DEPARTMENT OF ELECTRICAL ENGINEERING

NATIONAL INSTITUTE OF TECHNOLOGY AGARTALA,

TRIPURA,799046

POWER ELECTRONICS LAB PROJECT ON

AUTOMATIC HAND SANITIZER DISPENSER

SESSIONAL REPORT SUBMITTED TO

NATIONAL INSTITUTE OF TECHNOLOGY AGARTALA

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PROJECT ON

AUTOMATIC HAND SANITIZER DISPENSER

- **NAME OF THE PROJECT: Automatic hand sanitizer dispenser**
- **DEPARTMENT: Electrical Engineering**
- **SUBJECT: Power ELECTRONICS LAB**
- **SEMESTER: 5TH**
- **YEAR:3RD YEAR**
- **GROUP:2**
- **SESSION:2023-2024**
- **SUBMITTED ON:**

ACKNOWLEDGEMENT

"We would like to express our gratitude and appreciation to all those who made it possible for us to complete this report. Special thanks are due to my supervisor, **Mr. D Bhattacharjee Sir,** whose help, stimulating suggestions, and encouragement supported us throughout the fabrication process and in writing this report. We also sincerely thank you for the time spent proofreading and correcting our many mistakes.

We would also like to acknowledge, with much appreciation, the crucial role of the staff in the Power Electronics Laboratory, who granted us permission to use the lab equipment, machines, and tools and also supported us in designing the drawings.

Many thanks go to all the lecturers and supervisors who have given their full effort in guiding the team to achieve our goals and for their encouragement to keep us on track. Our profound thanks go to all our classmates, especially our friends, for spending their time helping and providing support whenever we needed it during the fabrication of our project."

ABSTRACT

In the wake of global health concerns, ensuring proper hand hygiene has become more critical than ever. To address this pressing need, we present a project focused on the development of an Automatic Hand Sanitizer Dispenser. This innovative device is designed to promote efficient and contactless hand sanitization, reducing the risk of disease transmission in public spaces.

Our project leverages cutting-edge technology, including infrared sensors and microcontroller units, to create a user-friendly and hygienic solution. The Automatic Hand Sanitizer Dispenser detects the presence of hands, dispenses an appropriate amount of sanitizer, and ensures even distribution. This not only enhances user safety but also conserves sanitizer resources by preventing excessive usage.

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Certificate

This is to certify that the project entitled (AUTOMATIC HAND SANITIZER DISPENSER) is the bona fide work carried out by

Batta chaitanya sai priya,Prajna paul,Rampika chakma,Sangyapu charan kumar,Siva pavan,Gandepalli Nithin,Chaduvula Vijay kumar ,Saior Debbarma students of B.Tech in Dept. of Electrical Engineering,National Institute of Technology Agartala, Jirania,

Tripura(W)-799046 , India, during the academic year 2023-2024,

in partial fulfillment of the requirements for the degree of Bachelor of Technology in Electrical Engineering and that this project has not submitted previously for the award of any other degree, diploma and fellowship.

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Signature of the guide

Table of Contents

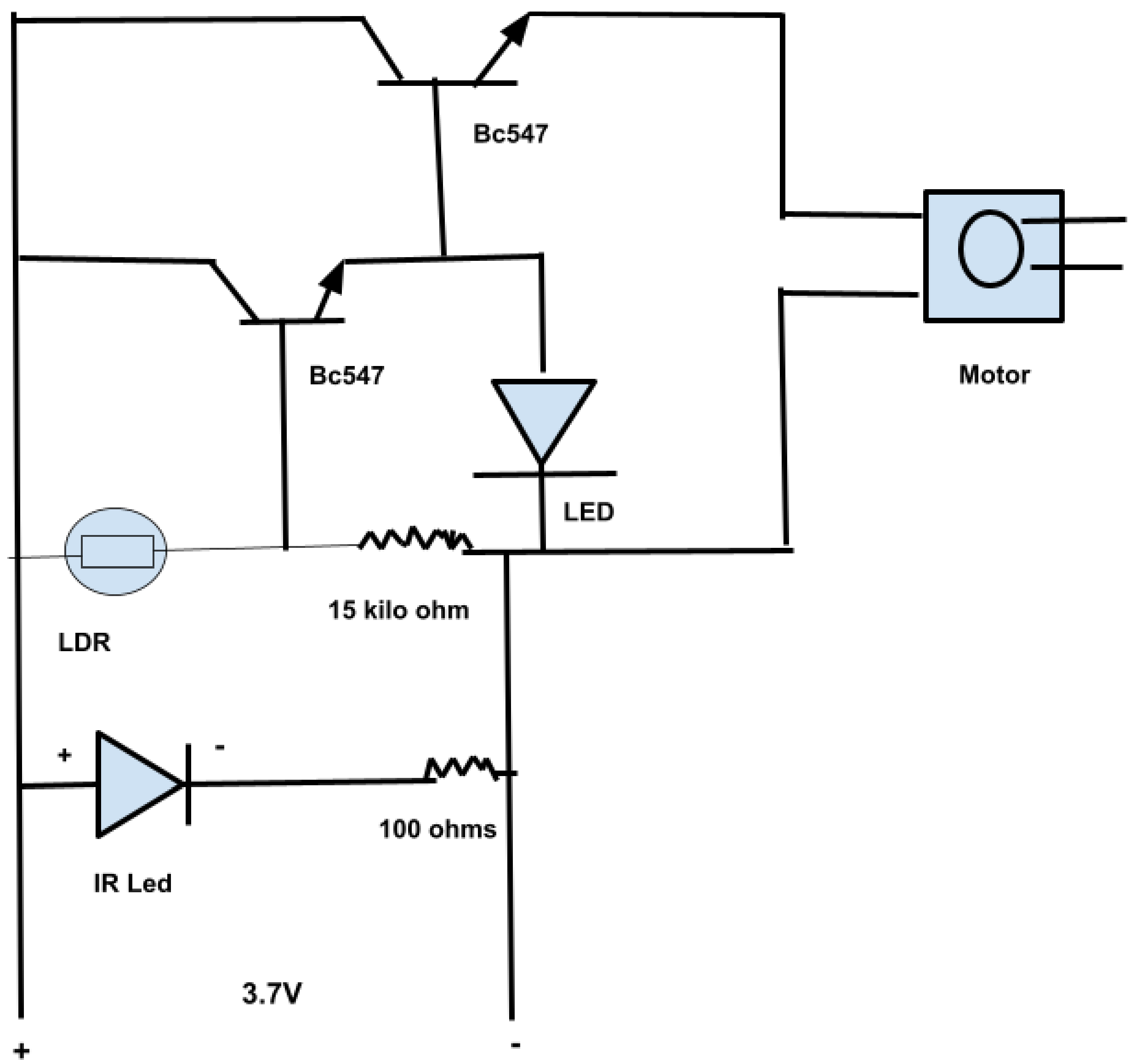
Aim of the project: To make an Automatic hand sanitizer dispenser.

Apparatus required:

Serial number	**Name of the apparatus**	**Specification**	**Quantity**
1)	Transparent bottle	-	1
2)	Dc motor	4-12 volts	1
3)	LDR		1
4)	IR-led		1
5)	Transistor	Bc-547	2
6)	Resistors	100 ohm and 15 kilo ohm	2
7)	LED(Light emitting diode)	1.6-2 volts	1

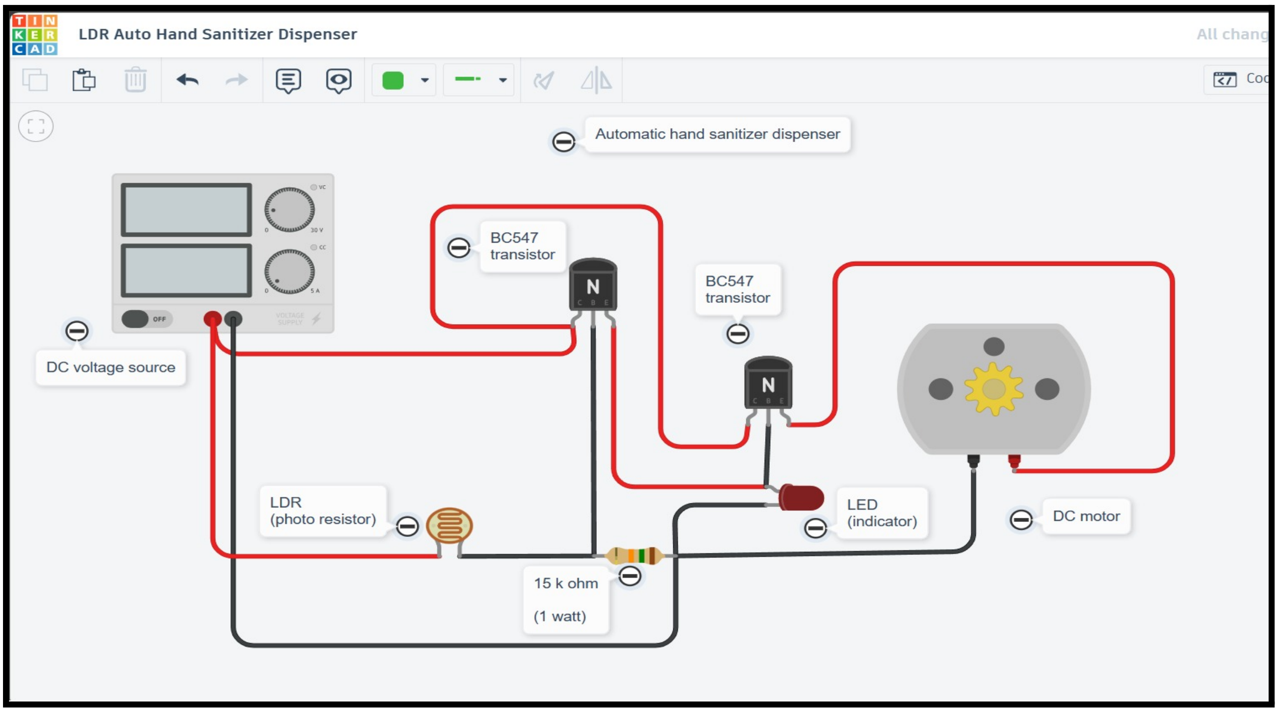
CIRCUIT DIAGRAM

Circuit Diagram of “ AUTOMATIC HAND SANITIZER DISPENSER”

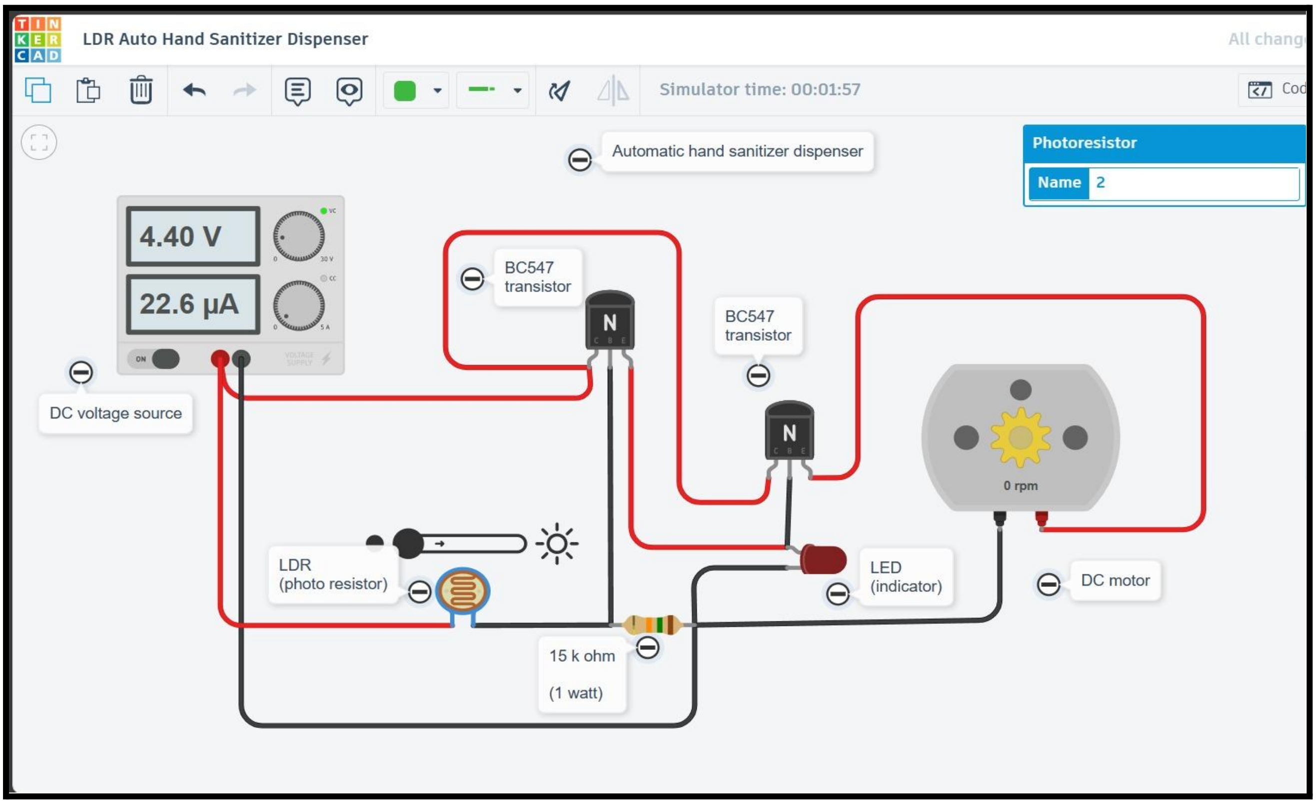


TINKER CAD SIMULATION

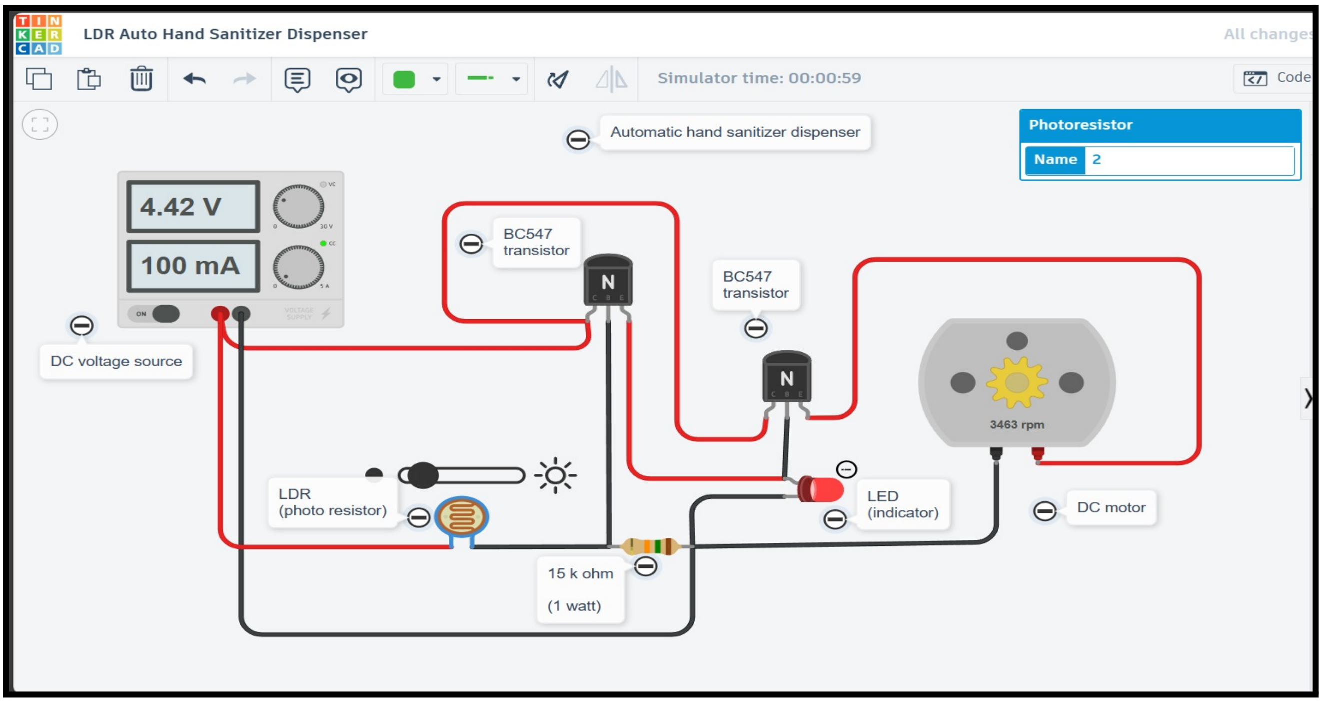
When circuit is off



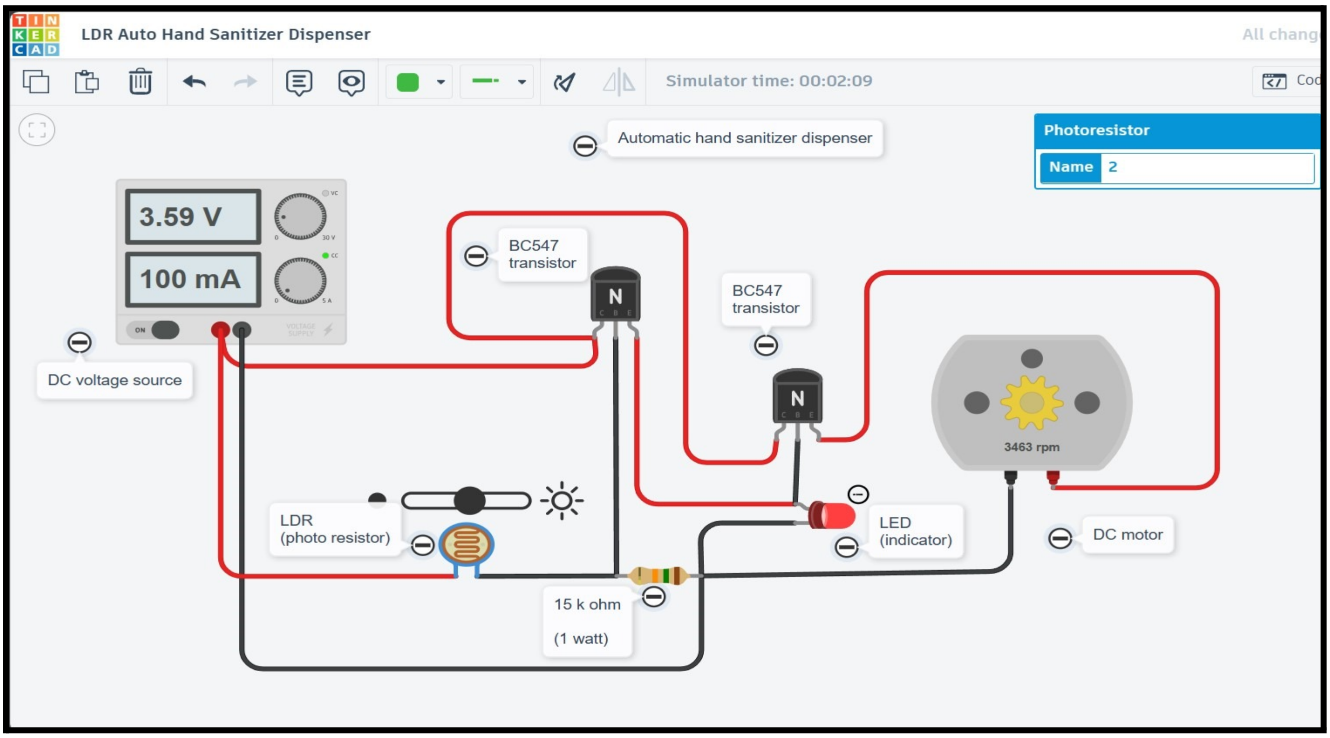
When circuit is on with no light on photo resistor or LDR (1)



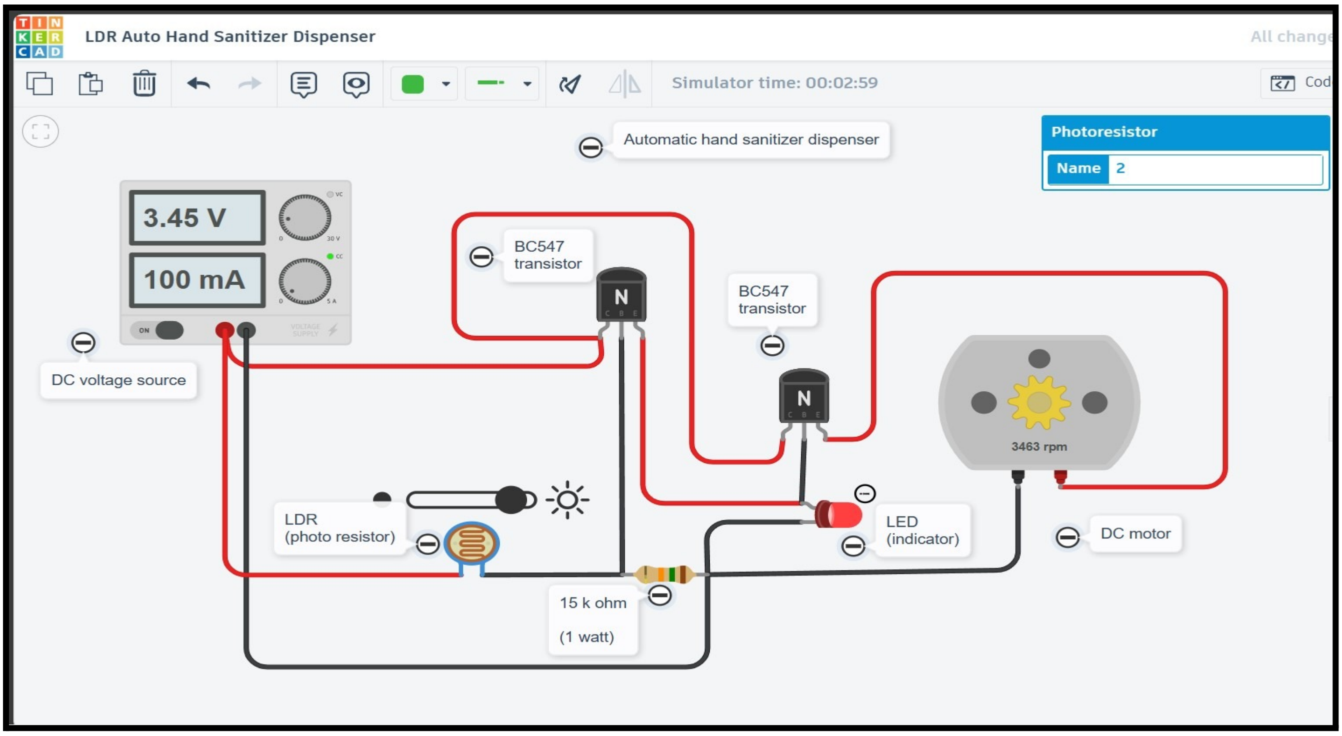
When circuit is on with light on photo resistor or LDR (2)



Medium intensity of Light



High intensity of Light



INTRODUCTION:

The Automatic Hand Sanitizer Dispenser Project is a modern and relevant application of technology to address the need for maintaining proper hand hygiene, especially in high-traffic areas such as hospitals, schools, offices, and public spaces. This project aims to create a hands-free solution for dispensing hand sanitizer, reducing the risk of the transmission of infectious diseases, including viruses like the common cold and flu, and more recently, COVID-19.

An Automatic Hand Dispenser works by detecting the presence of a user's hand or object, activating a dispensing mechanism to release a controlled amount of liquid, and providing a touchless and hygienic means for users to access the liquid. This technology is particularly useful in promoting proper hand hygiene and reducing the risk of disease transmission, especially in high-traffic areas and during public health crises.

THEORY:

COMPONENTS AND THEIR WORKING

LDR(Light dependent resistor):

It is an electronic component, also known as a photoresistor or photocell, whose electrical resistance changes in response to the intensity of incident light. In simpler terms, an LDR is a sensor that exhibits varying resistance based on the amount of light falling on it.

The resistance of an LDR decreases as the light intensity increases, and conversely, the resistance increases as the light intensity decreases. This property makes LDRs valuable in various applications, including light-sensitive switches, ambient light sensing for displays, and as components in circuits that require light-level detection or control.

Working of LDR:

- LDRs are made of special semiconductor materials.
- When exposed to light, they generate electron-hole pairs due to photon absorption.
- More light leads to more electron-hole pairs, increasing electrical conductivity.
- Less light results in higher resistance.
- LDRs are used in circuits to measure resistance changes and detect light levels
- Common applications include light-sensitive switches and automatic lighting control systems.

IR-LED:

An infrared light-emitting diode (IR LED) is a solid-state light-emitting (SSL) device that produces light in the infrared band or range of the electromagnetic radiation spectrum. IR LEDs allow for cost-effective and efficient production of infrared light, which is electromagnetic radiation in the 700 nm to 1mm range.

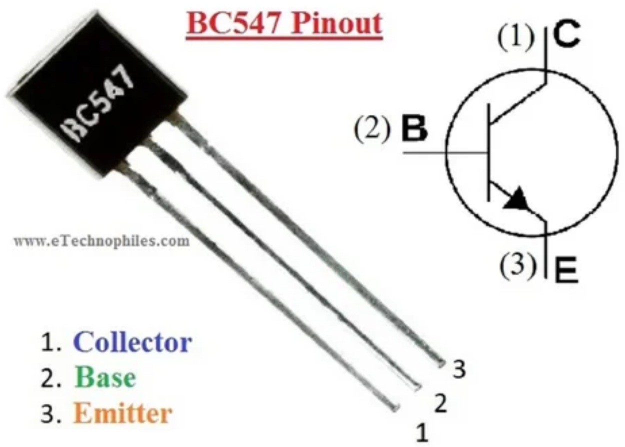
The various IR LEDs may produce infrared light of differing wavelengths, just like different LEDs produce light of different colors. IR LEDs are also useful in many types of electronics, such as remote controls for televisions and numerous other electronics. They are even in use in cameras; these infrared cameras use IR LEDs like a spotlight while remaining invisible to the naked eye.

Working of IR-LED:

An IR LED (Infrared Light Emitting Diode) is a semiconductor device that emits invisible infrared light when powered, utilizing the recombination of electrons and holes within its semiconductor material. This emitted infrared light, while invisible to the human eye, is used in various applications like remote controls and data transmission, where it carries information and can be detected by IR-sensitive receivers, such as photodiodes or phototransistors, for further processing and control purposes.

BC-547 Transistor:

The BC547 is a commonly used NPN bipolar junction transistor (BJT) known for its versatility in low-power electronic circuits. It features a pin configuration with Collector (C), Base (B), and Emitter (E) terminals and offers modest current amplification capabilities, typically up to 100 mA and a maximum collector-emitter voltage of around 45 volts.



Its applications range from signal amplification in small-signal audio amplifiers and oscillators to switching tasks in various low to moderate frequency electronic circuits, making it a popular choice in hobbyist and educational projects.

Working of BC-547 Transistor:

The BC547 transistor operates by controlling the flow of electrical current between its Collector (C) and Emitter (E) terminals based on the current applied to its Base (B) terminal. When a small current is applied to the Base, it allows a larger current to flow between the Collector and Emitter. This property is used for signal amplification and switching purposes in electronic circuits, making the BC547 a versatile component in a wide range of applications.

LED(Light emitting diode):

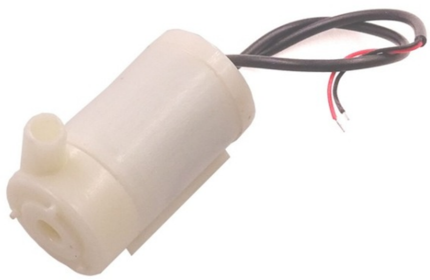
An LED, or Light Emitting Diode, is a semiconductor device that emits light when an electric current passes through it. LEDs are a type of solid-state lighting technology, and they are highly efficient, durable, and long-lasting compared to traditional incandescent and fluorescent light sources.

LEDs have revolutionized lighting technology and are used in a wide range of applications from everyday household lighting to advanced electronics and displays. Their efficiency, durability,and versatility have made them the preferred choice for many lighting and illumination needs.

Working of LED:

An LED (Light Emitting Diode) works by emitting light when an electric current flows through a semiconductor material. Electrons within the semiconductor recombine with electron holes, releasing energy in the form of photons, which produces light. LEDs are highly efficient, long-lasting, and available in various colors, making them widely used for lighting, displays, indicators, and many electronic applications. Their solid-state nature, instant illumination, and energy efficiency have made them a preferred choice over traditional light sources.

Dc Motor:



A 5V DC pump motor is a type of electric motor designed to operate on a direct current (DC) power supply with a voltage rating of 5 volts.

A 5V DC motor is an electric motor designed to operate on a 5-volt direct current (DC) power supply. It is commonly used in a wide range of electronic devices, toys, small appliances, and DIY projects. These motors allow for variable speed control by adjusting the applied voltage and can change rotation direction by reversing the polarity. They come in various types, sizes, and form factors to suit different applications and are known for their versatility and compatibility with low-voltage systems.

Working Principle:

A 5V DC motor operates by using a 5-volt direct current (DC) power supply to create an electromagnetic field within its coil, which interacts with permanent magnets to generate rotational motion. This motion is controlled by varying the voltage and direction of current flow through the coil, and it can be used for various applications, such as driving fans, toys, or small devices, making it a versatile choice for low-voltage projects.

100 ohm and 15 kilo ohm resistors:

100 ohm resistor:

A 100-ohm resistor is an electrical component that has a resistance value of 100 ohms. In electronic circuits, resistors are used to limit the flow of electric current, control voltage levels, and divide voltage in various applications. A 100-ohm resistor would limit the current passing through it according to Ohm's law (V = I * R), where V represents voltage, I represents current, and R represents resistance. In this case, if a voltage of 1 volt is applied across the 100-ohm resistor, it would allow a current of 0.01 amperes (or 10 milliamperes) to flow through it. Resistor values are commonly marked using color codes or numeric codes, and resistors come in various wattage ratings to handle different power dissipation requirements in circuits.

15 kilo ohm resistor:

A 15 kilo-ohm resistor can be represented as 15kΩ or 15,000Ω. This resistor is used in electronic circuits to control the flow of electric current and manipulate voltage levels. It is often used in applications where relatively high resistance values are needed, such as voltage dividers, signal attenuation, and various other circuit functions.

WORKING OF PROJECT

An Automatic Hand Dispenser Project is designed to provide a touchless and hygienic solution for dispensing liquids, such as soap or hand sanitizer.

An automatic hand dispenser operates by detecting a user's presence using sensors, processing this input with a microcontroller, and triggering a precise liquid dispensing mechanism. The touchless design promotes hygiene and is commonly used in settings like public restrooms, healthcare facilities, and public spaces to encourage proper hand hygiene and minimize the risk of disease transmission.

Here's a simplified explanation of how such a project typically works:

1)Sensor Activation:

When a user places their hand or an object under the dispenser, a sensor (commonly an infrared sensor, ultrasonic sensor, or capacitive touch sensor) detects the presence and triggers the system.

2)Microcontroller Control:

The sensor sends a signal to a microcontroller (e.g., Arduino or Raspberry Pi), which acts as the brain of the system. The microcontroller processes the sensor input and controls the dispenser's operation

3)Liquid Dispensing Mechanism:

The microcontroller activates the liquid dispensing mechanism, which accurately measures and releases a predetermined amount of the liquid (e.g., soap or hand sanitizer).

4)User Interaction:

The user can then use the dispensed liquid for its intended purpose, such as hand washing or sanitizing.

5)Feedback (Optional):

Some projects include user feedback mechanisms, like LEDs or LCD displays, to indicate the successful dispensing of liquid or to display additional information (e.g., the liquid level in the reservoir).

6)Power Supply:

The dispenser requires a power supply, which can be a battery or a connection to mLiquid Reservoir: The project includes a container or reservoir to hold the liquid to be dispensed, and it should be designed for easy refilling to ensure continuous operation mains power, depending on the design and intended use of the project.

7)Liquid Reservoir:

The project includes a container or reservoir to hold the liquid to be dispensed, and it should be designed for easy refilling to ensure continuous operation

8)Enclosure:

An enclosure protects the electronic components from environmental factors and maintains the system's aesthetics.

ADVANTAGES OF THIS PROJECT:

- **Hygiene: Ensures that users can sanitize their hands without touching a potentially contaminated dispenser, reducing the risk of disease transmission.**
- **Convenience: Offers a convenient and touchless solution for hand sanitization in high-traffic areas.**
- **Resource Efficiency: Dispenses an appropriate amount of sanitizer, reducing waste and saving costs in the long run.**
- **Data Collection (Optional): Some advanced systems can collect data on sanitizer usage, helping organizations manage their resources effectively.**

DISADVANTAGES OF THIS PROJECT:

- **Initial Cost:**

  The cost of setting up and installing touchless dispensers, especially advanced systems with data monitoring capabilities, can be relatively high compared to traditional manual dispensers.

- **Maintenance:**

  Automatic dispensers may require regular maintenance, including refilling liquid reservoirs, changing batteries or power sources, and addressing technical issues. Neglecting maintenance can lead to system downtime.

- **Technical Failures:**

  Like any electronic device, automatic dispensers can experience technical failures, such as sensor malfunctions or motor issues, which can disrupt service and require troubleshooting and repairs.

- **Dependency on Power: Most automatic dispensers require a continuous power source, whether from batteries or an electrical outlet. Power outages or battery failures can render the system temporarily inoperative.bleshooting and repairs.**

CONCLUSION

In conclusion, the Automatic Hand Dispenser Project offers a valuable and innovative solution for promoting hygiene, reducing the risk of infection, and enhancing user convenience in various settings. It addresses the critical need for touchless and efficient dispensing of liquids like soap and hand sanitizer, particularly in environments such as healthcare facilities, public spaces, and businesses.

The project's advantages, including improved hygiene, resource efficiency, and adaptability, make it a compelling choice for organizations and individuals aiming to maintain a high standard of cleanliness and public health. However, it's essential to be aware of potential challenges, such as initial costs, maintenance requirements, and technical issues, to ensure the project's successful implementation and operation.

Ultimately, the Automatic Hand Dispenser Project plays a crucial role in modern hygiene practices, contributing to a safer and more hygienic environment for all. Its benefits extend beyond the current context, emphasizing the importance of ongoing advancements in technology to meet the evolving needs of public health and safety.

PICTURES OF OUR PROJECT