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An Application Of Infrared Sensors In Providing Instructions For Logic Gates In Automatic Doorstops

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ABSTRACT
A parking space unit is an effective square measure for placing one vehicle (passenger car, bus/truck, or motorbike). This includes free space on the left and right of the vehicle meaning that the doors can be opened for passengers to get on and off as well as certain things such as space for special wheelchairs to park vehicles for people with disabilities as well as free space at the front and back. Parking Gate Bar, or by another name barriergate, is a device for restricting entry and exit of vehicles, the function of this parking door barrier or parking barrier is to indicate that a vehicle is allowed to enter or leave the parking lot, after passing through the parking guard post. Parking door barriers are usually operated using direct DC or AC electricity. , depending on needs and the price level which is adjusted to field conditions. The speed of the parking gate opening is one of the points that determines the price for the item, because the speed of opening will affect the overall parking service cycle, if the parking gate opens faster, more vehicles will be served. , whether leaving or entering the parking area, and ultimately parking customers will be more satisfied, if this speed reduces the waiting time of parking customers.

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INTRODUCTION

Tests carried out on the sensors on the parking gate will later work to open and close the parking gate based on commands given by the infrared sensor. In this way, if a command is given to the Adjustable infrared Sensor, the bar will open and close automatically. This is interesting in analyzing the performance of sensors that provide input to logic gate IC components. Later what I will analyze is the distance of the object to the sensor, color texture and type of object and provide input to the logic gate IC which can work and give commands to the motor which can automatically open and close the bar when the sensor is active.

Changes in human lifestyles today are often caused by the rapid development of technology which provides many forms of convenience in the use of devices or tools that are directly related to human life. We can prove this by the emergence of more and more new creativity in the world of electronics. For this reason, I carried out experiments and tests to develop an idea with the title "Performance Analysis of Adjustable Infrared Sensors in Giving Commands to Logic Gate IC Components in Automatic Parking Bars".

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Tests carried out on sensors on parking barriers will later work to open and close parking doors based on commands given by the infrared sensors. Thus, if a command is given to the Adjustable Infrared Sensor, the crossbar will open and close automatically. This is interesting in analyzing the performance of sensors that provide input to logic gate IC components. Later what I will analyze is the distance of the object to the sensor, color texture and type of object and provide input to the logic gate IC which can work and provide commands to the motor which can automatically open and close the crossbar when the sensor is active.

Literature Review

A Parking

A parking space unit is a measure of the effective area for placing one vehicle (passenger car, bus/truck, or motorbike). This includes free space on the left and right of the vehicle, meaning that the doors can be opened for passengers to get on and off as well as certain things such as space for wheelchairs specifically for parking vehicles for people with disabilities as well as free space at the front and rear.

Parking Gate Bar

Parking Gate Bar, or by another name, barrier gate, is a device for restricting entry and exit of vehicles. The function of this parking gate or parking barrier is to indicate whether a vehicle is allowed to enter or leave the parking lot, after passing through the parking guard post. Parking door latches are usually operated using direct DC or AC electricity, depending on needs and the price level which is adjusted to field conditions. The speed at which the parking latches open is one of the points that sets the price for the item, because the opening speed will affect the service cycle. parking as a whole, if the parking barrier opens more quickly, more vehicles will be served, both leaving and entering the area parking, and ultimately parking customers will be more satisfied, if the speed reduces the waiting time of parking customers.

Sensors

Sensors are tools that can be used to detect and often function to measure the magnitude of something and function to change one energy into another form of energy Daryanto (2011). Sensors are a type of transducer used to convert mechanical, magnetic, heat, light and chemical variations into voltage and electric current. Sensors are usually categorized by gauges and play an important role in the control of modern manufacturing processes. Several types of sensors that are widely used in electronic circuits include light sensors, temperature sensors, and pressure sensors, ultrasonic sensors.

Infrared or infrared is electromagnetic radiation with a wavelength longer than visible light, but shorter than radio wave radiation. Infrared radiation has a range of three "orders" and has a wavelength between 700 nm and 1 mm. Infrared was discovered accidentally by Sir William Herschell, an astronomer from the United Kingdom, when he was conducting research looking for optical filter materials that would be used to reduce the brightness of solar images in solar system telescopes.

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Logic gates

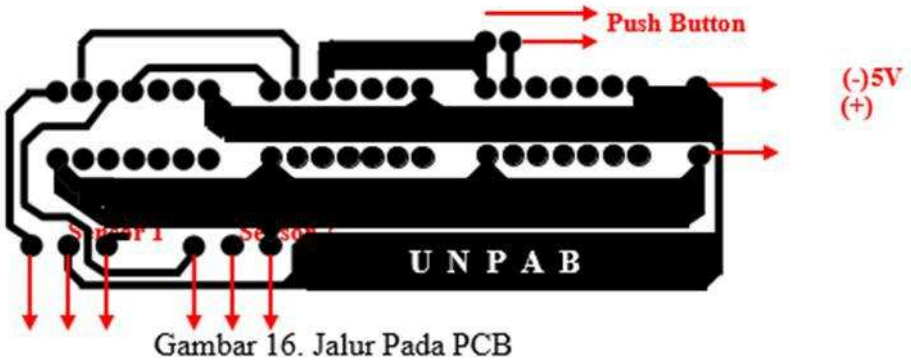
Logic gates are the basic circuit that forms a computer which has millions of transistors in a microprocessor which form thousands of logic gates Widodo Budiharto et al (2008:59). A logic gate is a circuit with one or more input signals but only produces one signal in the form of high voltage or low voltage. Logic gates are the basis for building digital electronic circuits. A logic gate has one output terminal and one or more input terminals. The output and input of this logic gate are expressed in HIGH (1) or LOW (0) conditions. In a TTL system the HIGH level is represented by a voltage of 5V, while the LOW level is represented by a voltage of 0V.

Through the use of logic gates, we can design a digital system that will evaluate input levels and produce specific output responses based on the logic circuit design. There are seven logic gates, namely AND, OR, INVERTER, NAND, NOR, exclusive-OR (XOR), and exclusive-NOR (XNOR). However, only the INVERTER and OR logic gates will be discussed.

Figure 1. Logic Gate IC

METHOD

At this stage the author makes detailed PCB paths according to the circuit drawing that has been prepared, draws the PCB path using a permanent marker and later dissolves it with FeCl3 to print the appropriate path image.



Gambar 16. Jalur Pada PCB

Figure 2. Pcb Layout.

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At this stage the author will install the required components on the PCB board that has been drawn. Before connecting the PCB board, it should be sanded first so that the solder tin that will be attached adheres perfectly.

Figure 3. Components that have been soldered

At this stage the author tested the function of the components that had been completed in the test assembly including the infrared sensor working system to give commands to the logic gate IC components and cutting off the current to the motor driver by a push button switch.

Figure 4. Parking Bar Frame

The picture above is a picture of the entire automatic parking barrier frame that uses an adjustable infrared sensor. Starting from cutting the iron, smoothing the iron, forming the frame, installing gear, installing components, installing the Adjustable Infrared Sensor and performance trials.

The image above is a schematic of a sensor circuit using logic gates. Sensors are used and function to give commands in the form of logic input in the form of binary

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numbers (0) and (1) to the logic gate IC circuit. The function of binary numbers is that when the Infrared Sensor is not touched by an object, it gives an input value of 1 to the logic gate circuit. And when the sensor is blocked/touched by an object, it will give an input value of 0 to a series of logic gates.

RESULTS AND DISCUSSION

Network model

The circuit model that the author will explain is presented in the following figure:

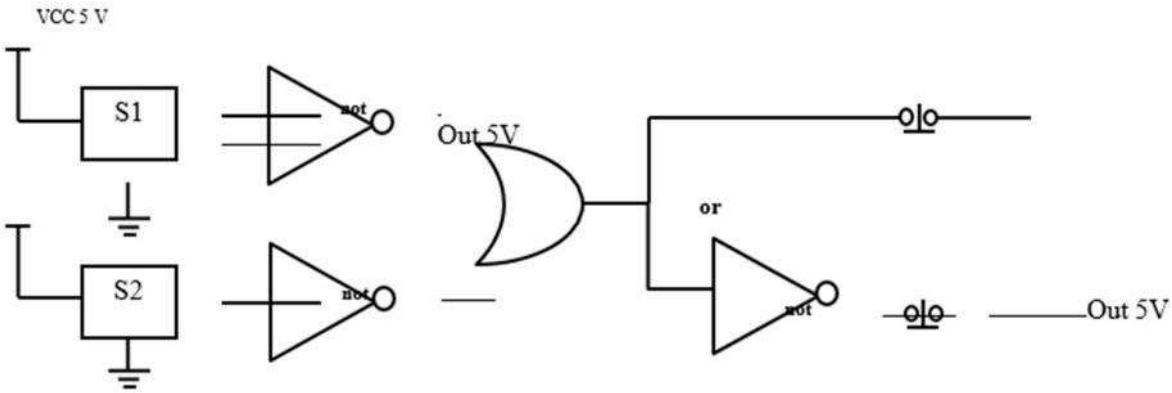

Figure 5. Circuit Schematic

If the infrared light emitted by the sensor is blocked by an object within a specified distance range of 3 cm to 80 cm, the sensor will have a logic 0 which will be forwarded to the NOT DM logic gate IC which will change the input Logic 0 becomes 1. For more clarity on the working principle of the sensor on the Not DM logic gate IC, you can see the truth table below.

Table 1. Sensor Truth Table for Notes

MON	LOGIC GATE IC NOT
SOR	DM
0	1
1	0

Analysis of the NOT logic gate working system

The NOT logic gate IC has the function of receiving logic input from an infrared sensor, if the sensor is blocked by an object and provides logic 0 input to the NOT logic gate IC, the NOT logic gate IC will reverse the logic position from logic 0 to logic 1 and will continue to OR logic gate ic. For more clarity on the working principle of the NOT logic gate, see the truth table below.

Table 2. Note Truth Table for OR

SENSOR INPUT INFRARED	GATE OUTPUT NOT	MOTTOR
1	0	DOWN
0	1	GO ON

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OR Logic Gate Working System Analysis

The OR logic gate IC has the function of forwarding commands given to the NOT logic gate IC to the 12 v dc motor driver. if the NOT logic gate IC provides logic 1 input then the OR logic gate IC will provide logic 1 input to the motor driver and provide logic 1 input to the NOT logic gate IC which then the NOT logic gate IC provides logic 0 input to the motor driver which causes the motor to move put the door latch up. And vice versa if the NOT logic gate IC gives

Logic input 0 to the OR logic gate IC will then provide logic 0 input to the motor driver and provide logic 0 input to the NOT logic gate IC which then the NOT logic gate IC provides logic 1 input to the motor driver which causes the motor to move the door latch downwards. This is a combination of a logic working system between a NOT logic gate IC and an OR logic gate IC.

The push button switch has the function of stopping the movement of the motor so that unwanted rotation does not occur. Because this circuit is designed very simply, the role of the push button is very important to stop unwanted motor rotation. The working system of this push button is that when the door latch presses the push button, it will provide logic 0 to the motor driver and stop the movement of the motor quickly.

Testing Sensor Circuits Against Types of Objects

In this test, the author tested the sensor with different types of objects. Each object has a different distance to the sensor. In this test the author obtained the results of the sensor distance to different objects that were provided. Here are some tests on different objects.

CONCLUSION

From the description that has been summarized based on the discussion above, I can conclude that writing this thesis has provided positive results for us. The positive things in question are as follows: The Adjustable Infrared Sensor can respond (active) with a maximum distance of 80cm from objects (objects) that are directly in front of the sensor in a straight line. Based on the test results, this Adjustable Infrared sensor has different distances to objects, color textures and types of objects. We can understand how the Infrared Sensor works in giving commands to the logic gate IC circuit. We can understand in a simple way how the infrared sensor works automatically which can open and close the bars.

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