure of gases or liquid that opposes a diaphragm which is made of stainless steel, etc., and converts the measured value into an electrical signal as an output. Pressure is an expression of the force per unit area A and required to stop a fluid from spreading. It also acts as a transducer, generates a signal as a function of the pressure foisted. it can also be used in altitude sensing.

4 METHODOLOGY

A. MANCHESTER ENCODING:

MANCHESTER code is therefore sometimes known as biphase code. frequent level transitions in the Manchester encoded signal correctly decode the value and timing of each bit from the transmitter. manchester coding as per G.E. thomas and ieee802.3 the encoding of each data bit is either high then low, or low then high, for equal time and It is a self clocking signal with no dc component. As a result, electrical connections using a Manchester code are easily secluded and ensures frequent line voltage transitions, directly proportional to the clock rate, this helps the clock recovery.

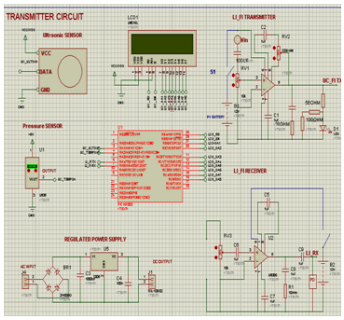


Fig. 3. Simulation design.

From fig.3 the ultrasonic sensor, pressure sensor, lifi transmitter and receiver circuit are interfaced are interfaced to the microcontroller. When ever the sensors detects and vary the led glows and data transmission takes place to the motor so that speed reduces as this is the simulation can not possible to show the motor speed.

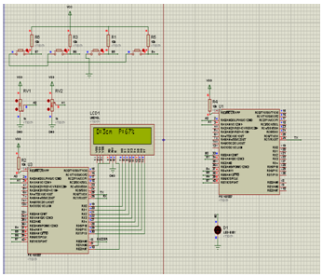


Fig. 4. Simulation output.

but led glowing can be seen in the simulation which is shown in fig.5. Speed reduction is shown in the hardware circuit.

5 CONCLUSION

Communicating via light, it is an advanced and easy way. The use of advanced electronic braking system(EBS) has been implanted to avoid collision and to prevent accident. It also consumes less power and by using this technique in our daily life communication no health hazard takes place to the people travelling on roads.

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