

ENHANCE DESIGNING SECURITY TOOLS USING SENSOR LIGHT DEPENDENT RESISTOR (LDR) THROUGH MOBILE PHONE

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Abstract

Many research of theft due to lack security systems contained in the house, this is due to limited costs in the installation of security systems that generally use CCTV cameras or security systems with a microprocessor using GSM modem. As a settlement of the high cost of installing this system, it is designed and created a security tool with the priority of forwarded financing and can work to minimize the possibility of theft cases. This tool works as a detector in the room, where when there is movement within the house it will be notified to the user about the situation in the room. This research on paper uses LDR (light dependent resistor) sensors as a detection of movement in the house and cellular phone as a tool to inform the user of the tool about the condition of the home circumstances. The results obtained from the use of this tool is obtained information on the mobile phone user tool when there is movement on the door the secured space, so that the user of the tool can take action in response to the information transmitted from the tool.

Keywords: LDR sensor, Op-amplifier, Speed dial.

I. INTRODUCTION.

Light Sensor LDR (Light Dependent Resistor) is one type of resistor that can experience changes in resistance when experiencing changes in light reception. LDR, known by many names: photo-resistor, photo-conductor, photo-conductive cell, or just photo-cell and which is often used in literature is photo-resistor or photo-cell (Aryza, et al., 2018). The amount of resistance value on the LDR Light Sensor (Light Dependent Resistor) depends on the size of the light received by the LDR itself. LDR is often called a device or sensor in the form of resistors that are sensitive to light (Granado-Criado, 2010).

This tool is designed to ensure the safety of the room can be detected by the user of the tool either while indoors or not in the room. This will also reduce costs when compared to using the services of security guards and improve the security of a room. In pengoprasiannya, this tool utilizes the LDR sensor whereas this sensor will detect the movement of the door of the room through the light it receives. In this case conducted a review of the books from the library to get a supporting theory for the design of this tool (Azam, 2017).

II. LITERATUR REVIEW.

2.1. Photo-Resistor / LDR Mechanism

A Photo-resistor or LDR is a component that uses a photo-conductor between the two pins. When the surface is exposed to light there will be a change in resistance between them. The mechanism behind the photo-resistor or LDR is photo-conductivity, that is an event of change in the conductance value of a semiconductor material when the photon energy from light is absorbed by it. When used as a Photo-resistor or LDR, the semiconductor material is used only as a resistive element and there is no PN connection. Thus, Photo-resistor or LDR is purely a passive component (Aryza, et al., 2018).

2.2 Operational-Amplifier

The operational amplifier or opamp (from operational word amplifier) is a amplifier in the peripheral with two inputs and one discharge which has a very high voltage gain. Operational Amplifier or in short op-amp is one of analog component which is often used in various application of electronics circuit. The most common op-amp applications include inverter, non-inverter, integrator, differential and comparator circuit.

An Operational-Amplifier is basically a device with three terminals consisting of two high impedance inputs, the other is called Inverting Input, indicated by negative or less sign (-) and the other is called Non-inverting Input, marked with positive or plus sign (+). The third terminal represents the output terminal of the Operational Amplifiers which can input and distribute either voltage or current. In a linear Op-amp, the output signal is a reinforcing element, known as the gain (A) that doubles the value of the input signal and depends on the nature of the input and output signals. Symbol operational amplifier in the circuit is as in the following picture (Abdullah & Halim, 2004):

NOTED :

V_+ : noninverting input

V_- : inverting input

V_{out} : Output

V_{s+} : positive power supply

V_{s-} : negative power supply

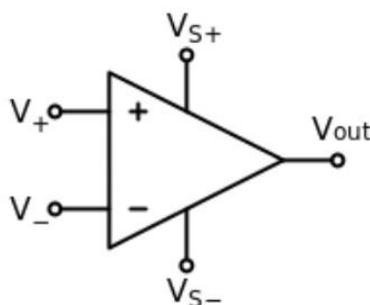
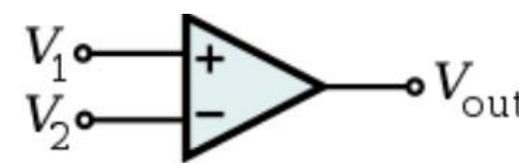
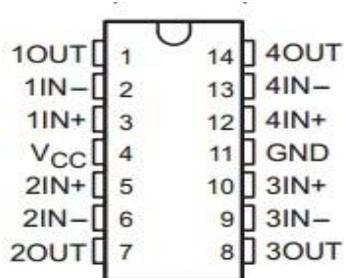


Figure 1. Structure OC Amplifier

In the manufacture of tools, used IC LM324 which acts as a comparator. The comparator or comparator is an application of an operational amplifier which in principle works by utilizing a high value open loop gain on this component (Aryza, 2018).

LM324 IC is specifically functioned solely as a comparator voltage value in a circuit. This is slightly different from other types of amplifier components of the like. The working principle of the comparator is to compare two input voltages and change the output to show which voltage is higher.



Figures 2. The foot structure of the LM324 IC and its input and output symbols

2.3 Adapter

The power supply serves to provide source voltage to a circuit so that it works. Generally

electronics equipment requires DC current (unidirectional). Therefore, AC current flow from PLN must be converted first into DC current. In this case we need a voltage-reducing circuit in the form of a step-step transformer which is assisted by a rectifier circuit and a filter. For that use an adapter.

2.4 Laser Diodes

In the process of sending light as a source of information for the sensor working system, a laser diode is used as the light source. The laser diode is one type of diode where the active medium uses a semiconductor with a p-n junction similar to the LED. Laser diodes are sometimes also abbreviated LD or ILD.



Figures 3. Dioda Laser

The laser diode was discovered at the end of this century by Harvard University scientists. The working principle of this diode is the same as any other diode, that is, through the circuitry of the electronics circuit, which consists of the terminals p and n. In both terminals are often generated 2 voltages, namely:

- *charged forward, the current is generated in the direction of the value 0.707 for the division of the peak v , the waveform above (+).*
- *Back forward biased, this is a reversed voltage that can damage an electronic component.*

2.5 Cellphone

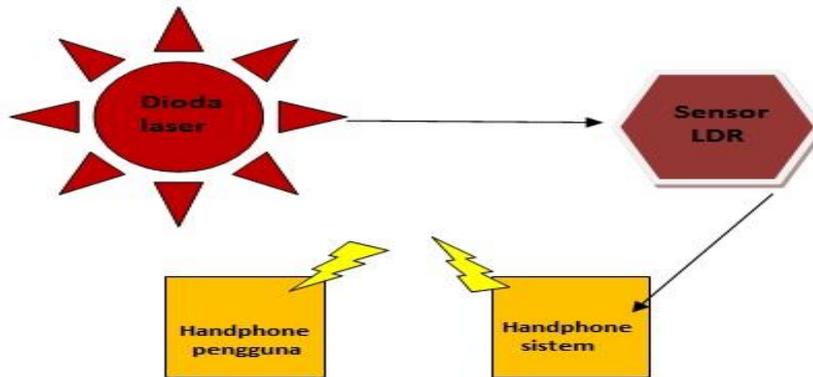
A mobile phone is an electronic telecommunication device that has remote communications capabilities in a portable / mobile manner and does not need to be connected to a wired or wireless telephone network. The networks used in the use of cell phones include CDMA (Code Division Multiple Access) and GSM (Global System for Mobile Telecommunication).

III. METHOD OF RESEARCH.

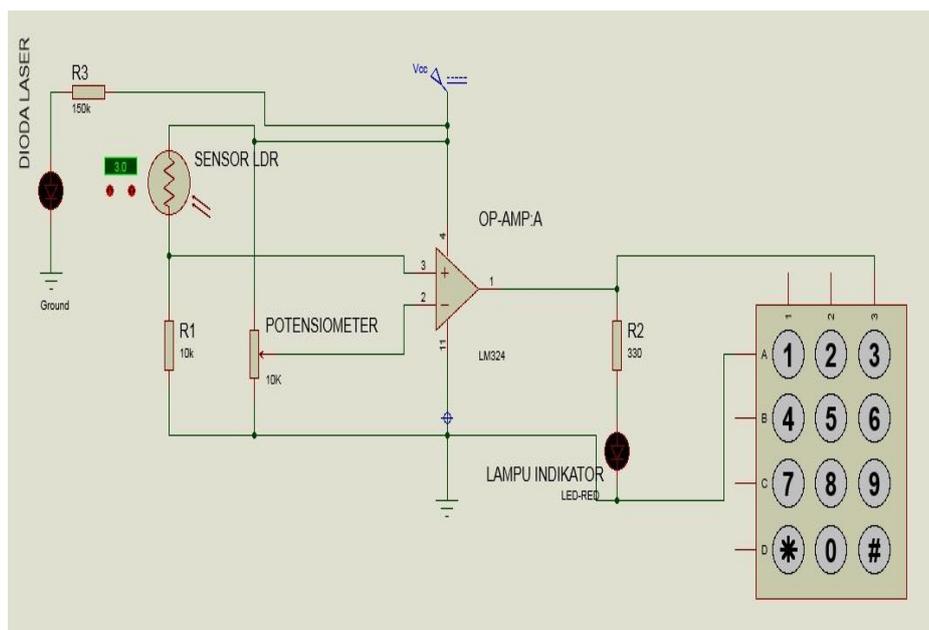
Block diagrams are one of the simplest ways to explain how a device works and make it easy to localize errors from a system. With the block diagram, we can analyze the way the circuit and design the hardware to be made in general.

A diagram is a sequential relation statement of one or more components that have a separate working entity, and each component block affects the other components.

Block diagram has a special meaning by providing information in it. For each block is connected to a line indicating the working direction of each block in question. Here is a block diagram of the room security tool that will be created.

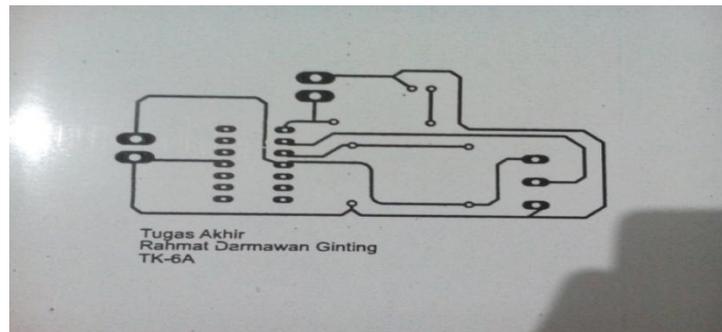


Figures4. Diagram Blok Tools



Figures 5. The tool circuit scheme

After designing the circuit and tested on the protoboard board as the first test medium, it can be continued by designing the PCB board from this tool set. In the design, arranged component layout according to aesthetic elements and consideration of component functions. In making this PCB path using techniques manually.



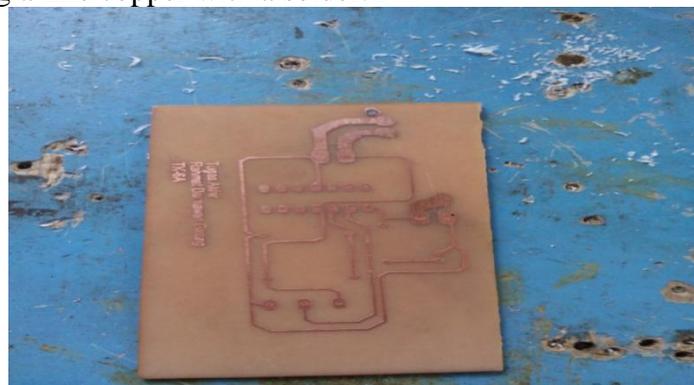
Figures 6. Layout PCB

As for the need to be considered in the process of making PCB lines include:

- Avoid the formation of the path that menyiku and turn sharp
- Try to use the jumper as much as possible
- Avoid short links
- Make the path as short as possible

3.1. PCB Path Design Testing and Repair

In PCB printing there is often an error in the path, for example the path is disconnected or tangent to other lines. Therefore, it would be better if the PCB is checked again and corrected if there is an error. The way that can be done in checking the path is to see the path or by checking with a multimeter. If there is an intersecting path, it can be cut with a cutter, if one is disconnected, connected by attaching a fine copper with a solder.D



Figures 4. Printed PCB

3.2. Component soldering

After the inspection and repair process is done, the next step is the installation and soldering of components on the PCB in accordance with the planned layout.

In the process of installation and soldering is done with attention to several things, namely:

- Soldering time, done in the not-too-distant future because it is feared to damage paths and heat-sensitive components.
- The use of tin should be kept to a minimum and pay attention to its maturity in the point of connection.

- The use of safeguards is made to protect and facilitate the replacement of heat-sensitive components, eg ICs using socket ICs.

3.3 Assembling

After soldering process, first PCB cleaned from the rest solderan and pasta using tinner. After that, testing the circuit to test whether the circuit has been running correctly. If the circuit is running, then the next process of assembling the components into the miniature of the house.

The process carried out in the assembly of the phone is by removing the battery then releasing the front cover of the button and the next transparent cover over the button. After dismantling the transparent cover over the button, it will encounter a thin white film in the main terminal. This thin white film is then opened to taste and adjust to the button that will be used .



Figures 5 Mobile that has been dismantled

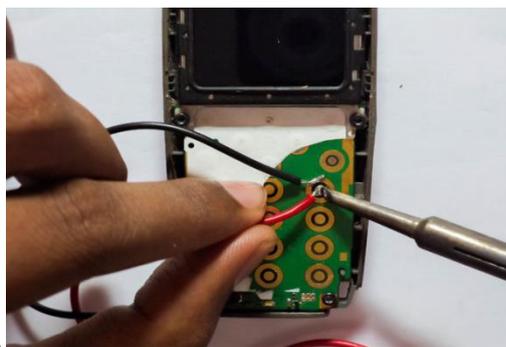
IV. RESULT ANALYSIS

The next step is to check the polarity of the button, ie by inserting the battery back into the phone and turning it on. In this tool, 3 buttons are used for speed dial, therefore simply check the terminalson the button 3. Put the multimeter on the dc voltage measurement then put the 2 terminal tester on the button and turn the tester position on the terminal until it is known which one is the positive terminal and which is the negative terminal (in this case, the outer terminal is the terminal negative and inner terminal is a positive terminal).



Figures 6. Measurement of mobile phone polarity

Next, solder the cable to connect the phone with the sensor driver



Figures 7. Wiring Of System

V. CONCLUSIONS.

From the process of designing, manufacturing, and testing this tool it can be concluded as follows:

- LDR sensor works with working principle of voltage divider circuit.
- The intensity of light affects how the LDR sensor works.
- IC LM324 op amp in this tool works as comparator difference (comparator).
- The phone in this tool acts as the successor of the information from the sensor to the user of the tool.
- Do not just secure the front door only in applying the tool, but securing the other doors as well.



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