FASTEST FINGER FIRST MOBILE JAMMAR FOR MILITARY SURVEILLANCE

20EC5203 - ELECTRONIC DESIGN PROJECT I

A PROJECT REPORT

Submitted by

DEEPAK B

DHARAN S

SRIRANGAN V

in partial fulfillment for the award of the degreeof

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)

SAMAYAPURAM – 621 112

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BONAFIDE CERTIFICATE

Certified that this project report titled **"FASTEST FINGER FIRST & MOBILE JAMMAR FOR MILITARY SURVEILLANCE"** is the bonafide work of **DEEPAK B (811722106017), DHARAN S (811722106019), SRIRANGAN V (811722106110)** who carried out the project under my supervision. Certified further, that to the best of my knowledge the work reported herein does not frompart 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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INTERNAL EXAMINER **EXTERNAL EXAMINER**

DECLARATION

We jointly declare that the project report on "**FASTEST FINGER FIRST & MOBILE JAMMAR FOR MILITARY SURVEILLANCE**" is the result of original work done by us andbest of our knowledge, similar work has not been submitted to "**ANNA UNIVERSITYCHENNAI**" for the requirement of Degree of **BACHELOR OF ENGINEERING**. This project report is submitted on the partial fulfillment of the requirement of the awardof Degree of **BACHELOR OF ENGINEERING**.

Signature

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DHARAN S

SRIRANGAN V

Place: Samayapuram

Date:

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LIST OF ABBREVIATIONS

AC	-	Alternating Current
AWG	-	American Wire Gauge
BC	-	Bipolar Complementary
DC	-	Direct Current
FET	-	Field-Effect Transistor
GSM	-	Global System for Mobile Communications
IC	-	Integrated Circuit
IoT	-	Internet of Things
LED	-	Light Emitting Diode
LTE	-	Long-Term Evolution
mA	-	Milliampere
MOSFET	-	Metal-Oxide-Semiconductor Field-Effect Transistor
NE555	-	A standard type of 555 Timer IC
NPN/PNP	-	Negative-Positive-Negative / Positive-Negative-Positive
PP3	-	A type of 9V battery
RF	-	Radio Frequency
SPST	-	Single Pole Single Throw
V	-	Voltage
V-I	-	Voltage-Current
µF	-	Microfarad

CHAPTER-1

COMPONENTS

1.1 BREAD BOARD:

A breadboard is an indispensable tool in the electronics industry, providing a convenient platform for assembling and testing electronic circuits. Its rectangular design features a grid of interconnected holes arranged in rows and columns, offering an efficient and cost-effective environment for experimentation. The layout is thoughtfully organized, with multiple holes within each row electrically connected, enabling current flow between components without the need for additional wiring. Beneath the surface, a network of conductive strips forms a matrix of electrical pathways, facilitating easy and flexible connections. One of the key advantages of a breadboard is its ability to accommodate a wide range of components without requiring permanent modifications. This flexibility not only supports innovative circuit design but also simplifies troubleshooting and modifications. Breadboards are highly portable, making them ideal for users of all experience levels to practice wiring, build circuits, and gain hands-on experience. They play a vital role in concept testing and circuit assembly, providing a foundational tool for learning electronics and honing practical skills. Breadboards are particularly valued for their distinctive features, such as power rails and jumper wires. Power rails, typically marked with red and blue color coding, provide dedicated paths for connecting power sources like batteries or external power supplies. This arrangement simplifies the process of distributing electricity across the board, allowing for quick and straightforward power connections.

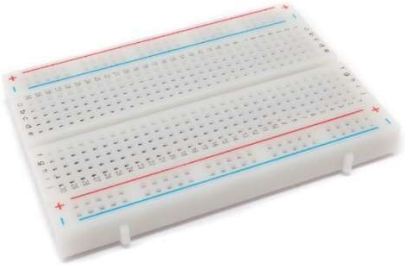

Figure :1.1 Bread board

Jumper wires further enhance the breadboard's functionality by enabling connections between various components. These wires, with pre-stripped ends, allow experimenters to link elements such as resistors, capacitors, and integrated circuits, creating both simple and complex circuits. The combination of the breadboard's flexible grid structure and the versatility of jumper wires empowers users to design, test, and refine circuits with ease. Breadboards are widely utilized in educational environments, hobbyist projects, and the prototyping stages of product development. Their user-friendly nature encourages exploration, innovation, and active engagement with electronic principles, making them an essential tool for anyone working in electronics. By fostering creativity and supporting iterative learning, breadboards continue to be a cornerstone in the advancement of technology.

1.2 DIODE:

A diode is one of the most fundamental and versatile semiconductor devices, comprising two terminals known as the anode and cathode. Its defining characteristic is its ability to control the flow of electrical current, allowing it to pass in one direction while blocking it in the opposite direction. This unidirectional behavior forms the basis of its application in various electronic circuits, making it an essential building block in modern technology. The primary function of a diode is rectification, where it converts alternating current (AC) into direct current (DC). This is a critical process in power supply circuits, where diodes work as rectifiers to deliver a steady DC voltage required for operating electronic devices. For instance, in a bridge rectifier configuration, multiple diodes work together to ensure the efficient conversion of AC to DC. This capability makes diodes integral to a wide range of applications, from household electronics to industrial machinery. The behavior of a diode is governed by its voltage-current (V-I) relationship, encapsulated in the Shockley diode equation. This equation highlights the exponential growth of current with increasing forward voltage. When forward-biased, a diode permits current flow by allowing electrons to move across the p-n junction. This state is achieved when the anode is at a higher potential than the cathode, overcoming the built-in potential barrier of the junction. Forward-biased diodes are widely used in circuits to conduct current and manage voltage drops, often serving roles in power regulation and signal routing. In reverse bias, the diode presents a high resistance, preventing current flow. This occurs when the anode is at a lower potential than the cathode. The diode's reverse bias capability is critical in protecting circuits, as it blocks unwanted current flow that could damage components. Additionally, reverse-biased diodes play crucial roles in applications such as voltage clamping and transient voltage suppression, safeguarding sensitive equipment from spikes or surges in voltage.

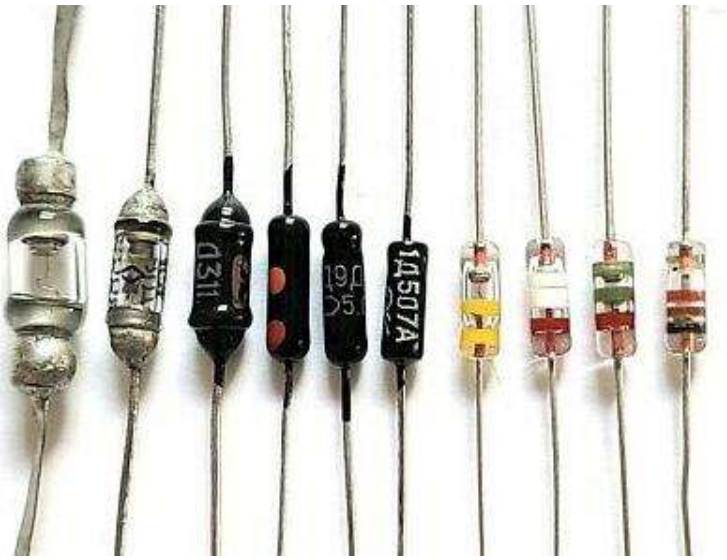

Figure: 1.2 Diode

Beyond general-purpose diodes, specialized types have been developed to meet specific needs in electronic systems. **Zener diodes**, for example, operate in reverse bias to provide precise voltage regulation, while **Schottky diodes** are designed for high-speed switching with low forward voltage drops, making them ideal for high-frequency applications. **Light-emitting diodes (LEDs)** are another significant innovation, converting electrical energy into light and revolutionizing industries such as lighting, displays, and indicators. Other types include **photodiodes**, which respond to light, and **tunnel diodes**, known for their negative resistance behavior in high-speed and microwave applications. Furthermore, diodes are essential in analog and digital signal processing. They are used in modulation and demodulation of signals in communication systems, voltage multipliers for generating higher DC voltages, and waveform clipping or shaping in oscilloscopes and signal generators. Their role extends to more advanced technologies, such as solar panels, where diodes are used to prevent reverse current, ensuring the efficient operation of photovoltaic systems. In educational and research contexts, diodes are fundamental in teaching electronic principles, offering a hands-on understanding of semiconductor physics and circuit behavior. Their simplicity, combined with their broad applicability, makes them one of the most studied and utilized components in electronics.

1.3 LED:

Light Emitting Diodes (LEDs) represent a transformative advancement in lighting and display technologies, with extensive applications spanning diverse industries. Operating on the principle of electroluminescence, LEDs emit light by converting electrical energy into visible light with exceptional efficiency. This capability leads to significant energy savings, reduced electricity costs, and a notable decrease in carbon emissions, making LEDs a cornerstone in efforts to combat climate change and promote sustainability. Their high energy efficiency positions LEDs as the preferred choice for applications such as street lighting, residential and commercial lighting, and large-scale displays.LEDs offer unparalleled durability owing to their solid-state design, which eliminates fragile components like filaments and glass enclosures. This robustness makes them highly resistant to shocks, vibrations, and environmental stresses, ensuring a longer operational lifespan and reduced maintenance requirements. These characteristics make LEDs particularly advantageous for critical applications, such as battery-powered devices, including smartphones, wearable gadgets, and medical instruments.In the automotive sector, LEDs have become the standard for headlights, taillights, and interior lighting. Their superior brightness, energy efficiency, and extended lifespan contribute to enhanced visibility and safety while reducing energy consumption. Furthermore, their ability to perform reliably across a wide range of temperatures ensures consistent functionality in challenging environments, making them indispensable in modern vehicles.

Figure:1.3 LED

LEDs are essential in various fields, including healthcare, agriculture, and entertainment. They are used for phototherapy, surgical lighting, and diagnostic imaging, providing precision and reliability. In agriculture, LEDs optimize light conditions for plant growth, increasing crop yield while conserving energy. In the entertainment industry, LEDs provide high-resolution displays in event lighting and digital screens. Emerging innovations like micro-LEDs and organic LEDs (OLEDs) are pushing the boundaries of display technology, enabling ultra-thin, flexible, and energy-efficient screens for next-generation devices. Micro-LEDs offer superior brightness and energy efficiency, revolutionizing applications like wearable displays and augmented reality systems. OLEDs offer unparalleled image quality and deep contrasts, making them ideal for premium displays in televisions, smartphones, and laptops. LED technology has significantly reduced global energy demand and greenhouse gas emissions, driving innovation in sustainability, from solar-powered lighting systems to energy-efficient urban infrastructure. As the focus on energy conservation and sustainable development intensifies, LEDs continue to evolve, addressing critical energy challenges and shaping the world's energy landscape for decades to come.

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 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

Batteries are essential in various technologies, powering everyday gadgets and driving large-scale innovations like electric vehicles and grid-scale energy storage. Lithium-ion batteries are crucial for sustainable mobility in transportation, while advanced battery technologies support renewable energy sources. Emerging technologies like solid-state and flow batteries are expanding energy storage possibilities, offering enhanced safety and energy density. In today's digital age, batteries are essential for progress and innovation, shaping the way we store and utilize energy, ensuring a connected, sustainable future. Their versatility, efficiency, and evolving technology continue to shape our energy storage and utilization.

1.5 RESISTOR:

A resistor is a fundamental electronic component that opposes the flow of electric current. 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, contributing to the overall functionality and performance of electronic systems. In summary, 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. 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. 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.

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. 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.

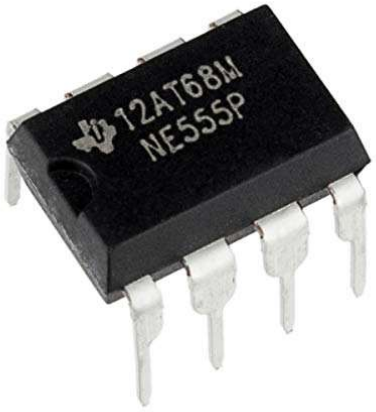

Figure:1.7 Integrated Circuit (IC)

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 nature of ICs enables the creation of complex electronic systems while minimizing space requirements, power consumption, and manufacturing costs. Integrated Circuits have revolutionized the field of electronics, contributing to the development of countless electronic devices, from computers and smartphones to medical equipment and communication devices.

1.8 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 (negative-positive-negative) and PNP (positive-negative-positive), involve the movement of charge carriers between two semiconductor materials. On the other hand, FETs encompass types like MOSFETs (Metal-Oxide-Semiconductor Field-Effect Transistors) and JFETs (Junction Field-Effect Transistors), relying on the modulation of conductivity within a channel. 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.

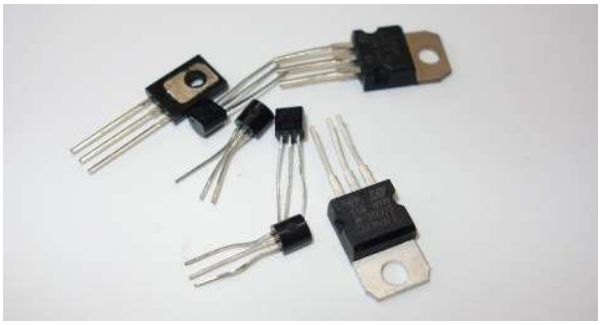

Figure:1.8 Transistor

The compact size, low power consumption, and reliability of transistors have been instrumental in the miniaturization and advancement of electronic technology. Transistors have played a transformative role in the evolution of electronic devices, contributing significantly to the development of computers, devices, and various electronic systems. The continued refinement and integration of transistors into electronic circuits underscore their enduring importance in shaping the landscape of modern technology.

1.9 COIL ANTENNA:

A coil antenna is a crucial component in wireless communication systems, designed to transmit and receive electromagnetic signals effectively. It operates based on electromagnetic induction, where a conductive material, like copper, generates or interacts with electromagnetic waves when an electric current flows through it. Coil antennas are known for their compact design, high efficiency, and ability to operate over a range of frequencies. They are constructed by winding a conductive wire into a helical or spiral shape, increasing its length while maintaining a compact form. Performance parameters such as inductance, impedance, and resonance frequency are determined by factors like the number of turns in the coil, the diameter of the winding, and the spacing between turns. Coil antennas are widely used in applications where space constraints and high efficiency are critical. Ferrite coil antennas are commonly used in AM radios due to their compact size and low frequency operation. Helical antennas are used in satellite communication systems and GPS devices due to their circular polarization and high gain.

Figure:1.9 Connecting wires

Coil antennas are essential in emerging technologies like wireless charging systems for smartphones and electric vehicles, as well as IoT devices, for efficient power transfer through inductive coupling. As wireless technologies evolve, advanced materials and designs are enhancing the capabilities of coil antennas. Printed coil antennas are becoming popular due to their lightweight and flexible properties, making them suitable for wearable devices and flexible electronics. Advancements in metamaterials are enabling the creation of coil antennas with improved performance metrics, such as higher efficiency and reduced size. Coil antennas are a cornerstone of modern communication and power transfer systems, with their adaptability, efficiency, and compact design making them indispensable across various industries.

1.10 SWITCH:

Switches are essential components in electronic circuits, regulating the flow of electrical current within a system. They enable users to control device operation, adjust settings, and select modes. Switches are versatile and simple, making them indispensable in various applications, from household electronics to industrial machinery and automation systems. When in the "closed" position, a switch creates a continuous path for current flow, allowing the connected circuit to function. Conversely, an "open" switch interrupts the flow of electricity, disabling the circuit.Switches are categorized into mechanical and electronic types, each designed for specific use cases and operational environments. Mechanical switches, such as toggle, rocker, push-button, and rotary switches, are manual-operated and offer a tactile response. Electronic switches, like transistors, MOSFETs, and relays, provide faster operation and greater reliability, making them indispensable in modern digital circuits, automated systems, and communication networks. Specialized switches, like reed switches activated by magnetic fields and micro switches for precision sensing, extend their utility to specialized domains like automotive systems, robotics, and safety mechanisms. Smart switches, featuring touch sensitivity and remote-control capabilities, have revolutionized user interaction, making them essential in smart homes and industrial IoT systems.

Figure:1.10 Switch

Switches have evolved significantly with technological advancements, enhancing their efficiency and durability. Solid-state switches, which operate without moving parts, are commonly used in high-speed and high-power applications. Touch-sensitive and proximity-based switches have replaced traditional mechanical components in devices like smartphones, appliances, and industrial control panels. These switches often incorporate capacitive sensing technologies for seamless control. In critical applications like aerospace, healthcare, and automotive systems, the reliability of switches is paramount. Hermetically sealed and ruggedized switches are used to withstand extreme temperatures, pressures, and vibrations. Incorporating switches into circuit design requires careful consideration of their electrical characteristics, such as current rating, voltage rating, contact resistance, and actuation force. Proper selection and placement of switches can enhance the performance and safety of electronic systems. Built-in safety features, such as fail-safe mechanisms and overload protection, safeguard systems and users from electrical faults. In contemporary applications, switches play a crucial role in energy efficiency and automation. Programmable switches and smart relays are used in industrial and home automation systems to optimize energy consumption and manage power distribution, storage, and usage. As electronic devices become more sophisticated and interconnected, the role of switches in ensuring efficient and reliable operation will continue to expand, cementing their position as a cornerstone of modern electronics.

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. These wires, 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. Beyond their basic role in establishing electrical connections, connecting wires contribute significantly to the organization and structure of circuit layouts. Their flexibility allows for the creation of specific signal paths, aiding in the systematic arrangement of components.

Figure:1.11 Connecting wires

Different lengths accommodate diverse circuit layouts, while distinct colors aid in visually distinguishing between various connections. 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.

CHAPTER-2

FASTEST FINGER FIRST

2.1 ABSTRACT:

The "Fastest Finger First" circuit is yet another of the innovative practical systems that have been devised to give the quiz-based competition a flair by detecting the first person in line to respond. As such, for this given project, the flexibility and adaptability of the 555 Timer IC is utilized with the objective of making the system reliable and responsive. Each unit has a push button activating it and also contains an LED light to indicate feedback. It works on the principle that a circuit responds only to the input it receives when it is first connected, while all other inputs are blocked until a human intervenes to reset the system. A common form of feedback mechanism using diodes ensures continuity in responses in the sequence. The 555 Timer IC is set up in its monostable mode, where a button press generates a single pulse at the output. This mechanism ensures that the LED of the first responder is lit, thus ensuring that it gets priority. The feedback mechanism also makes sure that, after the first response has occurred, no further inputs are considered to maintain the justice and integrity of the game. This project is very suitable for implementation in educational institutions, quiz programs, and competitive events because it highlights simplicity, cost-effectiveness, and reliability. This modular design ensures scalability; thus, the circuit can easily accommodate multiple participants without sacrificing its performance. Another feature is its resetting, which enables rapid and efficient re-initializing of the system for consecutive rounds. The use of basic electronics components such as the resistance diode and LEDs besides the inclusion of a 555 Timer IC reflects basic electronics principles as implemented within the circuitry. This circuit causes one to think of an aspect whereby the most simplistic solutions tend to work best to deliver a solid resolution to the different challenges found in their lives. The "Fastest Finger First" circuits highlight, within the competitive context, that creativity does indeed significantly contribute toward efficiency while also enhancing transparency.

2.2 INTRODUCTION:

The "Fastest Finger First" mechanism is a new approach towards making competitive and interactive events more efficient by automating the determination of who the fastest responder is. This system aims to make quizzes, trivia contests, and many other activities dependent on immediate responses accurate, fair, and efficient. This reduces the chance of human error and creates a far more efficient automated process for the entire experience of participants and organizers. At the heart of the system is the multifunctional 555 Timer IC, which is one of the core elements of the electronics world. In monostable configuration, the 555 Timer responds to the pulses in the input by creating a reliable output pulse that activates associated indicators such as LEDs, thus graphically showing who reacted first. The modular structure of the system allows easy scaling inasmuch as several participants or teams could be added without overly complicating the circuit design. The operation of the system depends on a carefully planned integration of electronic components. Every module is provided with a momentary push button, which serves as an input trigger for a person. When the button is pressed, the signal is treated by the 555 Timer IC, and it will trigger an LED that serves as an indicator of the response. A positive-feedback system by means of diodes in combination with a common status rail ensures that all further button presses are ignored after the first. Locks the process integrity by considering only the fastest response. The system is characterized by its reset ability, where the circuit returns to its original state after every round. A reset button specifically temporarily connects the reset pins of all the 555 Timer integrated circuits to ground, turning off all LEDs and preparing the system for further rounds. This makes it ideal for use in schools, colleges, and professional quiz competitions, ensuring smooth operation, even in fast quiz environments. The "Fastest Finger First" system has been designed with an emphasis placed on ease of use, dependability, and cost feasibility. This system is both financially viable and easily accessible to both enthusiasts and experts because it uses readily obtainable electronic components, which include resistors, diodes, and LEDs. Its pragmatic design coupled with intuitive functionality makes it a very important tool for creating organized and interactive quiz-related events. The initiative further demonstrates that basic electronics have the capability to solve practical problems by demonstrating the role of skill

and engineering in the manufacturing of new products. In summary, this system presents an ideal combination of technological advancement and practical functionality, facilitating a smooth user experience. Regardless of whether it is utilized in an educational setting or during an extensive quiz competition, the "Fastest Finger First" system delivers a reliable and effective approach to increase engagement and uphold equity in various competitive contexts.

2.3 COMPONENTS USED:

Per Module:

- NE555 Timer IC – 1
- Momentary Push Button Switch – 1
- PN Diode (e.g., 1N4148) – 1
- LED + Series Resistor (270 Ω) – 1
- Resistor (10 kΩ) – 1

Common for All Modules:

- Reset Button – 1
- LED + Series Resistor (270 Ω) – 1
- Resistors (1 kΩ) – 2
- Breadboard and Connectors
- DC Power Supply (5–12 V)

2.4 CIRCUIT DIAGRAM:

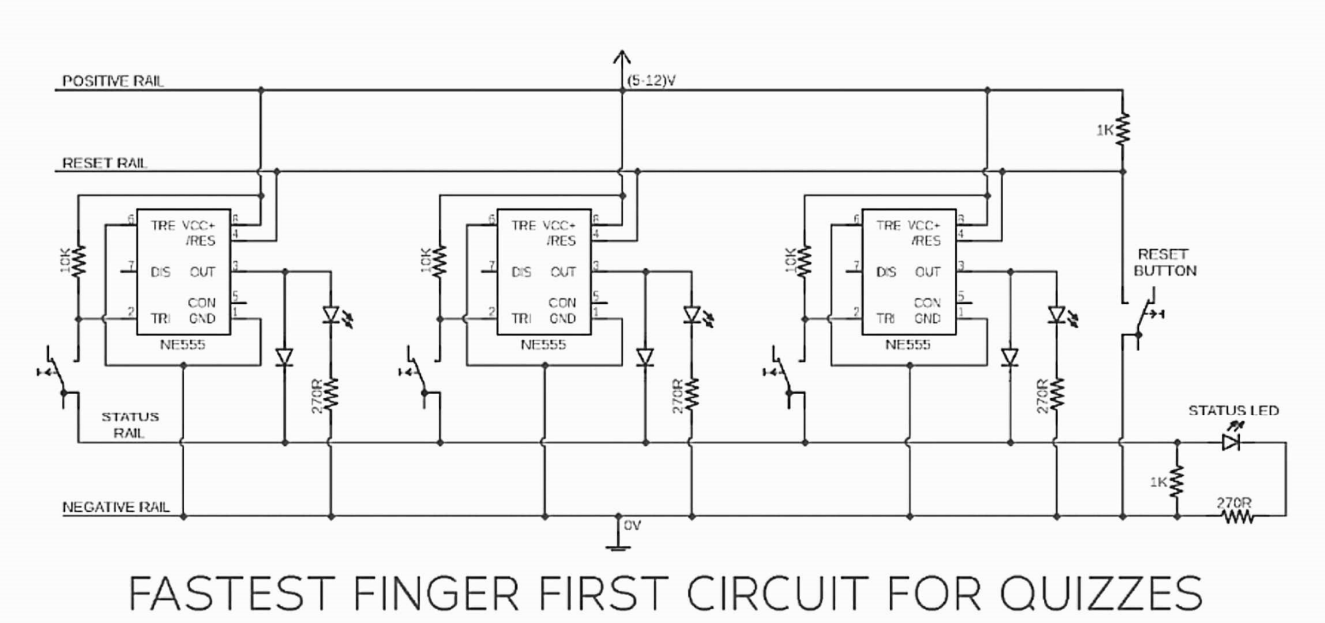

Figure: 2.1 Circuit Diagram of Fastest Finger First

2.5 WORKING MODEL:

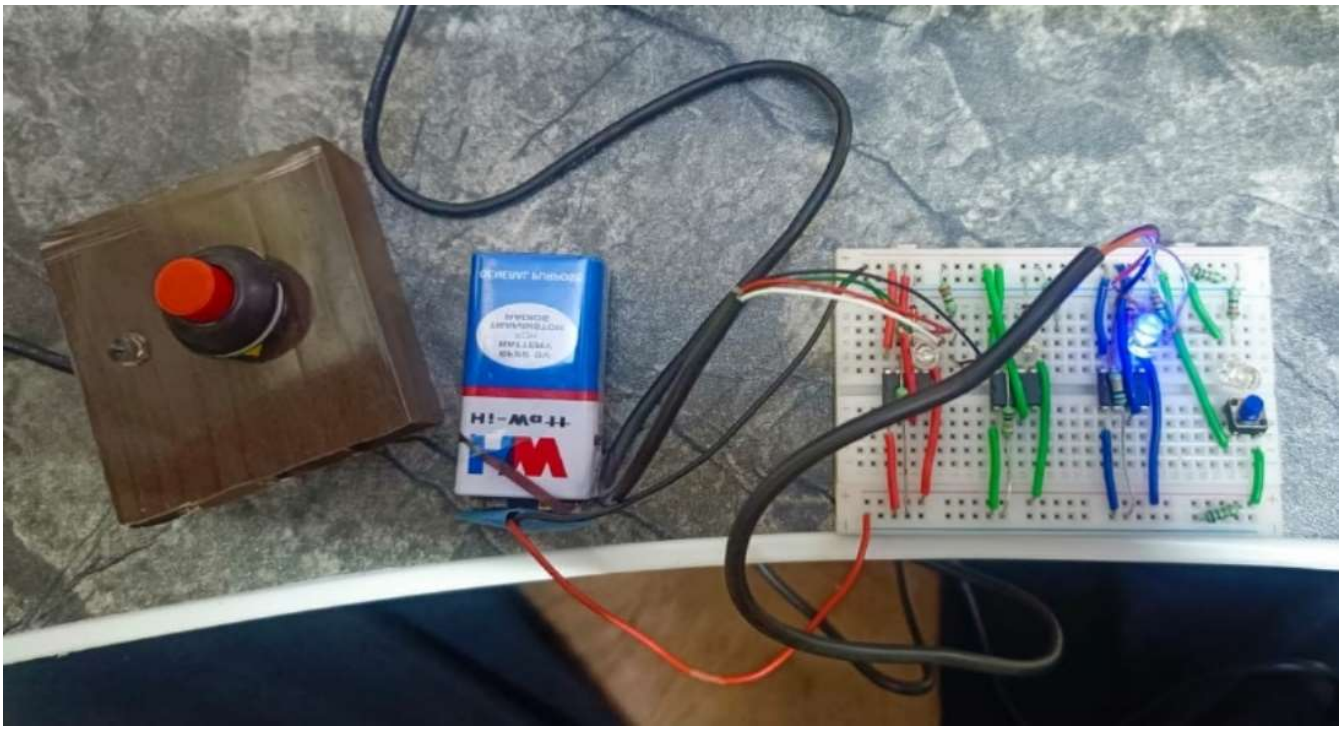

Figure:2.2 Working Model

This entire mechanism of working with the "Fastest Finger First Circuit Using 555 IC" discusses how various components interact with each other to achieve its accurate operation-evidence of detection and locking up of the first response. Hence, every module designated for the participants is built on the lines of speed, accuracy, and user feedback. It is clever, as the circuit permits several inputs to function in independent but harmonious interference-free fashion where the first valid response to get registered will be locked into. Its working principle is really that of a voltage trigger and is also feedback driven based on diodes with rail-synchronization.

Under normal conditions, all modules sit in standby where the other 555 Timer ICs wait to be triggered. Its implementation is as a momentary push button interface. When a push button is pressed, a low-voltage pulse is sent to Pin 2 of the relevant 555 Timer IC. As a result, Pin 3 immediately goes to ON state since that is the output from the IC. The LED associated will then go into an ON state with visual feedback as its output becomes high. In competitive scenarios, this immediate response identifies the first responder. Feedback mechanism of this circuit is the defining feature in ensuring that the first response alone is recorded. Once any module's output goes high, positive voltage is fed back to the shared feedback rail through a diode, which is then connected to the output of the IC. This diode separates that feedback signal from other modules while allowing the change of feedback rail voltage toward positive supply voltage. The level of the feedback rail is seen at all other module inputs simultaneously, and the Pin 2 from more buttons presses causes them not to be triggered, and thus, the output of the unique module remains asserted.

2.6 BLOCK DIAGRAM:

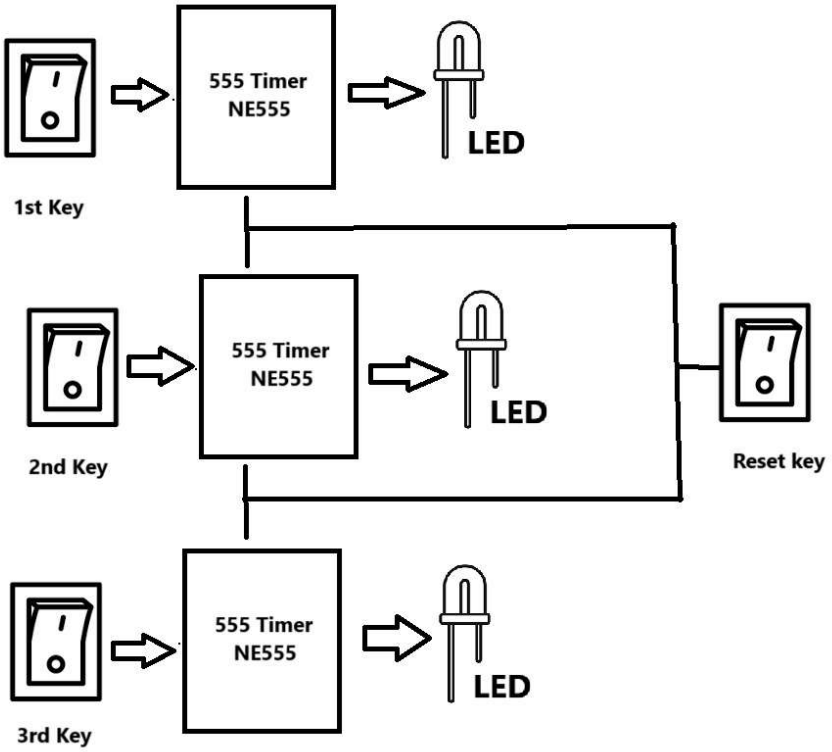

Figure:2.3 Block Diagram

Power Source: This module gives the circuit ample voltage and current. Modules have an objective in that constant stable power will be supplied to all elements of the system. A source can either be a battery or an adapter, though, in practice, a DC is predominantly used. This module, for the clean supply has regulators for voltage, and also filters to remove any spikes of voltage from reaching the circuit to avoid causing short circuits.

Input Section: The input section consists of push buttons assigned to every participant or team. These would then engage the circuit and, after mere wink of eye button push from a subject within their module, it would feed down to the 555 Timer IC to set the systems responding behavior. This again is an absolutely critical piece in the fact that it allows communication by the user, and thus fast and responsive to avoid delay or even a misfire.

555 Timer IC Module: Each unit member is equipped with a 555 Timer IC wired in monostable configuration. The circuit inputs at Pin 2 are of low-duration-short pulse, as at least one of the two switches has been turned on. The IC now, and its asserted output drives pin 3, where this one consequently lights up the led. Then there is just one and no more than that. For completeness, for the feedback mechanism, it just feeds through the pin in that position at Pin2 in the IC of the 555 Timer in the system. It has diodes and a common feedback rail such that first input is counted and the others are rendered useless. In this module, after the triggering of the 555 Timer IC, the output sent from these feeds a high signal to the feedback rail. This ensures that even when the buttons of all other modules are pressed, the trigger pins of all other modules will not be activated. This, therefore, will ensure equity in the whole process and also not allow counting more than one response.

LED Indicators: This is to have an inbuilt LED indicator for every module. With each button being pressed by either of the parties, it illuminates the other LED to show who reached first there. This mechanism turns out to be quite crucial for on-time recognition of the fastest reaction. Hence, this gadget is quite user-friendly and acceptable in competitive settings.

Reset Mechanism: It contains a reset button and reset rail coupled with all modules. The preparation of the system for the next cycle after the response has been recorded is possible through the application of a reset button. When pressed, it grounds the reset rail and thus grounds all the 555 Timer ICs along with LEDs. This allows it to get ready for later use without further readjustment.

Working Process

- Power supply energizes the circuit and allows all modules to be activated in the standby mode.
- When any button is pressed, it sends corresponding high output to the 555 Timer IC.
- High output will activate the LED and feedback mechanism that blocks all the other modules.
- Resetting mechanism returns all modules to their previous default state once response is acknowledged**.**

2.7 ADVANTAGES:

- The circuit is quick to find the responding device.
- It is fair since it has a multi-response blocking.
- It is a very simple design and uses parts that are easily available.
- Very reliable because it uses the 555 Timer IC.
- Easily reset for multiple use.
- Low power consumption and hence efficient.
- Low cost and therefore multipurpose.
- Visual feedback can be easily obtained using LED indicators.
- Compact and portable in design.
- Easy to assemble and maintain.

2.8 APPLICATION:

- Used in quiz programs as for the first response
- For learning in educational institutes
- In games for buzz round events
- Corporate usage with activity in team building.
- For reaction time test under psychology
- In laboratory measurement with experiment timing
- Responses use in class
- Best suited with a recreation activity or as for the game of trivia
- Suits in speeding up the training response with decision-making

CHAPTER – 3

MOBILE JAMMER FOR MILITARY SURVEILLANCE

3.1 ABSTRACT:

The Mobile Jammer for Military Surveillance is a hand-held, low-cost device to inhibit mobile phone signals within a covered range. It operates by transmitting on the same frequency of operation of mobile communication networks thereby jamming their transmission as well as reception. This is useful particularly in military applications, creating free environments in sensitive locations without allowing any unauthorized means of communication. It contains a 555 Timer IC with many passive and active components in the circuit, including resistors, capacitors, and an RF transistor. It gives a base frequency due to the 555 Timer IC, and this frequency is then fine-tuned by the resonant LC circuit to be almost within the GSM frequency range of about 450 MHz. The enhanced frequency radiating from the RF amplifier circuit further creates a robust interference signal. Add noise with capacitors that cannot be differentiated by the mobile receivers as valid communication signals. The antenna sends the jamming signal and jams communications within a 100-meter radius. The main parts of the circuit include an oscillator, a tuned LC circuit, an RF amplifier, and an antenna. The oscillator is the source of the original frequency that then gets filtered to the desirable resonant frequency by the tuned LC circuit. RF amplifier amplifies the signal up to the level that gives definite interference with mobile communications. An antenna sends this signal into the environment, disturbing GSM networks in the district. This project enlightens the whole world on the importance of signal control and frequency interference in the electronic and communication engineering field. The device is being used in various fields, military surveillance, examination halls, prisons, and other areas which require controlled communication. However, it is worth noting that such devices are unlawful in most countries because they can be interfering with legitimate channels of communication and compromise public safety. This is an educational demonstration of RF signal interference and jamming, which presents the principles of oscillators, amplifiers, and resonant circuits. The design is confined to the GSM frequency

band; however, it may be stretched up to the frequency bands, to 4G or 5G networks, or improve the scope and efficiency of the device. Conclusion Conclusion In the current mobile jammer, there is a bright example of how electronics could be used for some purposes, such as disturbing signals. It, therefore, manifests the importance of ethical application so that such technology is used only in a well-controlled environment where it has suitable purpose.

3.2 INTRODUCTION:

Mobile Jammer for Military Surveillance is a project whose main aim is to design a device intended to interfere with mobile communication signals within a particular area. The project is common in places that need secure and undisturbed communication. Such a device is meant to jam or degrade the mobile network signal to eliminate unwanted communication. These types of applications become very important in military operations, security installations, examination halls, and any such sensitive areas where communication has to be secure in nature. Mobile jammers operate through the transmission of signals, emitting on the frequencies of mobile networks, cutting all the receptions on mobile phones. Devices work usually by broadcasting radio waves at the same or closely matching ranges to those where the mobile phone networks are actually in operational activity. This disables all the mobile phones within it range from accessing the network. They are not allowed to call and be called, text and even not able to have data services. This project applies one of the highly flexible and popularly used in electronics, the 555 Timer IC. This will create a stable frequency, which has to be further modified so that it will resonate to the mobile network's frequency. Most commonly it occurs in case of GSM systems roughly at about 450 MHz. This frequency is amplified by a radio frequency amplifier circuit and then modulated by noise, thereby enhancing the interference, which is then transmitted and propagated through an antenna. Addition of noise will make this signal unusable to mobile devices and hence cannot communicate to the cell towers surrounding their areas. Construction of the jammer circuit involves resistors, capacitors, inductors, and transistors all together to create conditions for disrupting the signal. The LC circuit tunes the circuit to the desired frequency. This power is supplied through a 9V battery. Combining all these parts places the jammer in an active position to interrupt signals

up to a 100-meter radius, making it work very well in confined spaces. Although the mobile jammer seems to be very effective in jamming communication over mobile phones, use of jamming devices remains a crime in most nations due to their potential in disrupting public as well as emergency communications. This project is purely academic in nature as an insight into how electronic circuits, radio frequency technology, and the basic principles that apply in signal jamming work. In conclusion, this project is a demonstration of technical designs of a mobile jammer and, above all, stresses the proper and lawful use of such technology. The understanding of this project will pave the way for more innovation and enhancement in the area of communication security in military, defense, and private applications.

3.3 COMPONENTS USED:

555 Timer IC	Monostable or astable multivibrator, 8-pin IC, 4.5V-15V	1
Resistors	220Ω, 5.6KΩ, 6.8KΩ, 10KΩ, 82KΩ, 1/4W	6
Capacitors	2pF, 3.3pF, 4.7pF, 47pF, 0.1µF, 4.7µF, 47µF, 30pF Trimmer	8
Coils	3 Turn 24 AWG, 4 Turn 24 AWG	2
Transistors	BC-547 (NPN), BF495 (NPN), max frequency: 250MHz, 500MHz	3
Antenna	15 Turn 24 AWG, Coiled antenna	1
LED	Red LED, forward voltage: 2V, current: 20mA	1
Switch (ON/OFF)	SPST, rated for 9V DC	1

9V Battery	9V, PP3 type	1

3.4 CIRCUIT DIAGRAM:

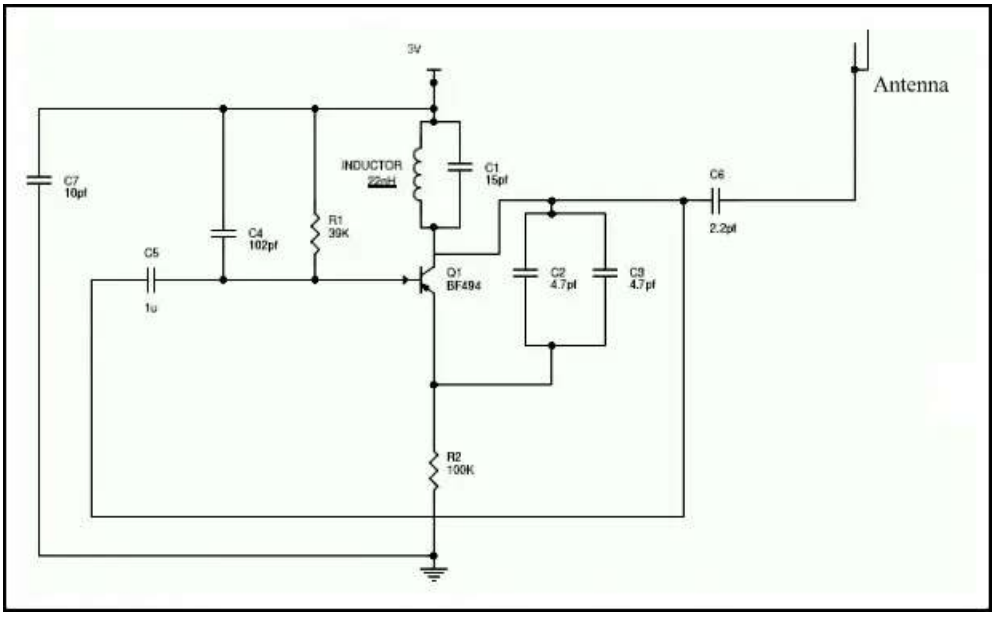

Fig:3.1 Circuit Diagram

3.5 WORKING MODEL:

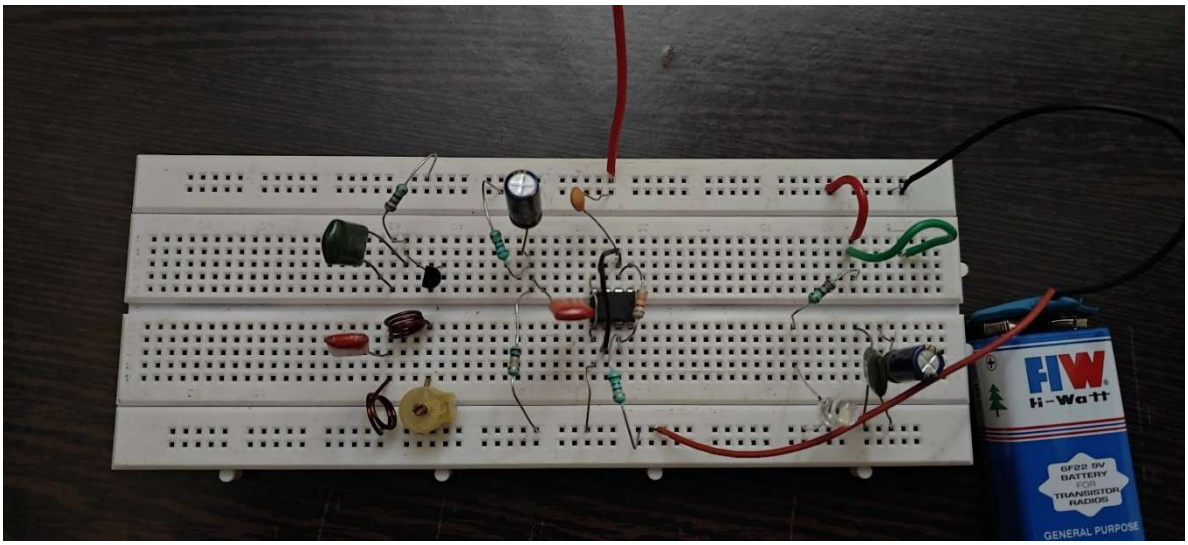

Figure:3.2 Working Model

The Mobile Jammer works on the principle of giving interference between a mobile phone and the cell tower that is nearest with radio frequency signals. The actual principle behind the mobile jammer is electromagnetic interference over the same frequency range the mobile uses, thus cutting off signals to the phone or to transmit. The first 555 Timer IC starts a jammer circuit by having its power supply in this circuit. In effect, a 555 Timer is a multivibrator, or rather an astable that generates pulses continuously. Therefore, pulses control the transistor, preferably BC-547, amplifying the signal so that it is able to drive an RF signal generator. The RF then produces signals within specific frequency bands used in mobile phones. The primary components of the signal generator would be capacitors and inductors in the tuned circuit. The oscillator happens to be the signal amplified by the transistor. It sends it over the antenna as an RF signal. If this mobile gets caught in the range of that jammer, then it will capture the signal, and due to interference through that jammer, connection with the network would get interrupted. Loss of a few signal bars and eventually showing no sign if interference continues will be the first indicator on that phone. The second circuit is made up of the inductors and capacitors, which are the basis of a tuned circuit. A tuned circuit, for instance, is a circuit that oscillates at a frequency, for example, 450 MHz, which forms the frequency used in the mobile phones. Once there is the application of a supply, the capacitor, and inductor become a resonant circuit, a circuit that continues to produce the high-frequency signal that then gains strength in amplification by the RF amplifier before being radiated out through the antenna. Since the signal of mobile jammer is nearly similar to one applied in the mobile network, this leads to impossible differentiation made by a mobile phone between signals and interference from jamming. They either fail to receive calls or not to send calls and even data fully. As such, this handicaps the operation of a mobile phone by occupying their frequency spectrum with noise signals and unwanted signals. Both of the jamming versions interfere with the mobile range, and therefore they stop devices in a given circle around 100 meters from reaching any contact with their related base stations. The exact extent depends on the strength produced by the jammer as well as its location near the mobile device. In a mobile jammer circuit, it utilizes

summation of oscillators, amplification of RF's, and antennas in generating the jamming of mobile frequencies. It interferes with the cell phone in the creation and holding of a network connection. The gadget is able to block signals within a certain range but only reduces the signal strength and not blocks it completely. This circuit is a very powerful device to demonstrate the methodologies involved with signal jamming, although most countries ban this due to its potential to interfere with communication services.

3.6 BLOCK DIAGRAM:

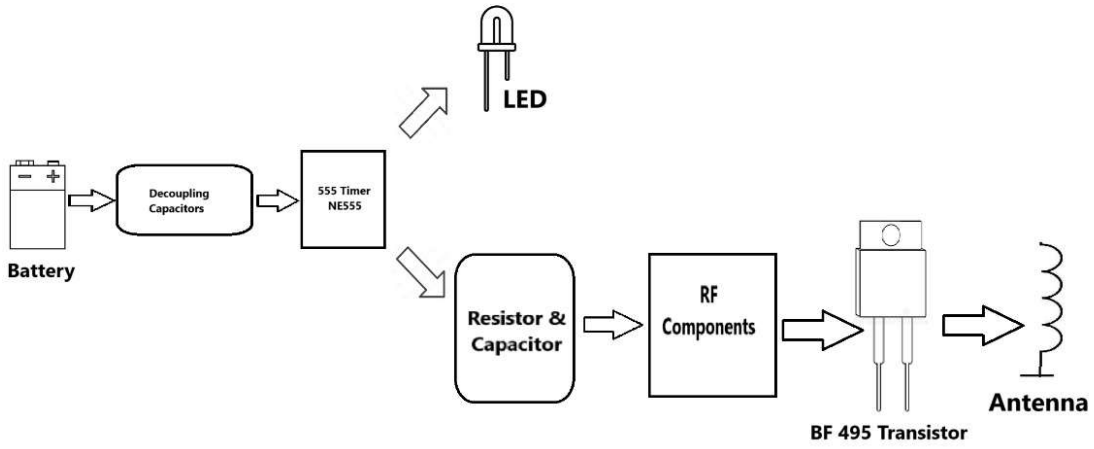

Figure:3.3 Block Diagram

Power Supply: Power supply essentially serves as the backbone for the entire circuit of mobile jammer as all parts of this circuit draw power with its aid only. The stable DC is the power supply demand, and it could draw from the battery or taken from the regulated DC adapter; the voltage could be varied over the demand of the requirements of the 555 Timer and the associated components in this circuit. Usually, the range may vary between 5 to 12 volts. But it should also be stable not to cause interference so that its supply of electricity would vary with a failure to work properly in the jamming circuit or else never work at all. Sometimes, in practical developments for field use of the jammer, a rechargeable battery is used.

Decoupling Capacitors: 0.1 µF, 4.7 µF: The decoupling capacitors are one essential component for noise filtering to ensure voltage stability. The 0.1 µF capacitor will filter some of the high-frequency noise which can be induced either by the power supply or even by the

neighboring electronic components. Thus, even the 555 Timer and the transistor that wouldn't have worked up now will now work well, though the 4.7 µF capacitor kills off some low-frequency ripples and variations to bet-ter represent a smooth DC supply. These capacitors act as short-term energy storing tanks and store the energy at whichever time the demand is rising and retain energy at whatsoever times supply is more than demand. Without these capacitors, a circuit can fail or even show some periodic output signals.

555 Timer (NE555): The 555 Timer is actually the heart of this circuit. It ensures that there is always a continuous oscillating signal in the nature of square waves. It is astable, hence producing one constant stream of pulses. The frequency and duty cycle are both determined from the outside by this timing circuit through an added resistor which has a resistance of 82 kΩ and another external capacitor that has a value of 0.01 µF. For cell phone jamming, there is oscillation frequency set in the bandwidth of mobile communication ranging from GSM at 850/900/1800 MHz to LTE at 2.4 GHz. All cell phones will be then phase locked to local cell towers at this speed. The 555 Timer is a stable, repeatable oscillation that is amplified in subsequent stages to give strong jamming.

Indicator LED: This is an indicating LED that tells whether the circuit is working or ON. That has an added limiting resistor, which is series connected with an LED. This is to prevent overflow of the current which could damage this LED in case it draws that much and the connections will be done either from the output of the power supply, or sometimes, to the output of the 555 Timer. The jamming procedure will not use the help of the LED but the component in the circuit has been very important in fault finding and monitoring.

Resistor (82 kΩ) and Capacitor (0.01 µF): These are parts of the 555 Timer timing network so very important to achieving the oscillation frequency. The resistor and capacitor will determine how long it takes for the capacitor to charge and discharge; this time is what is crucial to creating the square wave that defines the outputted frequency. In this circuit, the values chosen are 82 kΩ and 0.01 µF to maximize disruption frequencies for jamming cellular mobile signals. That these values could be varied would give a jammer for the interference of other specific bands.

RF Circuit Inductor and Capacitor: The RF parts form a tank circuit that is an oscillation circuit of a combination of inductors and capacitors. It amplifies the 555 Timer oscillation toward high-frequency jamming, shaping. Thus, a tank circuit formed to resonate with a frequency that falls under a mobile communication frequency in either a GSM band or LTE bands, fine-tuned in a way to highly interfere destructively and flood the receivers of the mobile devices.

Transistor BF495: Transistor BF495: BF495 transistor amplifies the signal of this RF segment to the receivers. If it is not restrained then this would hardly have jamming effects that have been created by 555 Timer in its low power operation. The transistor enabled the signal to be amplified enough to allow it to reach a much more extensive territorial area so that the interfering signal would be able to actually interfere with the cell phones and their base stations. This is where the amplification point is, and the signal will now be strong enough to actually cause interference in mobile phones and their base stations all over the geographical area of the jammer.

Antenna (24 AWG Wire): It is the last point in a circuit, where it radiates the amplified signal into the air. The transmission in case of such arrangement is very efficient as with the composition of 24 AWG wire, dimensions and arrangement count. Generally, the length of an antenna is a small fraction of the wavelength of a frequency under consideration, so this will add to its transmitting features further as to transmit an RF signal. The jammer blocks the mobile communication signals, that then make devices connect with the nearest tower. The shape of the antenna has a great influence over the length and the performance of the jammer.

3.7 ADVANTAGES:

- **Prevents unauthorized communication.**
- **Enhances security in sensitive areas.**
- **Cost-effective and easy to build.**
- **Compact and portable design.**
- **Effective in emergency situations.**

- **Simple circuit design.**
- **Non-invasive signal interference.**
- **Versatile for various applications.**

3.1 APPLICATION:

- Prevents enemy communication interception.
- Secures confidential military operations.
- Disrupts enemy mobile network usage.
- Enhances operational security measures.
- Protects against remote detonators.

CHAPTER-4

CONCLUSION:

There were the "Fastest Finger First" and "Mobile Jammer for Military Surveillance", reflecting the entire gamut of modern electronics applications to augment user experience as well as security. The Fastest Finger First project was so designed as to promote an entertainingly competitive atmosphere, perfectly suited for interactive games, educational activities and team building exercises. It integrates technology on prompt responses, fair plays and multiple teams' accommodation into the very seamless experience, and hence it has been modified with different situations. It, therefore, improves the aspect of playing since its speed in response and cooperation is experienced. Not only is this helpful tool applied merely in entertainment, but it is also exceedingly applicable in training and educational usage. In this particular case, the Mobile Jammer project ensures safety for crucial operations primarily by military surveillance. The interference caused to the mobile communications within a set radius of area ensures safety against possible remote observation or sabotage for military assets. This circuit design using RF amplifiers, oscillators, and tuning circuits is applied to ensure that the jammer works appropriately in targeted regions. It is one of the most significant defenses for defense operations. Electronic component build with capacitors, transistors, and antennas makes the system very solid, causing signal blocks with low interference. Both represent the ability of electronics to be applied toward real-world problem solving—to either create an environment that breeds teamwork and competition, or secure military operations against clandestine threats. But at the same time, both projects also equally represent the growing need for precision, adaptability, and efficiency of electronic systems that have to be applied towards achieving an intended end result and provides a useful glimpse into what to expect for the future of interactive technologies and security solutions. These projects demonstrate the capability of modern electronics to be applied in wide sectors and underscore that friendly design and technological innovation are the keys to solving complex problems.

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