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LOCALIZING OBJECT LOCATION FROM CAMERA AND ULTRASONIC SENSORS USING ARDUINO

Mr. S. MUNAF[1], A. VISHNU BAGAWATH[2], M. SANTHOSH[3], R. ROHITH[4]

[1]Assistant professor, Department of ECE, Sri Ramakrishna Institute of Technology, Tamil Nadu, India
[2-4]UG Student, Department of ECE, Sri Ramakrishna Institute of Technology, Tamil Nadu, India

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Abstract – *Automatic cars are a cutting-edge technology these days, and our research will aid automatic or semi-automatic cars in object recognition and determining their distance. Automobile can recognize objects and estimate distances using an ultrasonic sensor and a camera module as input data. An object detection system is a circuit that is designed to detect things that are outside the human eye's range of vision, such as objects that are outside the visible light region of the electromagnetic spectrum or objects that are at a distance larger than the human eye's field of vision. This research will use an ultrasonic sensor, a camera sensor, and the Arduino UNO to construct an object detection circuit. The value of the distance between the object and the monitor would be exhibited along with the detection.*

Key Words: **Camera sensor, Ultrasonic sensor, proteus, Arduino, Arduino IDE** are some of the terms used in this paper.

1. INTRODUCTION

Ultrasonic sensors have been installed in vehicles for many years. These Advanced Driver Assistance Systems (ADAS) sensors have mostly been employed for parking advice and blind spot identification. Ultrasonic vehicle data is more valuable than ever before, thanks to the rise of automotive IoT and advancements in autonomous vehicles. Ultrasonic sensors use high-frequency sound waves to gauge the distance between objects in close proximity, similar to how bats use echolocation. Ultrasonic sensors can be used in conjunction with other vehicle sensors such as radar, cameras, and lidar to provide a complete image of a vehicle's immediate surroundings. While ultrasonic sensors require close proximity and sluggish speeds, they have the advantage of being able to be used accurately in low-light circumstances.

2. PROPOSED SYSTEM

The block design illustrated in Fig. above consists of an ultrasonic sensor and a camera sensor, both of which operate as inputs to Arduino and outputs to a monitor. The ultrasonic sensor and camera sensor are utilized to determine the object's location and distance. The Arduino will localize the object location based on the input received.

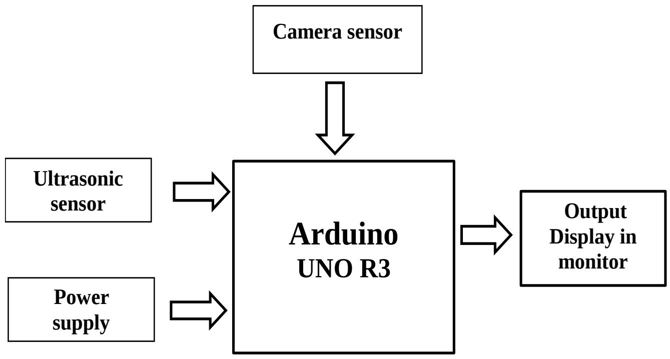

Fig: Block diagram

2.1 ULTRASONIC SENSOR

The HC-SR04 ultrasonic distance sensor is seen here. This low-cost sensor has non-contact measuring capabilities spanning from 2cm to 400cm with a range accuracy of up to 3mm. An ultrasonic transmitter, a receiver, and a control circuit are all included in each HC-SR04 module. On the HC-SR04, you only need to be concerned with four pins: VCC (Power), Trig (Trigger), Echo (Receive), and GND (Ground). An ultrasonic sensor is a device that uses ultrasonic sound waves to determine the distance between two objects. An ultrasonic sensor employs a transducer to emit and receive ultrasonic pulses that communicate information about the proximity of an item. High-frequency sound waves bounce off boundaries, resulting in different echo patterns. Ultrasound is dependable in any lighting condition and may be utilized both inside and outside. As long as the robot isn't moving too quickly, ultrasonic sensors can manage collision avoidance. Because ultrasonics are so commonly utilized, they may be used successfully in grain bin sensing applications, water level sensing applications, drone applications, even sensing automobiles at your local drive-thru restaurant or bank. Ultrasonic rangefinders are often employed as collision detection systems.

Fig: Ultrasonic sensor

2.2 CAMERA SENSOR

The OV7670 camera module is a CMOS image sensor that can capture full-frame windowed 8-bit pictures in a variety of image formats. Serial Camera Manage Bus (SCCB), an I2C interface with a maximum clock frequency of 400Khz, is used to control the OV7670 sensor. The OV7670 640X480 VGA CMOS CAMERA IMAGE SENSOR MODULE is a low-cost image sensor with a DSP that can function at a maximum of 30 frames per second and 640 x 480 ("VGA") resolutions, which is comparable to 0.3 Megapixels. The DSP may pre-process the acquired image before sending it out. The Serial Camera Control Bus can be used to customize this pre-processing (SCCB). OV7670 Omni Vision CMOS VGA (640480) CAMERA-CHIP Sensor with Omni Pixel technology Input Voltage: 3.3V DC operating temperature range: 0 to 50 degrees Celsius All glass lenses and lenses (including the seat) are made of Magnesium Alloy.

Fig: Camera sensor

3. EXPERIMENTAL SETUP

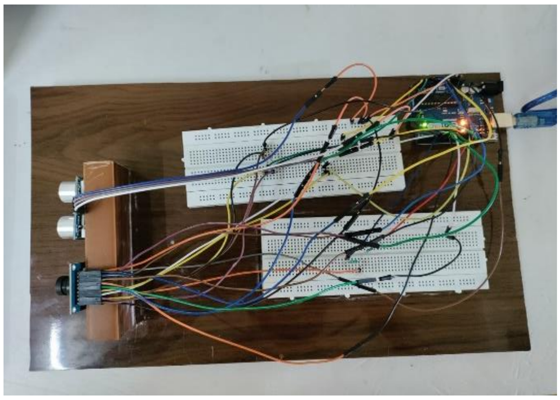

Fig: External Structure Model

The proposed methodology made up of the following sections:

3.1 ARDUINO UNO:

ATmega328 Arduino Uno micro controller board consists of 14 pins to permit influx and outflux of feeding (it is possible to use 6 pins as PWM signal outputs), 6 continuous signals with time commute group,16-megahertz electronic oscillators port connector, a non-board voltage regulator, ICSP header, and a reset button. The Arduino Atmega328 has 32 KB flash memory, 2 KB Static random-access memory and 1 KB electronically erasable programmable read-only memory. Arduino is a low-cost and easy–to–use programmable open-source microcontroller board that can be unified into a different electronic project. It is used to bridge software and hardware modules of the device.

3.2ARDUINO IDE:

The Arduino Integrated Development Environment (IDE), often known as the Arduino Software, includes a text editor for writing code, a message box, a text terminal, a toolbar with buttons for basic operations, and a series of menus. It communicates with and uploads programs to the Arduino hardware. The Arduino Integrated Development Environment (IDE) is a cross-platform programs (for Windows, macOS, and Linux) developed in C and C++ functions. It is used to build and upload programs to Arduino compatible boards, as well as other vendor development boards with the support of third-party cores. The IDE's source code is available under the GNU General Public License, version 2. processes.

4. RESULTS AND DISCUSSION

In this paper, the camera and ultrasonic sensor are connected to Arduino UNO. The Using the camera, we may visually determine the location of an item. The object's distance is detected and presented in centimetres. The distance between the item and the camera varies depending on its position. The below figure displays the image captured by camera module, the output display through ARDUINO IDE on COM3.

Fig: camera output

The below figure displays the output of the ultrasonic sensor in centimeters. The ultrasonic sensor will detect the object opposite to it (180^0) and display the distance of the object.

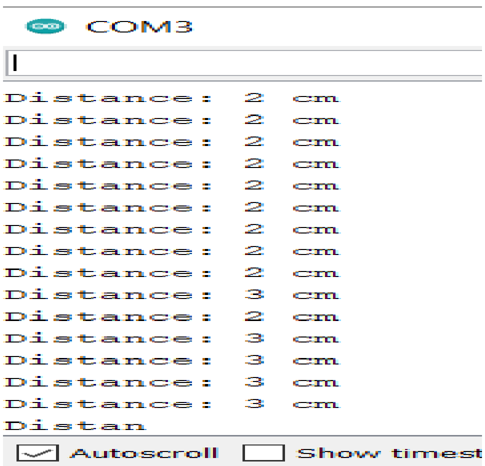

Fig: Ultrasonic sensor output

5. CONCLUSIONS

Numerous enhanced control methods provided designers with greater control over various advanced applications. The proposed mapping approach for the whole system is evaluated on a small scale or principles. The topic that we have picked for our design, "Radar System," is a very broad one with a very bright future. Radar systems have been deployed or used in a wide range of applications. Because of its security capabilities, this design has a lot of potential for the future. It has a wide range of uses. This framework can also be created or updated in response to changing needs and demands. Because we constructed a short-range radar, our study was constrained and restricted. Because the servo motor we used can only rotate in this range, our system can only detect objects from 0 to 180 degrees. As a result of this constraint, our approach cannot be used to places or areas for larger-scale obstacle identification.

6. REFERENCES

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