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Robot Control using Accelerometer and Obstacle Detection

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Abstract: *The price of human lifestyle cannot be inflated. Many people die every year in road user accidents. Speeding, poor visitor systems, drunk driving, impaired driving and various factors can contribute to an accident. The purpose of this text is to create a version that can be used in automobiles for accidents caused by invisibility in ice fog and to warn various drivers to avoid them. The Internet of Things (IoT) is a brand-new generation that could bring great boons to transportation gadget expertise. The reason behind this text is to create an IoT-enabled computing machine that can be used in automobiles to crash and save you from accidents in foggy low-visibility situations. An ultrasonic sensor can be incorporated with a Raspberry Pi and various accessories (power supply, jumpers, cutting board, etc.) to create this device.*

Keywords: Ultrasonic Sensor, Power Supply.

I. INTRODUCTION

Due to the growing international population and the rapid improvement of the automobile business, the avenue's visitors are increasing, increasing the number of fatal injuries. Fog causes piles of ice fatalities.According to a Times of India article published on 5 January 2019, 11,090 human beings died in 2017 due to avenue curves due to fog. The reason for this article is to prevent site visitors from accidents caused by fog. The purpose is to provide a cloud-based IoT machine for automotive obstacle detection to prevent injuries and save lives. To automate the car, we use a Node MCU with a remote sensor and an auxiliary device consisting of a Wi-Fi adapter and a power backup. We might be able to determine the actual distance of an obstacle in a truly sensitive environment in order to take the necessary measures to defend life. This IoT car gadget can be used to reveal business statistics in real-time and in case of an emergency to take preventive measures.

II. EXISTING SYSTEM

The system should definitely be replaced if it is more than ten years old. If properly cared for, the lifespan of the majority of sensors is between 10 and 20 years. Unfortunately, there is no question if the pre-installed system is more over 20 years old. It needs to be replaced.

Disadvantages:

- Security structures provide little protection against robbery.
- They do no longer guard your privateness. Meaning
- Road structures.
- Reactive and proactive domestic safety.

III.PROPOSED SYSTEM

The amplification platform required the NodeMCU to file records from the sensor (Echo ultrasonic sensor) and to report the power to run (DC cars). The complete framework is hooked up via a breadboard. There is an ultrasonic sensor around the auto that is used to discover any impediment. An ultrasonic sensor transmits sound waves and returns sound from an object. At the point wherein the item is exposed to ultrasonic waves, the impact of energy is a hundred and eighty stages. If the impediment is near sufficient, the power is contemplated very quickly. If the item is a way

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away, at this second the contemplated sign will make an effort to reach the recipient. In a traditional DC motor, there also are everlasting magnets at the outdoor, and a rotating armature at the internal. When this electricity is generated, it creates an attractive discipline within the armature that draws and repels the magnets inside the stator. As a result, the anchor rotates 128 degrees.

Advantages:

- Almost all cell robotic navigation structures can consist of a robot flight barrier.
- Can be used for household chores including automated vacuuming.
- They also can be utilized in dangerous locations where people can enter and kill.

IV. HARDWARE DESCRIPTION

Hardware Requirements

Node MCU Controller
Accelerometer
Ultrasonic
Servo Motor
Motor Driver
DC Motor

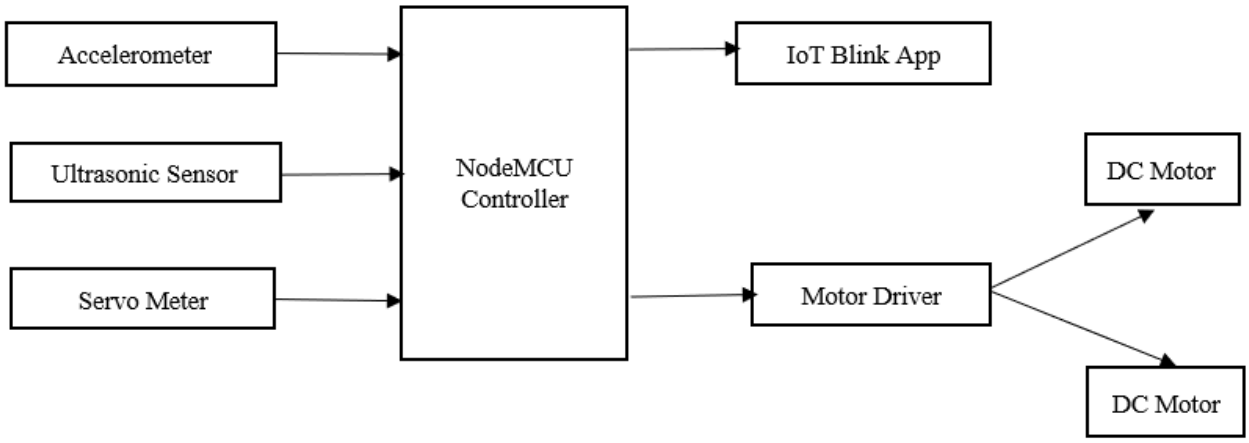

Fig 4.1 Block Diagram

A. Node MCU Controller

NodeMCU is an open source IoT platform. The scripting language Lua is used by the firmware. The word "NodeMCU" with the aid of default refers to the firmware, not to the CPU. The firmware makes use of the Lua scripting language. It is primarily based on the eLua layout and the Espressif Non-OS SDK for the ESP8266. It makes use of many open-source initiatives like lua-cjson and spiffs.

NodeMCU shortly after the discharge of the ESP8266. Espressif Systems started producing the ESP8266 on December 30. The ESP8266 is a Wi-Fi SoC embedded with TensilicaXtensa LX106 center, extensively used in IoT packages (see associated tasks). NodeMCU became released on October 13, 2014, when Hong Kong committed the primary nodemcu firmware record to GitHub. Two months later, the project expanded to include an open hardware stack thanks to Huang R. Gerber's devkit v0.9 report. After NodeMCU was able to access the IoT MQTT protocol using the Lua MQTT broker earlier this month, Tuan PM translated the MQTT purchaser library from Contiki to the ESP8266 SoC platform and dedicated it to the NodeMCU project.

Another fundamental update took place on January 30, 2015 whilst Devsaurus ported u8glib to the NodeMCU design, allowing the NodeMCU to without difficulty display LCD, Screen, OLED and VGA presentations.

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In the summer season of 2015, the creators left the firmware project and obtained a collection of impartial members. As of the summer season of 2016, NodeMCU is made from over 40 extraordinary modules. Due to confined assets, users must pick the modules that fit their project and create firmware tailored to their wishes.

Fig 4.2 Node MCU Controller

B. Accelerometer

Micro electromechanical structures (MEMS) are a technology that combines computers with small mechanical devices that include sensors, valves, rings, mirrors and actuators embedded in semiconductor chips. MEMS, or what he calls analog computing, could be "the middle era of the next decade." MEMS is also sometimes known as pain.

MEMS are already used for accelerometers in car airbags. They replaced much less reliable devices for a lower fee and promise a bloated bag that isn't the best in terms of slowness, but can also be defensive in terms of character range. A MEMS device basically carries a microchip on a small silicon chip that has some type of mechanical device such as a replica or sensor. These chips can potentially be produced in large quantities at low cost, making them valuable performance tools for many packages.

Among the monitored programs or programs MEMS available are:

- Global Positioning System (GPS) sensors that can be included in continuous monitoring of postal programs and can also replay the shipment in transit.
- Sensors embedded in the aircraft wing material that sense and react to airflow, translating the resistance of the wing floor; effective in growing many small flaps.
- Optical switching devices that can pass light signals through different paths at a switching speed of 20 nanoseconds.
- Sensor heating and cooling systems that significantly increase strength savings.
- Guiding structures with integrated sensors that can alternate the flexibility of fabric houses primarily based on the detection of atmospheric pressure.

Visual Diagram:

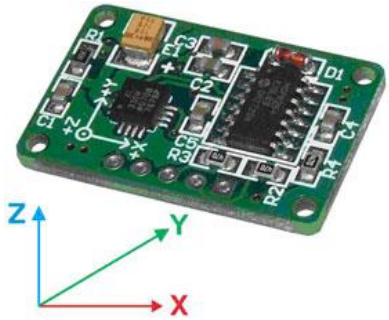

Fig 4.3 Accelerometer

C. Ultrasonic Sensor

Bats are amazing creatures. Blind before his eyes, yet with vision so accurate that he could tell the difference between a moth and a broken leaf even in full speed flight. There is no question that vision exists that is far superior to ours and

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beyond our ability, yet it is very definitely something that we can understand. Bats and many other members of the animal kingdom employ the method of ultrasonic range to navigate. In an attempt to mimic the ways of nature to gain an edge over everything, we humans have not only understood, but successfully mimicked some of these manifestations and utilized their potential to the fullest extent.

Fig 4.4 Ultrasonic Sensor

D. Servo Meter

A servo mechanism or servo pressure is an automatic device that uses bad comments with error detection to improve operationmechanism. Only in systems where notes or error correction signals assist in controlling a mechanical function or numerous parameters can a time slice be effectively used. For example, a car with cruise control uses a closed feedback loop, meaning it acts like a servo.

RC servos are used to control remote servos, commonly used in radio modes, in which they are used to power various mechanical systems. Radio-controlled servos are commonly used in small robotic programs due to their availability, reliability, and easy microprocessor manipulation.

The RC servo works from an electric motor automatically connected to a potentiometer. A pulse width modulation (PWM) signal is sent to the servo by a contemporary RC receiver. The electronics inside the servo will convert the impulse into a function in the impulse. The nominal pulse is between one and three. The RC servos are connected using 0.1" 3-manual connectors (lady) with trendy zero, 1/2" square pins (which should be gold plated according to the method). The unusual order is: signal, + intent, ground. The known voltage is 6 V DC, but some servos also use 4.8 V and 12 V, whose signal is a virtual PWM character with a price of 50 Hz. Every 20ms, the digital pulse of the position manipulation is energetically excessive. The nominal pulse is between one and three. Zero ms to 2.0 ms, with 1.5 ms typically in the middle of the range. Pulse width outside this variety can be used to "harass" - handing the server outside its daily variety. This characteristic of PWM is repeatedly (erroneously) referred to as pulse position modulation (PPM). The slave is controlled by three chains: earth, electricity, and manipulation. The slave will flow according to the pulse sent to the manipulation wire, which will set the perspective of the control arm.

The server waits for a pulse every 20ms to get perfect angular records. The servo pulse width determines the functionality of the servo angular movement.

A wider servo pulse than 1.5ms will set the servo to its "neutral" function, or 45°, a 1.25ms pulse at zero° and a 1.75ms pulse at 90°. The frame boundaries and hardware timing of the servo varies by logo and version, but often the angular movement of the servo can be somewhere in the ninety-one-hundred-and-twenty-degree range, and the neutral position is almost always 1.5ms. RC servos are normally powered by a receiver which in turn is powered by rechargeable batteries or a digital speed controller (ESC) or built-in or separate battery rectifier (BEC). Ni-Cd, NiMH, or lithium-ion polymer (Li-Po) batteries are frequently used batteries. Values vary by voltage, but maximum receivers operate at 5V or 6V.

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Fig 4.5 Servo Meter

E. DC Motor

A DC motor is used to force the mechanical load. In this laboratory, an independently excited DC generator forms the balance. It controls the weight of the device by converting the generator excitation. As the modern excitation of the DC generator increases, the load on the DC motor and consequently the armature current will increase. DC cars have characteristic torque and speed curves as shown in Fig. Nine.1. Because the factory gun does not longer have a torque size device, it is necessary to use an alternative DC motor concept. One alternative is to plot the shaft speed versus the state-of-the-art armature, since the torque is directly proportional to the current armature in a steady state-of-the-art engine implementation. The shaft speed is also a characteristic of the simultaneous excitation in a DC motor maintained at constant armature voltage due to the fact that the edge of the excitation is simultaneously proportional to the axis of the direct flux generated in the machine.

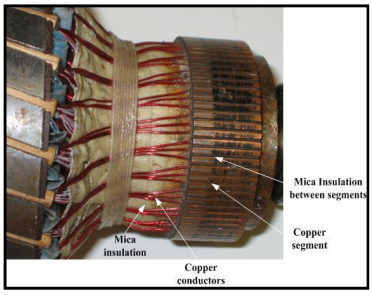

Fig 4.6 DC Motor

F. Motor Driver

In the field of robotics, we have some types of vehicles, DC motors, servo motors, step cars and so on. Car preferences depend on your software and there are exceptional approaches to accomplish them.

Some cars can be directly driven in branched approaches, consisting of hooking up a power source to them without delay and running them. But what if we want to manipulate these cars with other manipulation gadgets along with wi-fi systems, microcontroller etc.

Fig 4.7 Motor Driver

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V. SOFTWARE DESCRIPTION

ARDUINO UNO AND ITS PROGRAMMING

Arduino is a tool for building computers that could perceive and manage more of the physical world than your desktop laptop. It is an open-source bodily computing platform based totally on an easy microcontroller board and an improvement surroundings for writing software for this board.

Arduino can be used to layout interactive objects by using receiving enter from diverse switches or sensors and driving diverse lighting fixtures, automobiles and other bodily expressions. Arduino tasks may be standalone, or have interaction along with your pc software. Tables may be assembled through hand, or bought assembled; The open supply IDE is loose to down load.

The Arduino is an implementation of the Wiring programming language, just like a physical computing platform primarily based on multimedia programming processes.

Overview

The Arduino microcontroller is an easy-to-use and powerful unmarried-board computer that has gained good sized recognition inside the newbie and expert markets. Arduino is open source, because of this that the hardware is available at an affordable fee and the development software program is free. This guide is for ME 2011 students or students who are new to Arduino. Using Arduino, surf the internet; there are numerous opportunities.

This guide covers the Arduino Uno board, which is a great preference for college students and teachers. With an Arduino board, you can write programs and interface circuits to read switches and different sensors, in addition to manage vehicles and lighting fixtures with minimal effort. Many of the photos and pictures in this manual have been taken from files.

VI. RESULTS

The Robot Control using Accelerometer and Obstacle Detection is designed as per the block diagram 4.1. the overview of the block diagram is shown below.

Fig 6.1: Robot with Obstacle Detection

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Output:

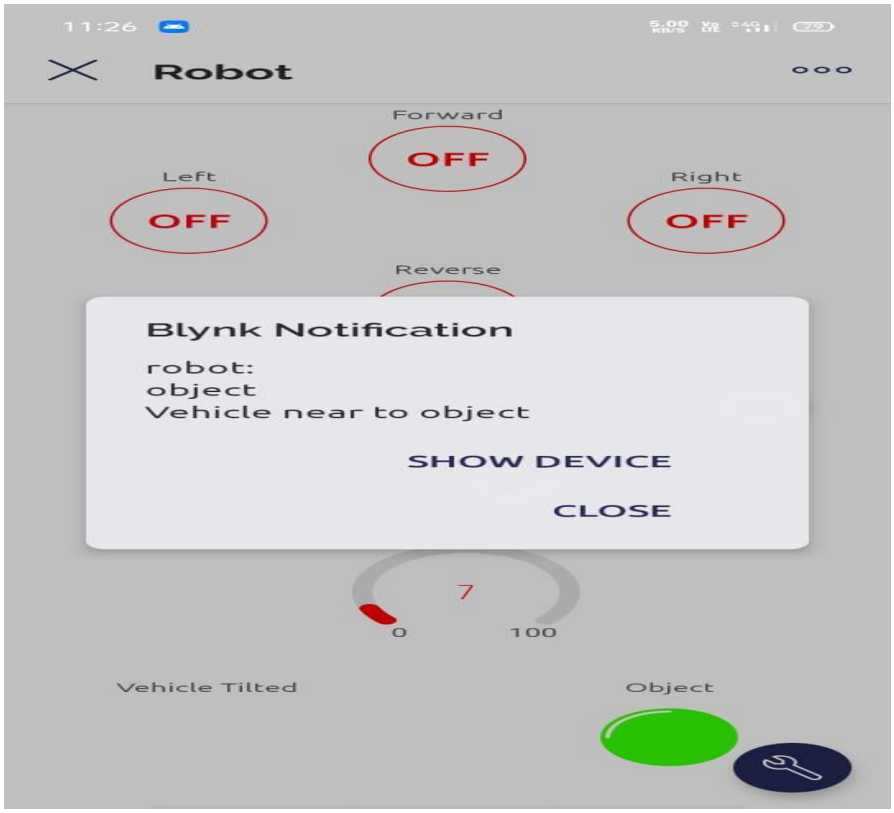

Fig 6.2 Output of the Project

VII. CONCLUSION

Structure and leakage detection for an automated computing machine. 2p network sensors were used to detect obstacles using a portable device. The Diploma of Fact and Least Fraud has become hereditary. Free frame assessment indicates the ability to avoid obstacles, the ability to move away from the crash site and change function. It is clear that with this type of arrangement, the greatest profit can be brought to the success of many constraints, with almost no human intervention. Finally, using ultrasound, the robot can be controlled remotely. The receiver and director were removed. This initiative will be useful in the climate, security and defense regions of the US adversarial elements.

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