VEHICLE DETECTOR DESIGN USING ARDUINO MICROCONTROLLER SENSOR

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ABSTRACT

This research aims to create a design for a vehicle detector so that it can be applied to detect empty vehicle parking areas. This equipment can then be used in parking buildings, shopping centers, offices and hotels.

The research method used is the experimental method. The results of research that has been carried out to determine the working principle of parking detection devices found that when the parking lot is full, we can immediately know. It is hoped that this research will be useful for the public, who are traveling to shopping centers, hotels and offices to provide information about parking.

Keywords: Detector; Sensors; Microcontroller; Arduino

Introduction

Arduino is an open source electronic kit designed to make it easier for artists, designers and anyone interested in creating objects or developing electronic devices that can interact using sensors and controllers (Saputro, 2020). The convenience of Arduino is widely applied in various detector devices such as Flood Detectors and in this case it can also detect vehicles.

As technology develops and especially digital technology, various tools are created to facilitate human needs to find parking for vehicles. Where the number of people and the need for public transportation are inadequate, which causes people to use private vehicles. Especially for cars that are often used in parking areas in shopping center buildings, office buildings and hotel buildings as well as parking lots in basements, it will be difficult to handle parking if you only rely on conventional parking attendants.

If you only use parking attendants then you need to have lots of parking attendants to run it effectively. If there are few parking attendants, there will be obstacles in searching for large parking lots and the number of users will make it difficult for parking users to find empty parking slots. A microcontroller is a digital electronic device that has input and output as well as control with a program that can be written and deleted in a special way. , how the microcontroller actually works is reading.

Formulation of the problem

Based on the background description stated above, the formulation in this research is as follows:

a. How do I find out if the parking area is empty?

b. What is the farthest distance the webcam can detect?

Objective

In this research, the researcher took the title Design of a Vehicle Detector Using an Arduino Microcontroller Sensor with the following objectives:

a. Can find out which parking areas are still empty

b. Knowing the Reading Distance from the Webcam.

Benefit

This tool is very useful for use in parking areas so that visitors can easily determine where to park

Research Flowchart

The methodology used in completing this Final Project is as follows:

Study of literature

This literature takes the form of books, journals and other internet sources.

Design

Carrying out system design and modeling so that the system can be used

Research Flow Chart

The following is a research flow chart used in this research as depicted in Figure below .
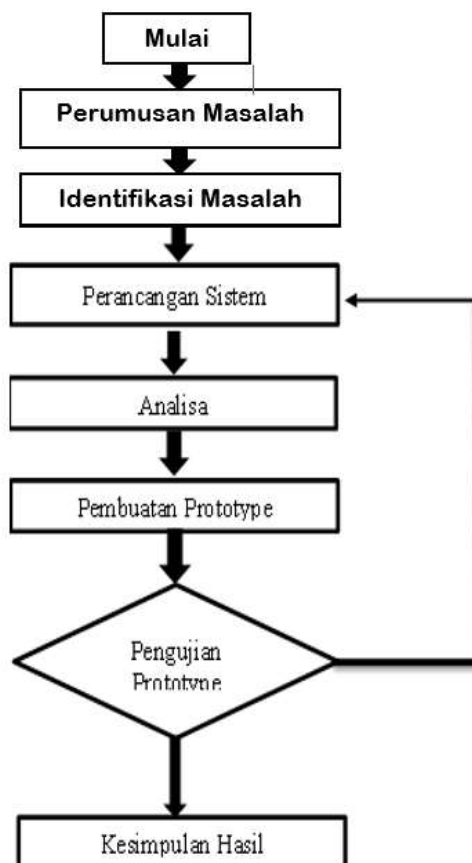

Figure Research Scheme

Materials and Equipment

To design and make a prototype of a Flood Detection Tool, the first thing to do is prepare the materials needed to make the prototype. These ingredients are:

1. Arduino Uno
2. Arduino Data Cable
3. Infrared sensors
4. LCD 16X2
5. Servo motors
6. Buzzers
7. Jumper Cables

Tool Work System Design

System analysis

Analysis of the running system is carried out to find out and understand how the Arduino-based Vehicle Detector system works. This vehicle detector system can be described as follows:

a. Users do not know information about empty parking locations

b. With this detector equipment, with notifications displayed on the display, parking officers can find out which parking slots are filled and which parking slots are still empty.
c. Parking attendants can notify users which parking slots are still empty.

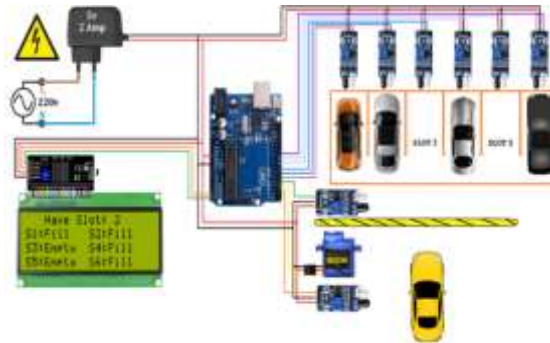An overview of how this detector works can be described in Figure as follows:

Figure Arduino System Design

Flow chart
In this section, we will explain the design of the vehicle detector working system used to regulate vehicle parking. In this system block diagram, the parts and workflow of the system will be explained with the aim of explaining how the system works and flow in outline in the form of images with the aim of making a system easier to understand and understand. The system block diagram image that the author will create is as follows, as in Figure below:
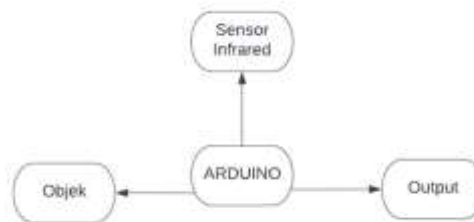

Figure System Block Diagram

In the system block diagram above, the object is, then the Infrared Sensor will detect the activity that is happening in the parking area, then it will be processed by Arduino with image processing, then after being processed by Arduino, the output will come out in the form of the number of parking loads, empty parking lots, parked vehicles, and vehicles out of the parking lot.
Figure 1.3 above explains that the Infrared Sensor will detect objects in real time, then the Infrared Sensor System will input it to the laptop by saving it in the created folder. The next process, Arduino will detect objects and analyze them, then Arduino will provide output in the form of the number of parking lots, empty parking lots, parked vehicles and vehicles leaving the parking lot.
Library Reference
Arduino is a type of single board micro controller that is open source derived from the Wiring Platform (Habibi, 2018). According to (Suhaeb, Yunus and Tommy, 2019) Arduino is an open source physical computing platform. Physical computing is a system or physical device using software and hardware that is interactive (can receive stimuli and respond back) (Hanafi, 2011) with the help of sensors. Arduino is quite flexible and easy to use both in terms of hardware and software. Beyond that, the main strength of Arduino is the large number of users, so that a large number of code libraries and supporting modules (hardware support modules) are available. This makes it easier for beginners to get to know the world of microcontrollers. Arduino software is processing software that is used to input programs to the Arduino Uno system. The IDE (Integrated Development Environment) on Arduino Uno consists of three parts, including (Mulyana and Kharisman, 2014)

a. Program editor: to write and edit programs in processing.
b. Compiler: a module that functions to convert processing language (program code) to binary code. Because the binary code can be understood by the microcontroller
c. Uploader: serves to enter the binary code into the microcontroller memory
       Several advantages of Arduino Uno compared to other physical computing platforms (Suhaeb, Yunus and Tommy, 2019):
a. Inexpensive, Arduino boards are cheaper compared to other microcontroller platforms.
Function description
Program Editor A window that allows users to write and edit programs in a processing language.
Verify Checks for error sketch codes before uploading to the Arduino board.
Uploader A module that loads binary code from a computer into the memory on the Arduino board.
New Creates a new sketch.
Open Opens a list of sketches on the Arduino sketchbook.
Save Saves the sketch code in the sketchbook.
Serial Monitor Displays serial data sent from the arduino board.
b. Cross-platform, Arduino software can run on Windows, Macintosh OS, and Linux OS.
c. Simple, clear programming environment. Arduino programming is easy to apply for beginners.
d. Open source and extensible software
e. Does not require a chip programmer device because there is already a bootloader
f. Already has USB communication facilities
g. Discussing programming is relatively easy because Arduino software is equipped with a fairly complete library.

Arduino Hardware
The Arduino board is a small microcontroller board or can also be interpreted as a small circuit containing a computer in the form of a small chip. In Figure 1.4. below you can see an arduino board with several component parts in it.
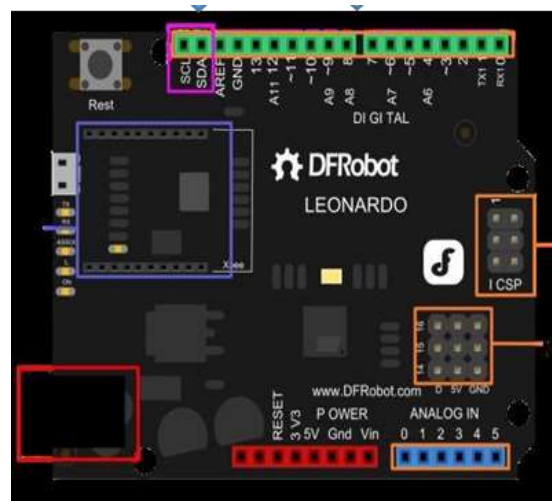

Figure Arduino Pin Out

Arduino Software
The Arduino software used is the driver and IDE, although there is still some other software that is very useful during Arduino development. IDE or Integrated Development Environment is a special program for a computer to be able to create a design or program sketch for the Arduino board. The arduino IDE is a very sophisticated piece of software written with
using java. As in Figure and Table below, the Arduino IDE consists of:

Figure Display of the Arduino Toolbar

sensors

The sensor is a detector of changes in the physical or chemical environment. The output from the sensor will be converted into an electrical quantity called a transducer. Currently it has been made with a small size on the order of nanometers. This size can facilitate use and save energy (Risdiandi, 2020). This sensor will measure the water level by the data microcontroller according to the programming input that has been designed.

Results and Discussion

Infrared Sensor Testing

Infrared Sensor Testing Infrared Sensor Testing aims to determine the ratio of radiation to an object that has been caught by the sensor to its actual distance. Testing is carried out by placing the Infrared sensor as an object sensor placed in front of the sensor. Testing on Infrared sensors begins by creating a program on Arduino. The list of programs for testing Infrared sensors can be seen in Figure below.

Figure Logarithm System

The infrared sensor works when the sensor emits radiation on an object. After the program is written in full, the program is downloaded to the Ardiuno. Then the object is placed in front of the infrared sensor. Object is placed.

How this system works in parking slots

Testing How the System Works After ensuring that all the circuits are in good condition, the entire tool is tested and applied to the parking area. The test is carried out by the car entering the parking area. Infrared sensors placed in front of the parking gate and behind the parking gate provide an Infrared signal when entering the parking gate. The microcontroller records numbers from the infrared sensor according to the input to check the availability of the number of parking slots. Data on changes in parking slot availability. When the infrared sensor reaches the parking area, the infrared sensor inputs the presence of empty and filled parking slots which will be displayed on the LCD screen placed in front of the parking entrance, to help users find parking slots. And when the parking slot is full, the parking gate will not open until a vehicle leaves the parking area as shown in figure below.

Figure Parking System Monitor

Conclusion

Based on the data from the test results that have been carried out, it can be concluded that the design of a vehicle detector with an Arduino microcontroller sensor has succeeded in working as expected, where its use can be used to regulate vehicle parking in shopping center buildings, hotels or office buildings. The design has been successfully created combining several components and circuits, among others

a. Arduino UNO as the main control, infrared as a detection sensor when it emits radiation on the intended object

b. The parking slot detection system works well according to the desired function

c. How the parking sensor works can be used as a tool in finding parking availability

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