SKIN RESPONSE METER
AUTOMATIC FOG MAKER MACHINE

20EC5203 - ELECTRONIC DESIGN PROJECT I

A PROJECT REPORT

Submitted by

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DHANUSRI NS

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in partial fulfillment for the award of the degree

of

BACHELOR OF ENGINEERING

in

ELECTRONICS AND COMMUNICATION ENGINEERING

K.RAMAKRISHNAN COLLEGE OF TECHNOLOGY

(An Autonomous Institution, Affiliated to Anna University Chennai and Approved by AICTE, New Delhi)

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BONAFIDE CERTIFICATE

Certified that this project report titled **“SKIN RESPONSE METER”**, **“AUTOMATIC FOG MAKER MACHINE”** is the bonafide work of **DHANUSRI NS (811722106018)** who carried out the project under my supervision. Certified further, that to the best of my knowledge the work reported here in does not from part of any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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I jointly declare that the project report on "**SKIN RESPONSE METER", "AUTOMATIC FOG MAKER MACHINE**" is the result of original work done by me and best of my knowledge, similar work has not been submitted to "**ANNA UNIVERSITY CHENNAI**" for the requirement of Degree of **BACHELOR OF ENGINEERING**. This project report is submitted on the partial fulfillment of the requirement of the award of Degree of **BACHELOR OF ENGINEERING**.

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Place: Samayapuram

Date:

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LIST OF ABBREVIATIONS

AC	-	Alternating Current
AI	-	Artificial Intelligence
ANS	-	Autonomous Nervous System
BJT	-	Bipolar Junction Transistor
CAD	-	Computed Aided Design
DC	-	Direct Current
FET	-	Field Effect Transistor
GSR	-	Galvanic Skin Response
IC	-	Integrated Circuit
IOT	-	Internet Of Things
JFET	-	Junction Field Effect Transistor
LED	-	Light Emitting Diode
MOSFET	-	Metal Oxide Semiconductor Field Effect Transistor
NPN	-	Negative-Positive-Negative
PCB	-	Printed Circuit Board
PNP	-	Positive-Negative- Positive

CHAPTER 1
COMPONENTS

1.1 BREAD BOARD

A breadboard serves as an indispensable tool in the realm of electronics, providing a versatile platform for the assembly and testing of electronic components. Comprising a rectangular board with a grid of interconnected holes, the breadboard is designed to offer a user-friendly environment that facilitates the creation of electronic circuits without the need for soldering as shown in the below figure 1.1 . The grid arrangement follows rows and columns, and within each row, multiple holes are electrically connected. Beneath the surface of the board, metal clips establish electrical connections, allowing for the creation of intricate circuits without the permanency associated with soldered connections.

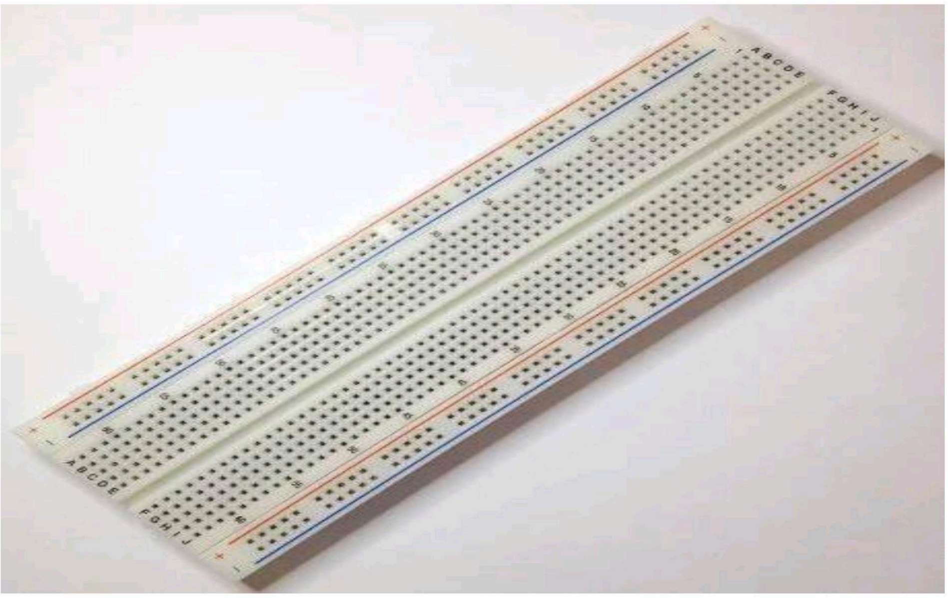

Figure 1.1 Bread board

In addition to its grid structure as shown in the figure 1.1, breadboards typically feature power rails along the sides, commonly colored in red and blue. These power rails provide accessible points for connecting power sources, whether they be batteries or external power supplies.

1.2 DIODE

A diode, a fundamental semiconductor device with two terminals known as the anode and cathode as shown in figure 1.2, plays a pivotal role in electronic circuits due to its unique electrical properties. The primary function of a diode is to control the flow of electric current by allowing it in one direction while blocking it in the opposite direction. This property is vital in rectification processes, especially in power supply circuits, where diodes are instrumental in converting alternating current (AC) to direct current (DC).The behavior of a diode is characterized by its voltage-current relationship, described by the Zener diode equation, which exhibits an exponential relationship between the voltage across the diode and the current flowing through it. When the diode is forward-biased, meaning a positive voltage is applied to the anode with respect to the cathode, it conducts current, allowing the flow of electrons. In contrast, when the diode is reverse-biased (negative voltage applied to the anode), it blocks current, essentially acting as a one-way valve for electric current. In addition to their crucial role in rectification processes, diodes exhibit a diverse array of types and applications, contributing significantly to electronic circuits and modern technology. One notable type is the Schottky diode, characterized by its rapid switching speed.

Figure 1.2 Diode

1.3 LED

Light Emitting Diodes (LEDs) which was shown in figure 1.3 represent a groundbreaking technology with wideranging applications across diverse industries. Functioning on the principle of electroluminescence, LEDs emit light as a result of electrons moving within a semiconductor material. The advantages of LEDs are manifold. They excel in energy efficiency by converting a significant portion of electrical energy into visible light, surpassing traditional incandescent bulbs that dissipate a substantial amount as heat. This not only contributes to lower electricity bills but also aligns with global efforts towards energy conservation. The durability of LEDs is a key asset, attributed to their solid-state construction, lacking delicate components like filaments or glass bulbs. It is available in various colours as shown in the figure 1.3.

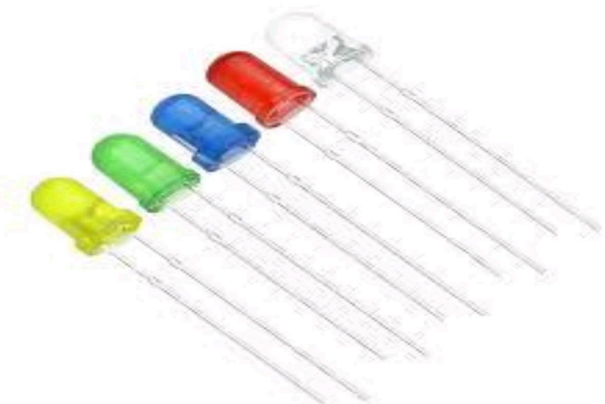

Figure 1.3 LED

Beyond their use in indicators and displays, LEDs play a pivotal role in driving technological advancements. Their low power consumption makes them ideal for battery-operated devices, while their contribution to energy efficiency aligns with sustainability goals. The continual evolution of LED technology underscores its importance in shaping a more sustainable and technologically advanced future. As research and development in this field progress, LEDs are likely to play an even more central role in addressing global energy challenges .

1.4 POWER SUPPLY

A battery stands as a fundamental component in the realm of portable electronics, operating as a versatile electrochemical device designed to store and deliver electrical energy through a controlled chemical reaction. Typically composed of one or more electrochemical cells, a battery consists of positive (cathode) and negative (anode) electrodes as in figure 1.4 immersed in an electrolyte solution. The chemical interaction between these components, when a circuit is closed, triggers a reaction that results in the flow of electrons, generating electrical energy. Alkaline batteries, for instance, are ubiquitous in everyday devices due to their reliability and cost-effectiveness. Lithium-ion batteries, renowned for their high energy density and rechargeable nature, are prevalent in various applications, including smartphones and electric vehicles. Nickel-cadmium batteries, also rechargeable, find their niche in portable electronics, offering a balance between efficiency and longevity. Alkaline batteries are ideal for low-drain devices, while lithium-ion batteries shine in applications demanding compactness and high energy storage.

Figure 1.4 Battery

Rechargeable batteries, a notable category, contribute significantly to sustainability efforts by minimizing waste and promoting resource efficiency. Particularly economical for devices with frequent usage patterns, rechargeable batteries not only reduce environmental impact but also prove cost-effective over time.

1.5 RESISTOR

A resistor is a fundamental electronic component that opposes the flow of electric current which is shown in the figure 1.5. It is a passive two-terminal device with the primary function of controlling or limiting the amount of current passing through a circuit. Resistors are crucial in electronics for adjusting voltage levels, protecting components from excessive currents, and defining time constants in various applications. Resistors come in various types, including fixed resistors with specific resistance values and variable resistors like potentiometers and rheostats that allow manual adjustment. The resistance of a resistor is measured in ohms (Ω) and is governed by Ohm's Law, which relates the voltage (V), current (I), and resistance (R) in a circuit through the equation $V = I \times R$. In electronic circuits, resistors play essential roles in voltage dividers, signal conditioning, and setting bias points for active devices like transistors.

Figure 1.5 Resistor

Moreover, in setting bias points for active devices like transistors, resistors contribute to stabilizing and controlling the operation of these components. They are also employed in filters, oscillators, and numerous other applications where precise control of electrical parameters is necessary. Resistors are foundational components in circuit design, offering control and stability in the flow of electric current.

1.6 CAPACITOR

A capacitor is a fundamental electronic component that stores and releases electrical energy in a circuit as in figure 1.6. It consists of two conductive plates separated by an insulating material called a dielectric. When a voltage is applied across the plates, an electric field is established, causing the accumulation of positive and negative charges on the respective plates. Capacitors are versatile components with various applications in electronics. They play a crucial role in smoothing voltage fluctuations, filtering signals, and providing energy storage in circuits. The ability to store electrical energy temporarily makes capacitors valuable in timing circuits, coupling AC and DC signals, and decoupling power supplies. Capacitors come in different types, including electrolytic capacitors, ceramic capacitors, and tantalum capacitors, each with specific properties suited to different applications as shown in below figure 1.6. The capacitance of a capacitor, measured in farads (F), indicates its ability to store charge.

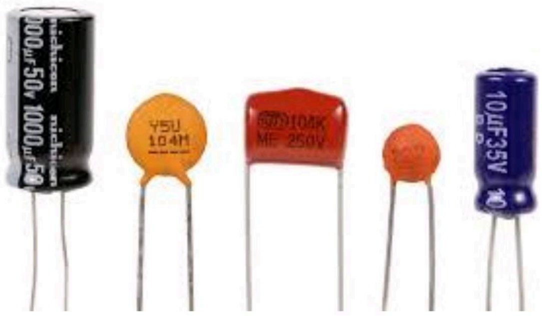

Figure 1.6 Capacitor

In electronic circuits, capacitors are essential for stabilizing power supplies, eliminating noise, and facilitating the proper functioning of various electronic components. They play integral roles in audio systems, power amplifiers, filters, and numerous other electronic devices, contributing significantly to the efficiency and performance of electrical systems. Capacitor are widely used in various application including electronic circuit ,power systems and communication devices.

1.7 INTEGRATED CIRCUIT

An Integrated Circuit (IC) is a compact arrangement of interconnected electronic components, such as transistors, resistors, capacitors, and diodes, fabricated on a semiconductor material as which is shown in the figure 1.7. The miniaturized design of an IC allows for the integration of multiple functions and electronic circuits into a single chip, providing a significant advancement in electronic technology. Digital ICs, such as microprocessors and memory chips, process binary information, enabling the operation of computers and digital devices. Analog ICs, like operational amplifiers (op-amps) and voltage regulators, are designed for continuous signal processing, common in audio amplifiers and power supplies. The 555 timer IC and the 741 op-amp are notable examples.

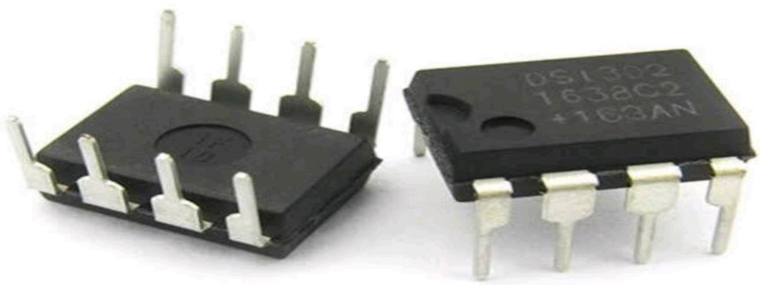

Figure 1.7 Transistor

The 555 timer is widely used for generating time delays, pulse-width modulation, and oscillations. The 741 op-amp, on the other hand, is versatile and commonly used in amplifiers and signal processing applications. The compact size of ICs as in figure 1.7 enables the creation of complex electronic systems while minimizing space requirements, power consumption, and manufacturing costs.

1.8 TOUCH PAD

Touch sensors work similar to a switch. When they are subjected to touch, pressure or force they get activated and acts as a closed switch. When the pressure or contact is removed they act as an open switch.The resistive touch sensors calculate the pressure applied on the surface to sense the touch. As shown in figure 1.8 these sensors contain two conductive films coated with indium tin oxide, which is a good conductor of electricity, separated by a very small distance.Across the surface of the films, a constant voltage is applied. When pressure is applied to the top film, it touches the bottom film. This generates a voltage drop which is detected by a controller circuit and signal is generated thereby detecting the touch. A touch pad is an input device that detects touch and converts it into electrical signals, often used in consumer electronics like smartphones and laptops. It operates using capacitive, resistive, or piezoelectric sensing technologies. Capacitive touch pads are the most common, detecting changes in capacitance when touched. Touch pads are durable, responsive, and support multi-touch gestures, making them suitable for various devices, including IoT systems and industrial controls. Design considerations include sensitivity, shielding against interference, and low power consumption for portable devices. Capacitor are widely used in various application including Computer input device,Industrial control system, Medical device and customer electronics.

Figure 1.8 Touch Pad

1.9 INDUCTOR

When current moves through a conductor, it creates a magnetic field. Inductors are electromagnetic devices that concentrate this magnetic field around the axis of a wound coil. The outer surface is shown in the figure 1.9.The ability of an inductor to induce voltage in itself due to changing current is called its inductance. The induced voltage is proportional to the rate of change of current. Inductors restrict sudden changes in current. They react against changes in current, either increasing or decreasing it. Inductors can store electric energy in the form of magnetic energy. The magnitude of the electromotive force generated on an inductor is proportional to the change rate of the current flowing through it. If the current is constant, the inductor is a short. An instantaneous change in current would generate an infinite voltage. An inductor is a passive electronic component that stores energy in a magnetic field when current flows through it. It typically consists of a coiled wire, often with a core made of air, iron, or ferrite to enhance its inductance. Inductors are critical in communication systems, power supplies, and RF circuits, where they filter signals, store energy, or provide impedance matching. Key parameters include inductance (measured in Henries), the core material, and the quality factor, which determines energy efficiency. They are designed to handle specific frequency ranges depending on the application.

Figure 1.9. Inductor

1.10 TRANSISTOR

A transistor, a pivotal semiconductor device, stands as a cornerstone in the world of electronics due to its remarkable ability to amplify signals and act as a switch. Representing a fundamental building block in electronic circuits, transistors offer versatility and are integral to a broad spectrum of applications, ranging from amplifiers and oscillators to digital logic circuits. The two primary types of transistors are bipolar junction transistors (BJTs) and field-effect transistors (FETs), each with its own variations. BJTs, categorized as NPN and PNP involve the movement of charge carriers between two semiconductor materials. On the other hand, FETs encompass types like MOSFETs and JFETs , relying on the modulation of conductivity within a channel.There are many types of transistors like JFET,MOSFET,etc.,which are shown in figure 1.10. This ability to amplify signals is harnessed in various devices, including audio amplifiers that drive speakers, radio-frequency amplifiers in communication systems, and operational amplifiers in instrumentation. The compact size, low power consumption, and reliability of transistors have been instrumental in the miniaturization and advancement of electronic technology.

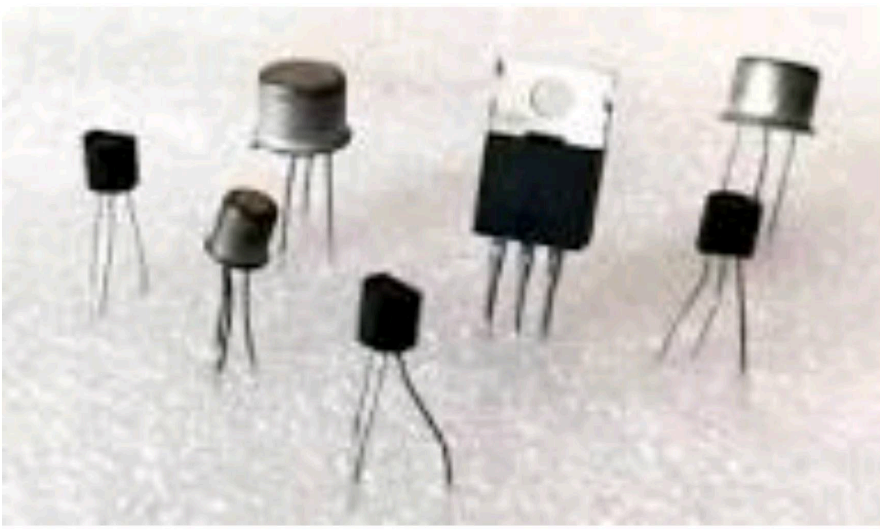

Figure 1.10 Transistor

1.11 CONNECTING WIRES

Connecting wires form the indispensable infrastructure of electronic circuits, serving as the vital conduits that establish electrical pathways and facilitate the seamless flow of electric current. The wires is shown in figure 1.11, typically composed of conductive materials like copper or aluminum, play a fundamental role in ensuring the proper functioning of circuits, both on breadboards and within complex electronic systems. The primary function of connecting wires is to link various components within a circuit, creating the necessary electrical connections for the circuit to operate as intended. Their conductivity allows for the transmission of electrical signals between different elements, forming the essential links that enable communication and cooperation among circuit components.

Figure 1.11 Connecting wires

This visual clarity becomes particularly crucial during the prototyping and experimentation stages of electronic system development, where designers and engineers need to troubleshoot and optimize circuit configurations. In essence, connecting wires are not just functional components; they are integral to the design, organization, and functionality of electronic circuits. As technology advances, the importance of well-designed and well-organized connecting wires remains paramount in the pursuit of innovation and progress in the field of electronics.

1.12 PRESET

A variable resistor, exemplified by components like potentiometers, stands out as a specialized and versatile device in electronics, offering a dynamic approach to controlling resistance within a circuit. Unlike fixed resistors, these preset which is shown in figure 1.12 which maintain a constant resistance value, variable resistors enable users to manually adjust resistance, providing a means to control the flow of electric current. Potentiometers, a common type of variable resistor, often feature a rotary or linear mechanism that allows users to modify resistance by turning a knob or sliding a lever. This adjustability makes variable resistors highly valuable in electronic devices and systems where the fine-tuning of voltage or current levels is essential for optimal performance. One of the key applications of variable resistors is in volume controls for audio equipment as in figure 1.12. Tuning circuits in radios and other communication devices represent another significant application of variable resistors.

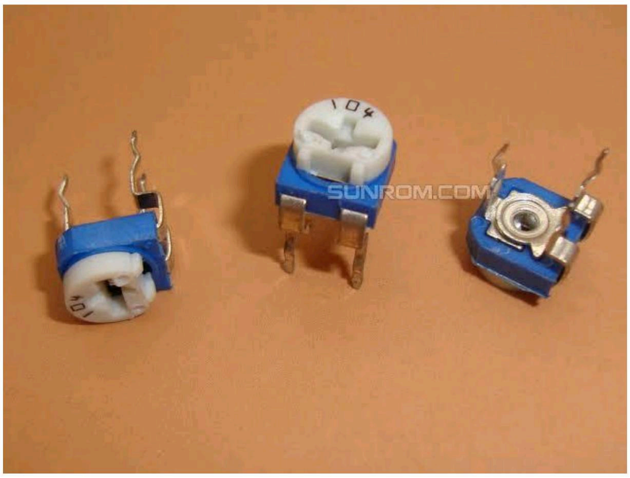

Figure 1.12 PRESET

In electronic designs, variable resistors contribute to the adaptability and functionality of systems. The ability to manually adjust resistance allows for realtime customization, providing users with control over the behavior of circuits. In summary, variable resistors, particularly exemplified by potentiometers, play a key role in electronic systems by offering a means for users to adjust resistance.

1.13. PIEZO DISC

The working principle of a piezo disc is based on the piezoelectric effect, which is when mechanical stress is applied to some materials, they produce an electric voltage.When mechanical stress is applied to the piezoelectric material, it generates an electric charge.Electrodes attached to the material collect the generated electric charge, producing an electrical signal.The electrical signal can be amplified, processed, or converted into a digital signal for various applications. A piezo disc is a piezoelectric device which is in figure 1.13 that converts mechanical pressure or vibrations into electrical signals and vice versa. It is typically made of ceramic or quartz material, sandwiched between two electrodes. These discs are widely used in sensors, actuators, and transducers, such as in buzzers, ultrasonic applications, and medical devices like ultrasound imaging. Their high sensitivity and compact size make them ideal for applications requiring precise signal conversion. However, careful impedance matching and frequency tuning are essential for optimal performance.The Piezo disc shown in figure 1.13 has several advantages such as high sensitivity and low power consumption.They also have some disadvantages such as fragility and temperature dependence.It is used in a wide range of applications including Sensors and detectors ,Actuators and motors,Energy harvesting and Medical devices. Piezo disc have many advantages like high sensitivity,low power consuption and have such a characteristics like sensitivity,Frequency Response,Temperature range and durability.

Figure 1.13.Piezo Disc

1.14 PRINTED CIRCUIT BOARD

A printed circuit board (PCB) is a vital component in modern electronics, serving as a robust and organized platform for the interconnection of electronic components which is shown in the below figure 1.14. Typically composed of a substrate material, such as fiberglass-reinforced epoxy, the PCB hosts a complex network of conductive pathways. More intricate electronic devices often utilize multilayer PCBs, where multiple layers of conductive pathways are stacked atop each other. This design allows for more compact and sophisticated circuits, essential for advanced electronics. The fabrication process of a PCB involves several steps. Initially, the circuit design is created using computer-aided design (CAD) software, specifying the arrangement of components and the layout of conductive pathways They replace traditional point-to-point wiring, reducing the risk of errors and enhancing the overall reliability of the system. Additionally, the compact design of PCBs contributes to the miniaturization of electronic devices, making them more portable and efficient. The versatility of PCBs has made them integral to a wide range of applications, from consumer electronics to industrial machinery and aerospace systems.

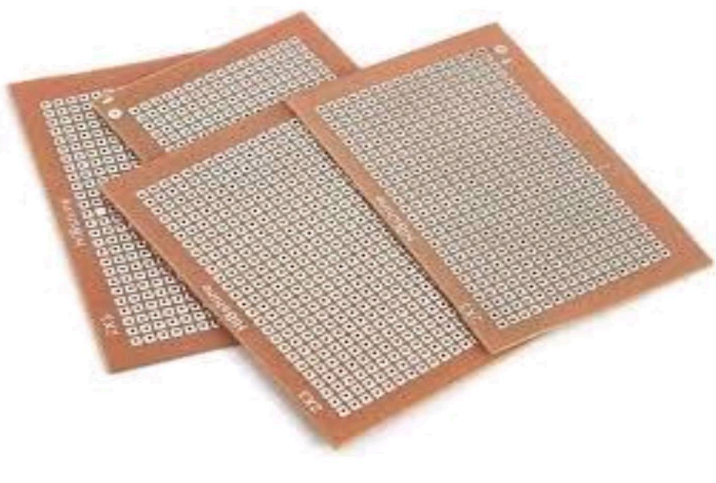

Figure 1.14 PCB Board

CHAPTER 2

SKIN RESPONSE METER

2.1 ABSTRACT

The Skin Response Meter is a compact and innovative device designed to measure variations in skin resistance, which serve as an indirect yet effective indicator of an individual's emotional and mental state. These resistance changes occur due to physiological responses triggered by stress, such as increased blood flow, enhanced skin permeability, and altered electrical conductivity. By utilizing an operational amplifier (CA3140) configured as a sensitive resistance-to-voltage converter, and a logarithmic LED driver (LM3915) for intuitive visual feedback, the device bridges simplicity and functionality. The system provides a dual-mode output using an analog VU meter and an LED bar graph, offering both precision and ease of use. With applications ranging from stress monitoring and biofeedback therapy to relaxation techniques, this device promises to make real-time emotional state analysis accessible and practical. Its compact design, low power requirements, and easy assembly make it suitable for both personal wellness tools and professional therapeutic applications. A Skin Response Meter is a device used to measure the electrical conductivity of the skin, which is influenced by physiological and emotional states. It is often employed in fields like psychology, psychophysiology, and health monitoring. The primary principle behind the meter is the galvanic skin response (GSR), which measures the skin's ability to conduct an electrical current. This conductivity varies with changes in skin moisture, which is controlled by sweat glands influenced by the autonomic nervous system (ANS). The meter typically consists of electrodes that are placed on the skin, usually on the fingers or palms, to detect resistance or conductance changes. The skin response varies in reaction to emotional stimuli, physical stress, and various psychological factors. When the individual experiences stress, anxiety, or emotional arousal, the sweat glands become more active, increasing skin conductivity. This change can be detected by the meter.

2.2 INTRODUCTION

The electrical resistance of human skin varies significantly under different physiological and emotional conditions, serving as a useful biomarker for understanding stress and relaxation states. In a relaxed state, the skin's resistance can be as high as 2 mega-ohms, but it decreases substantially when an individual experiences stress. This variation is primarily influenced by changes in blood circulation, sweat gland activity, and the permeability of the skin, which collectively enhance its electrical conductivity.The Skin Response Meter was developed to quantify these subtle changes, leveraging simple yet effective electronic components to create a reliable and user-friendly tool. By detecting variations in skin resistance through touch plates and converting them into measurable voltage signals, the device provides real-time insights into the user's emotional state. A logarithmic LED display offers immediate visual feedback, with a color gradient from blue (relaxed) to red (stressed), simplifying data interpretation even for non-technical users.

This device has numerous applications in modern wellness and therapeutic practices. It can assist users in monitoring stress levels during high-pressure scenarios, enhance mindfulness through biofeedback mechanisms, and aid in meditation practices by visualizing relaxation progress. Its compact form factor and adjustable sensitivity ensure compatibility with a broad range of skin types and resistance values, while its intuitive interface and energy-efficient design make it ideal for both individual and professional use. The Skin Response Meter represents a step forward in personal health monitoring, combining affordability, portability, and precision to promote mental and emotional well-being.It is designed to capture and measure these small changes in skin resistance using simple electronic components.The device is particularly useful for monitoring stress level and helping user understand their mental state during relaxation or meditation practices.The project enhances the ease of realtime monitoring, making it ideal for personal and professional use. The device is particularly useful for monitoring stress levels, aiding in biofeedback therapies, and helping users understand their mental state during relaxation or meditation practices.

2.3 COMPONENTS USED

Bread Board	1
Touch Pads	2
Resistor	10K,1K
Variable Resistor	5K(2),50K,100K
LED	1.5V(4)
IC	CA3140(1)
IC	LM3915(1)
Connecting Wires	As Required
Battery	9V(1)
Capacitor	3
Diode	2

2.4 CIRCUIT DIAGRAM

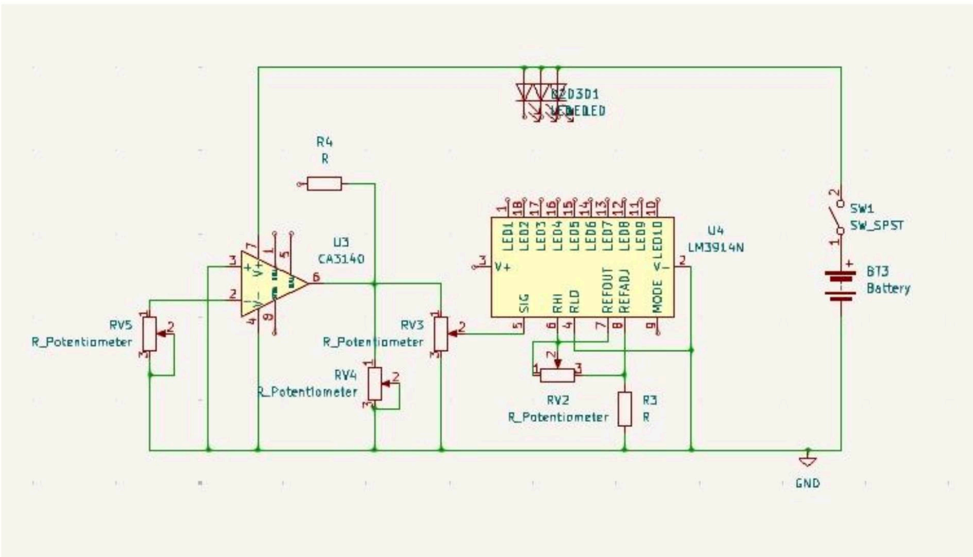

Figure 2.1 Circuit Diagram

2.5 WORKING MODEL

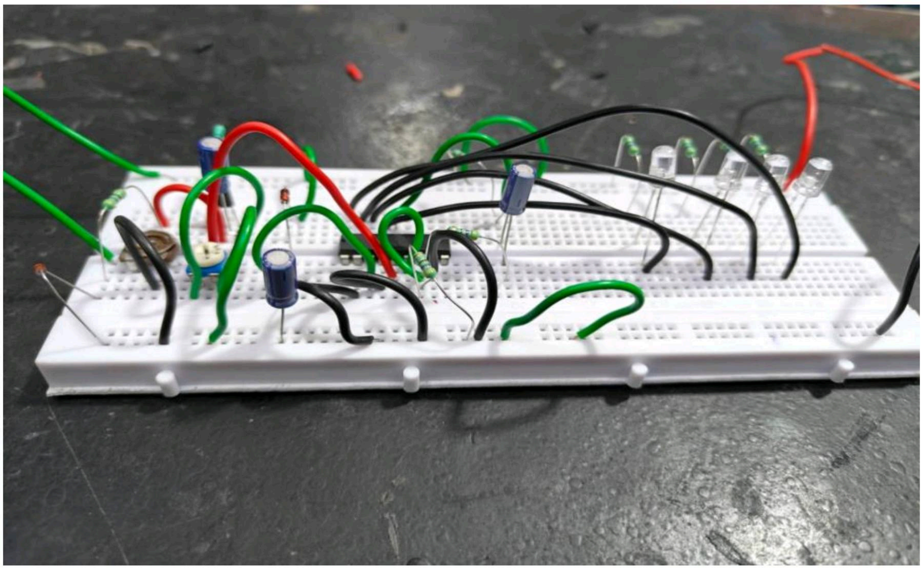

Figure 2.2 Working Model

The Skin Response Meter operates as follows:

1. **Sensing Amplifier**: The circuit's core component is the CA3140 operational amplifier, configured as a resistance-to-voltage converter. It measures the resistance offered by the skin via touch plates connected to the circuit.
2. **Signal Processing**: The touch plates are connected to the inverting and non-inverting inputs of the operational amplifier. Variations in skin resistance are converted into voltage changes, with a feedback resistor (R1) controlling the gain.
3. **Indicator Output**: The LED light is driven by the LM3915 IC, which offers a logarithmic visual representation of the skin resistance through LED brightness and colors.Brightness and sensitivity can be adjusted by the user.
4. **Operation**: When the user touches the plates, the circuit detects changes in skin resistance. High resistance (relaxed state) results in minimal output, while low resistance (stressed state) triggers more significant output on the meter and LEDs.
5. **Visualization:** LED indications range from blue (relaxed) to red (stressed), providing immediate feedback on the user's emotional state.

2.6 BLOCK DIAGRAM

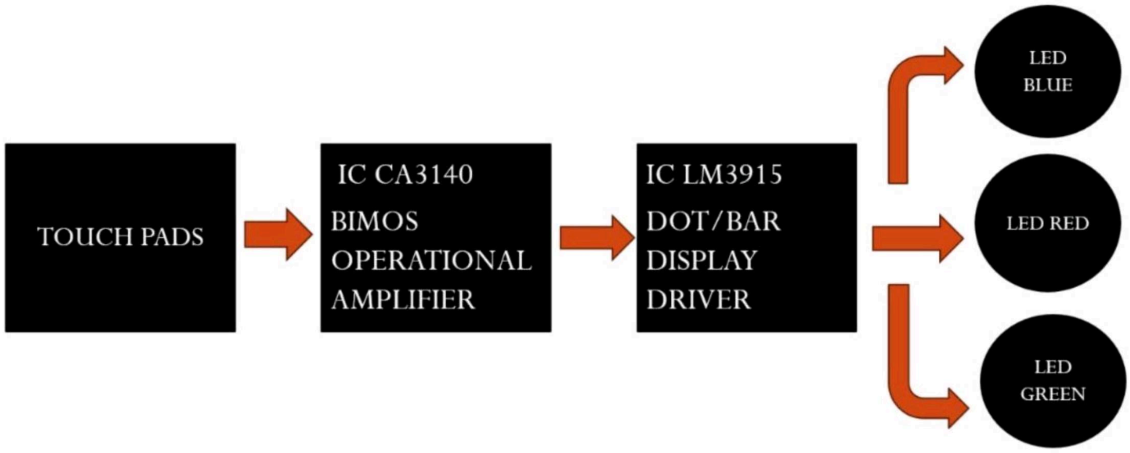

Figure 2.3 Block Diagram

The working of the skin response meter as in figure 2.6 block diagram can be explained as follows:

1. Touch Pads: These are the input sensors that detect the skin's resistance or conductance, which varies based on emotional states or sweat levels.

2. **IC CA3140 (Operational Amplifier):** The signal from the touch pads is typically weak, so it is amplified using the BiMOS operational amplifier IC CA3140. This ensures the signal is strong enough for further processing.

3. IC LM3915 (Dot/Bar Display Driver): The amplified signal is fed into the IC LM3915, which converts the analog voltage into a corresponding visual output.

4. LED Indicators: The LM3915 drives two LEDs (Yellow and Red). Yellow LED: Low skin conductance. 1 st Red LED for Medium skin conductance.2nd Red LED for High skin conductance.

5. Overall Functionality: The device measures and displays the skin's electrical response, which is useful for biofeedback applications like stress monitoring.

2.7 ADVANTAGES

- Cost effective
- The skin response meter is Easy to use .
- It is portable
- This is an Non – invasive monitoring
- Sensitive defection
- Real-time feedback
- Customizable sensitivity

2.8 APPLICATIONS

- Stress and anxiety measurements
- Pain management
- Sleep Disorder diagnosis
- Lie detection
- Emotional state assessment
- Emotional based gaming
- Neurofeedback training
- Athletic performance Monitoring
- Military and defence applications

CHAPTER – 3

AUTOMATIC FOG MAKER MACHINE

3.1 ABSTRACT

An Automatic Fog Maker is an innovative device that combines principles from electronics, sensors, and automation to simulate fog or mist for various practical applications. In electronics and communication, it is typically used for testing communication systems under environmental conditions that mimic real-world scenarios, such as signal degradation due to fog, weather, and atmospheric disturbances. These fog makers utilize ultrasonic, vaporization, or piezoelectric methods to create fog, which can be controlled automatically based on sensor inputs, making it a versatile tool in research, communication testing, and environmental simulations.The device usually consists of a fog generation system, sensors, and an automatic control mechanism. The fog generation system uses ultrasonic waves or thermal energy to create water vapor or mist, which is then dispersed into the environment. The sensors monitor parameters such as humidity, temperature, and fog density, providing real-time data to control the fog generation process. An integrated control system uses this data to adjust fog intensity and ensure the desired fog density for specific applications.

Applications of automatic fog makers in electronics and communication are vast, ranging from testing the performance of communication systems in low-visibility conditions to simulating environmental effects on wireless signal propagation. The primary goal is to provide a controlled environment where the effects of fog, mist, and similar weather conditions on communication signals, such as attenuation and distortion, can be studied and mitigated. The integration of automation enhances the accuracy and repeatability of the tests, while the use of real-time data ensures that the fog-making process is optimized for the specific testing requirements.This project presents the design,development,and testing of an Automatic fog maker machine,a novel device capable of generating fog automatically and efficiently.

3.2 INTRODUCTION

In the real of electronics and communication, environmental factors play a significant role in determining the performance of wireless communication systems. One such factor is fog, which can cause significant signal degradation and interference, especially in communication systems that operate over large distances or in open environments. Understanding how fog impacts signal transmission is critical for the design and optimization of communication networks, particularly for technologies like optical communication, microwave communication, and terrestrial radio systems.An Automatic Fog Maker serves as a vital tool in this domain, providing a means to simulate fog conditions in a controlled, repeatable manner. By artificially generating fog or mist, it mimics real-world environmental conditions that can cause scattering, attenuation, or diffraction of electromagnetic waves. The ability to generate fog autonomously based on sensor data and predefined settings enhances the versatility and precision of testing. Researchers and engineers use these devices to analyze how communication signals behave in foggy environments, thereby identifying strategies to improve signal clarity, reduce loss, and enhance the reliability of communication systems in adverse weather conditions.

The fog-making process typically relies on one of several techniques, including ultrasonic fog generation, vaporization, or piezoelectric misting. These methods allow the fog to be produced with controlled droplet size, density, and distribution, factors that directly influence the way light and radio waves propagate through the fog. Additionally, modern fog makers are equipped with sensors such as humidity sensors, temperature sensors, and optical sensors to monitor the environmental conditions. These sensors provide real-time feedback to an automatic control system, which adjusts the fog generation parameters to ensure consistent and repeatable conditions during testing.The Automatic fog maker machine has far-reaching applications in agriculture,entertainment,fire safety training,and climate control. These machines use advanced technology to create a dense fog that can be controlled and maintained automatically.

3.3 COMPONENTS USED

PCB	1
IC	555 Timer IC
Capacitor	100nf(2),1uf(1)
Preset	10K ohm(1)
Resistor	10ohm(1)
Transistor	Mosfet IRFZ44(1)
Inductor	220uh(1)
Piezo disc	113Khz(1)
Battery	12V(1)

3.4 CIRCUIT DIAGRAM

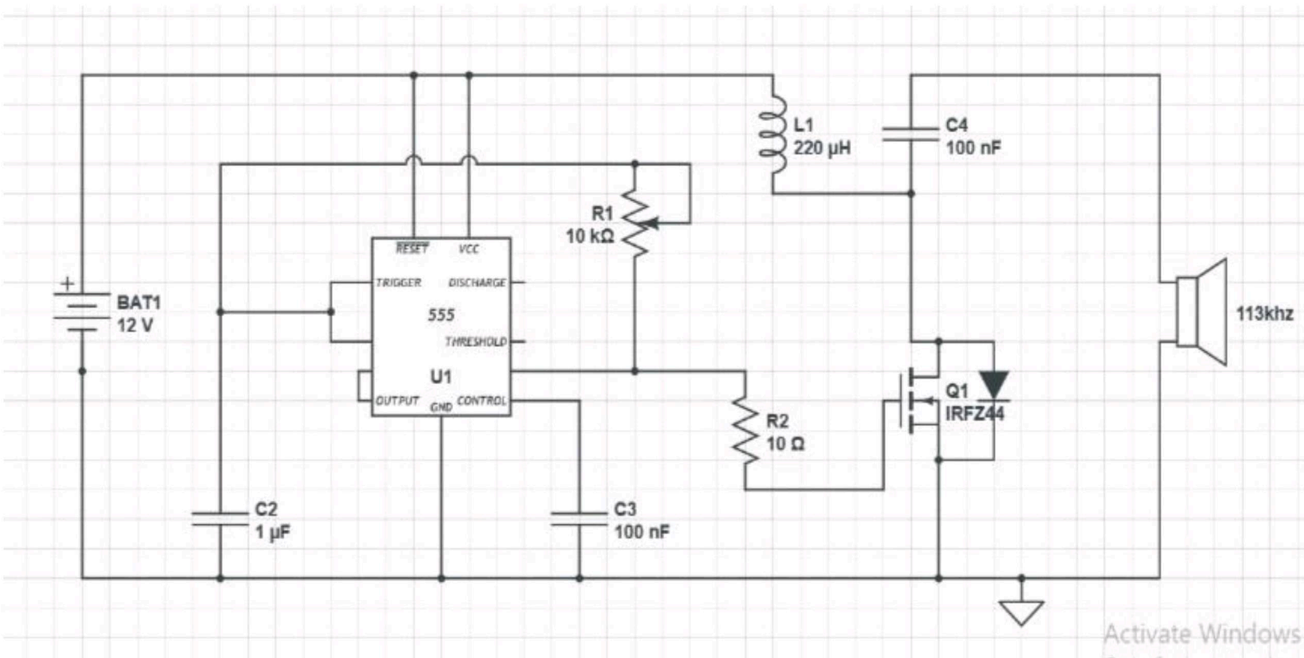

Figure 3.1 Circuit Diagram

3.5 WORKING MODEL

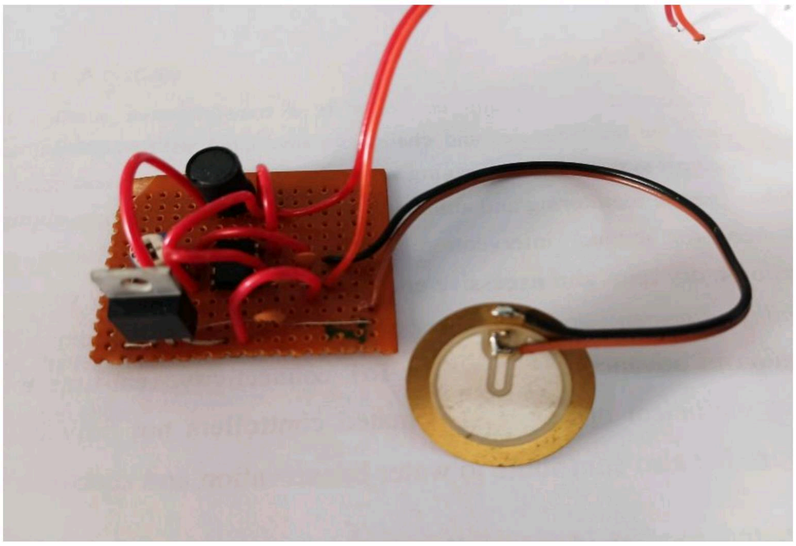

Figure 3.2 Working Model

The power supply (12V DC) is connected to the PCB.The voltage regulator is used to regulates the voltage. The Ne 555 Timer IC oscillates at 113kHz that oscillations drive the piezo disc which helps to creates ultrasonic vibrations which has the capability to break water droplets into tiny particles those particle create fog.The fog is released from the machine. The output fog can be adjusted using variable resistor and density can be adjusted using the preset 10K as shown in the above figure 3.5.

Power Supply Section:Connect the power supply (12V DC) to the PCB the voltage regulators are used to regulate the voltage. Connect the regulated voltage to the Ne 555 Timer IC.

Ne 555 Timer IC Section:Connect the Ne 555 Timer IC to the PCB.Connect the 100nF capacitors to pins 2 and 6. Connect the 1nF capacitor to 5 th pin.Connect the 10k preset to 7 th pin.Connect the variable resistor (10k Ohm) to 7 thpin .

MOSFET Section: Connect the MOSFET IRFZ44 to the PCB.Connect the gate terminal to pin 3 of the Ne 555 Timer IC. Connect the drain terminal to the heating element. Connect the source terminal to ground.

Piezo Disc Section:Connect the piezo disc to the PCB. Connect the piezo disc to pin 8 of the Ne 555 Timer IC. Connect the 220uH inductor to the piezo disc.

Heating Element Section: Connect the heating element to the MOSFET drain terminal.Connect the heating element to the water reservoir.

Water Reservoir Section: Connect the water reservoir to the heating element. Add water to the reservoir.

3.6 BLOCK DIAGRAM

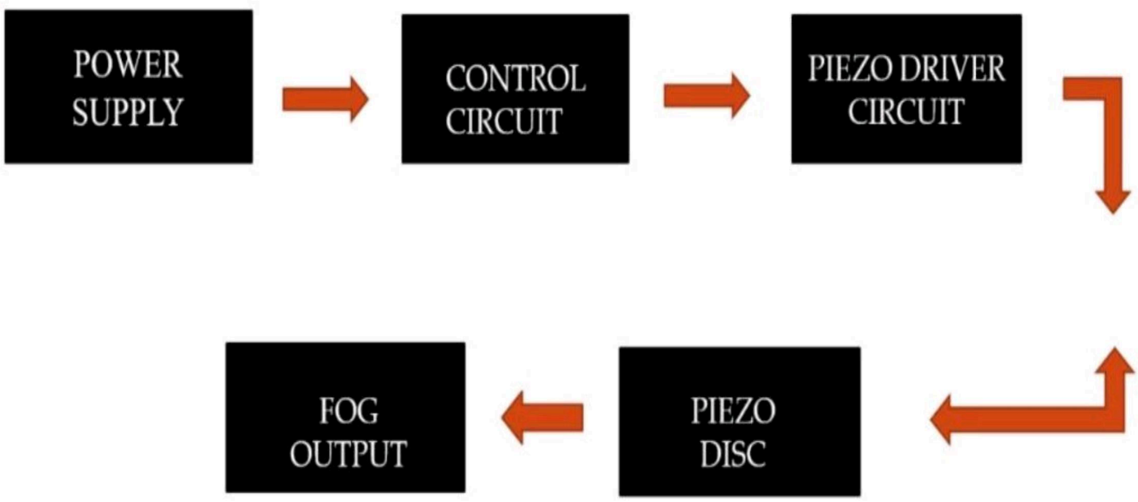

Figure 3.3 Block Diagram

The block diagram which is shown in the figure 3.6 represents a basic ultrasonic fogger system. Let's break down each block:

Power Supply: This block provides the necessary electrical power to all the components in the system. It typically converts AC power from the wall outlet to the appropriate DC voltage required by the other components.

Control Circuit: The brain of the system, the control circuit manages the operation of the fogger. It can include a microcontroller or other logic circuits to regulate the frequency and duration of the fog output. It might also incorporate sensors or timers to control the fogging process based on specific parameters like humidity or temperature.The control circuit is a Ne 555 Timer IC which helps to control a timers of a fogging process. 1. The NE555 can be used to generate a clock signal that drives the fog maker machine's circuitry. This clock signal can be used to control the frequency of the ultrasonic transducer, which creates the fog.

Piezo Driver Circuit: This circuit amplifies the electrical signal from the control circuit to a high-frequency signal suitable for driving the piezo disc. It ensures the piezo disc vibrates at its resonant frequency, which is essential for efficient fog generation. The piezo disc is used to create ultrasonic vibrations at a frequency typically between 1.6 MHz to 2.4 MHz. These vibrations are produced when an alternating current (AC) is applied to the piezo disc.

Piezo Disc: A piezoelectric ceramic disc, when subjected to an alternating electrical signal from the driver circuit, vibrates at a high frequency. These vibrations create ultrasonic waves that are transmitted into the water. When the ultrasonic vibrations are applied to a liquid, such as water or a fog juice, it creates a phenomenon called cavitation. Cavitation is the formation and collapse of tiny bubbles in the liquid, which generates a large amount of heat and creates a fog-like effect.

Fog Output: This represents the mist or fog produced by the system. The ultrasonic waves generated by the piezo disc cause the water molecules to break apart, creating a fine mist that is released into the surrounding environment.

3.7 ADVANTAGES

- Convenient and easy to use
- Time saving
- Consistent fog output
- Adjustable fog output
- Low maintenance
- Cost saving
- Long term reliability
- Energy efficiency

3.8 APPLICATIONS

- Theatrical productions
- Concerts and music clubs
- Theme parks
- Greenhouse fogging
- Crop protection
- Odor control
- Pool and spa fogging
- Film and photography

CHAPTER 4

CONCLUSION AND FUTURE ENHANCEMENT

4.1 CONCLUSION

The Skin Response Meter is a valuable tool that provides insights into the body's physiological responses by measuring the electrical conductivity of the skin. Its applications in fields such as psychology, neuroscience, and medicine make it an essential device for researchers and clinicians, enabling them to study human physiological responses, diagnose medical conditions, and develop new treatments.

The Automatic Fog Maker Machine is a cutting-edge device that offers a reliable, efficient, and safe way to produce high-quality fog effects. With its advanced features, such as automatic temperature control, ultrasonic technology, and remote control operation, this machine is ideal for a wide range of applications, including entertainment, industrial, medical, and agricultural settings. Its ability to produce a consistent and controlled fog output makes it an essential tool for creating realistic and immersive environments, while its energy efficiency and safety features ensure a cost-effective and worry-free operation.

This report has explored the design and functionality of two innovative devices: the Automatic Fog Maker Machine and the Skin Response Meter. The Automatic Fog Maker Machine offers a reliable and efficient way to produce high-quality fog effects, while the Skin Response Meter provides valuable insights into human physiological responses. Both devices have the potential to greatly impact their respective fields, with the Automatic Fog Maker Machine enhancing entertainment, industrial, and medical applications, and the Skin Response Meter advancing our understanding of human psychology, neuroscience, and medicine.

4.2 FUTURE ENHANCEMENT

The Skin Response Meter is poised for future enhancements that will further expand its capabilities. One potential advancement is the integration of wireless connectivity options, such as Bluetooth or Wi-Fi, to enable seamless data transfer and remote monitoring. This would allow researchers and clinicians to collect and analyze data more efficiently, and provide patients with more convenient and accessible care. Additionally, the incorporation of advanced signal processing algorithms could improve data accuracy and reduce noise, enabling more reliable and precise measurements. Another potential enhancement for the Skin Response Meter is the integration of artificial intelligence (AI) algorithms to analyze skin response data and provide personalized insights. This could enable researchers and clinicians to identify patterns and trends in skin response data that may not be apparent through manual analysis. Furthermore, the development of wearable devices that incorporate skin response measurement technology could enable continuous monitoring and real-time feedback, revolutionizing the field of skin response measurement and opening up new possibilities for research and treatment.

The Automatic Fog Maker Machine is poised for future enhancements that will further expand its capabilities. One potential advancement is the integration of Internet of Things (IoT) technology to enable remote monitoring and control of the machine. This would allow users to adjust settings, monitor performance, and receive notifications remotely, increasing convenience and reducing downtime. Additionally, the incorporation of advanced sensors and algorithms could enable more precise control over fog output, temperature, and humidity, allowing for even more realistic and immersive environments. Another potential enhancement for the Automatic Fog Maker Machine is the development of more sustainable and eco-friendly designs. This could include the use of renewable energy sources, such as solar or wind power, to reduce the machine's carbon footprint.The development of more efficient fogging technologies could reduce water and energy consumption, making the machine environmentally friendly. By prioritizing sustainability and eco-friendliness, the Automatic Fog Maker Machine could become an even more valuable and responsible tool for a wide range of applications.

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