DESIGN OF SECURITY TOOLS USING SENSOR LIGHT DEPENDENT RESISTOR (LDR) THROUGH MOBILE PHONE

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Abstract: *Many cases of theft due to lack of 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 tool 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.*

1. INTRODUCTION.

Changes in the current pattern of human life, much due to the rapid development of technology that many provide all forms of ease in the use of devices or tools that are directly related to human life [1] . 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 [2].

2, LITERATURE REVIEW.

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 [3]. 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 [4]. Usually LDR is made of cadmium sulphide which is a semiconductor material whose resistance varies according to the amount of light (rays) that hit it. Like a conventional resistor, LDR mounting in a circuit is exactly the same as a regular resistor installation. The LDR symbol can be seen as in the following figure [5].

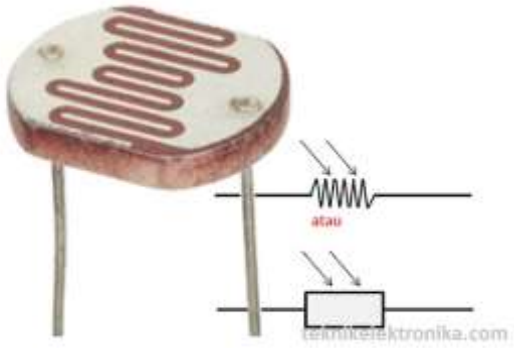


Figure 1. LDR Sensors and Symbols

2.1 Characteristics

LDR Light Sensor Characteristics (Light Dependent Resistors) The LDR Light Sensor (Light Dependent Resistor) is a component form that has a change in resistance depending on the amount of light. LDR characteristic consists of two kinds, namely the Recovery Rate and Spectral Response.

2.2. Work principle

The Working Principle of LDR Light Sensor (Light Dependent Resistor) will change with the change of the intensity of light that surrounds it or the surrounding. In a dark state the LDR resistance is about 10MΩ and in a light state of 1KΩ or less. LDR is made of semiconductor materials such as cadmium sulphide. With this material the energy from falling light causes more charge to be released or increased electrical current. This means that the resistance of the material has decreased [6].

In the dark or dim light, the material from the disk produces free electrons with a relatively small amount. So there are few electrons to transport the electrical charge. This means that when the light is dim, LDR becomes a bad conductor, or LDR can also have a great resistance in the dark or dim light. At the bright light, there are more electrons out of the atom of the semiconductor material. So that will be more electrons to transport the electrical charge. This means that when the bright light, LDR into a good conductor, or LDR can also have a small resistance during bright light. When we will set the sensitivity of LDR (Light Dependent Resistor) in a circuit then we need to use potentiometer [7].

2.3. 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 [8].

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 [2].

Figures 2. 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.*

3. METHODE 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.

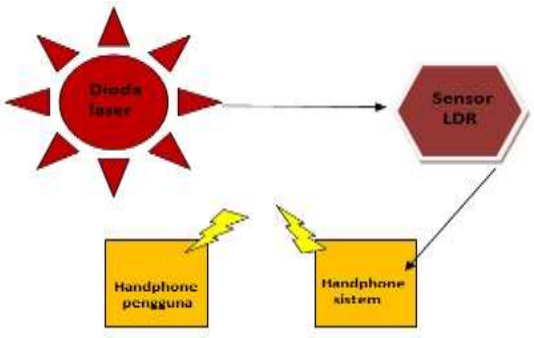
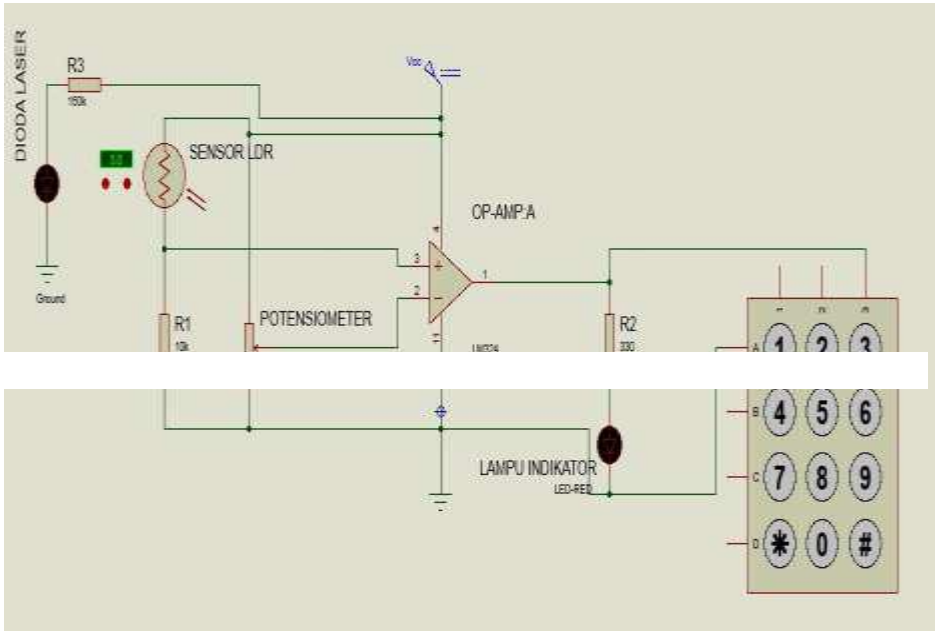


Figure 3. Diagram Block Tools.

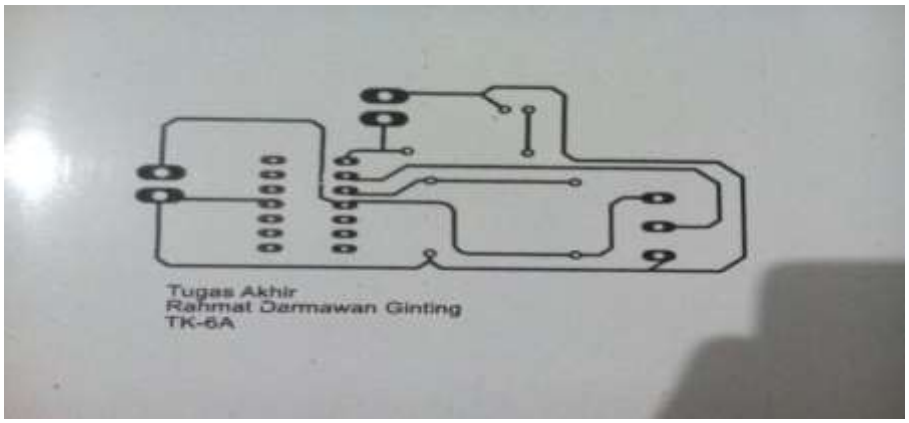
In the process of making the tool is done first circuit design using CAD applications, in this case using eagle.Here is a circuit drawing tool.



Figures 4. The tool circuit scheme.

4. ANALYSIS AND RESULTS.

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 5 . 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

The materials and tools used in this PCB manufacturing process are as follows:

- Cairan *Ferry choloride* (Fe_2Cl_3)
- Air (better if there is hot water)
- Spidol Permanent
- Sand paper
- Cutter
- Mecin bor
- Solder
- *Tinner*
- Timah
- Cleansing soap

The materials used include:

- Resistor (10K,330Ω)
- Potensiometer (10K)
- Operational Amplifier (IC LM324)
- Dioda Laser
- LED
- Sensor LDR
- Handphone seluler

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.

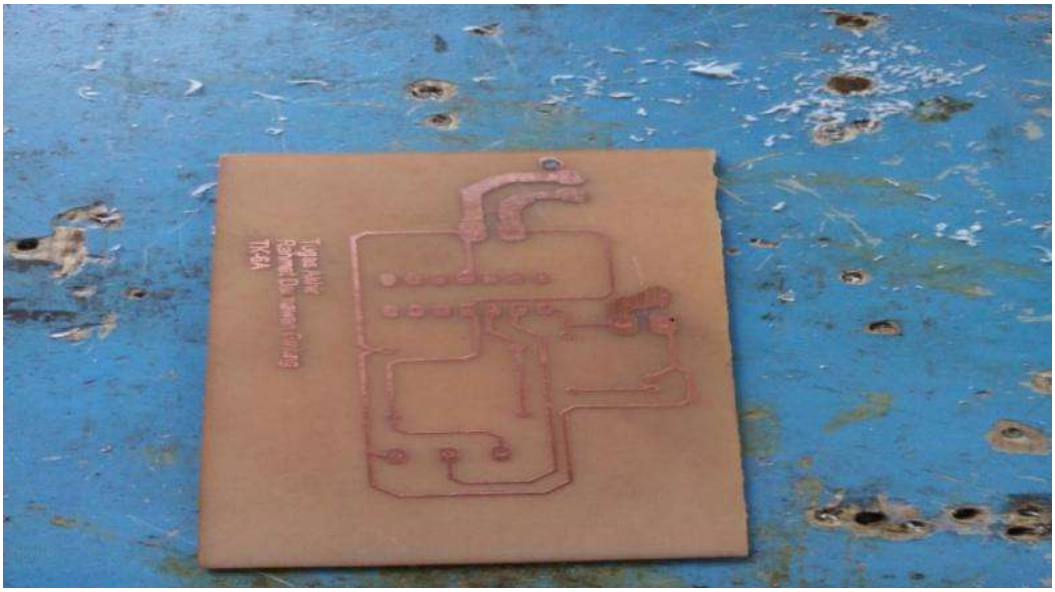


Figure 6. Printed PCB

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.

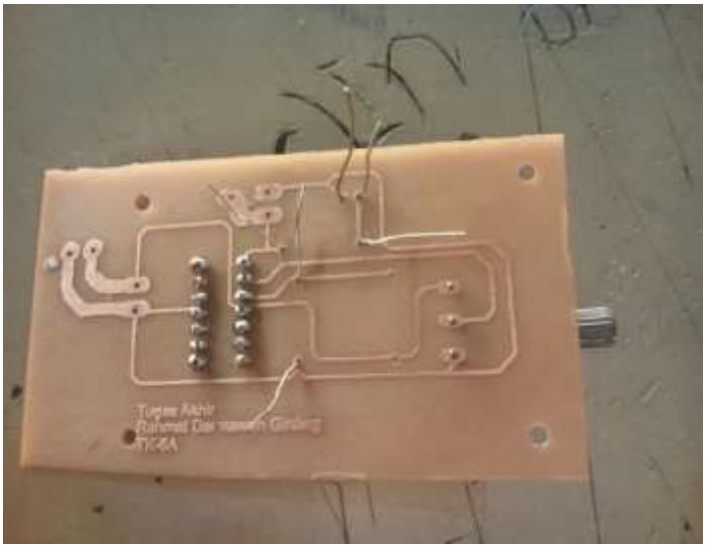


Figure 7. The component installation process

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.

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.

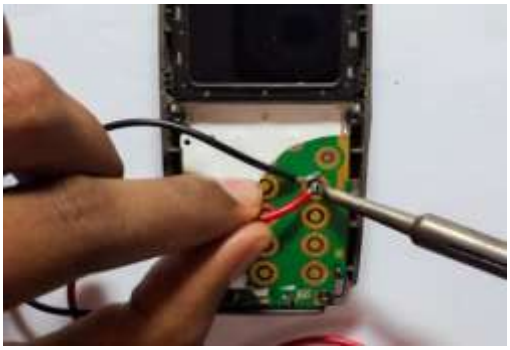
The process carried out in the assembly of the phone is by removing the battery then releasing the front cover of the button and the next transparent cover over the button.After dismantling the transparent cover over the button, it will encounter a thin white film in the main terminal. This thin white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

Figure 8. Mobile that has been dismantled

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 terminals on 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).

Figure 9 . Measurement of mobile phone polarity

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



Figures 10. Mobile phone terminal wiring

5. 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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