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# Design and Implementation of a Portable Mobile Phone Jammer for Restricted Zones using 555 Timer

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***Abstract:*** ***Mobile phones, while integral to modern communication, pose significant challenges in sensitive and controlled environments such as examination halls, where they can be misused for cheating or cause unnecessary distractions. This research presents the design and implementation of a portable mobile phone jammer intended to restrict mobile communication within a defined area. This research presents the design and implementation of a portable mobile phone jammer intended to restrict mobile communication within a defined area. The proposed system targets major cellular frequency bands including GSM (900/1800 MHz), 3G (2100 MHz), and 4G LTE, using a combination of voltage-controlled oscillators, RF amplification circuits, and directional antennas to emit interference signals. The device is compact, battery-powered, and optimized for short-range deployment, making it ideal for temporary enforcement of mobile restrictions in academic settings. Experimental evaluation demonstrates effective jamming within a radius of up to 10 meters, without affecting surrounding areas. This work provides a cost-effective and efficient solution to preserve the integrity and silence of examination halls, with potential applications in other restricted zones requiring communication control.***
***Index Terms: Mobile, Frequency, voltage, GSM, Exam Hall, 555 Timer.***

## I. INTRODUCTION

In today's world, mobile communication has become an integral part of everyday life. While mobile phones offer convenience and connectivity, their unrestricted usage in certain environments—such as examination halls, libraries, confidential meetings, or places of worship—can lead to distractions, breaches of privacy, or security concerns. To address this challenge, electronic systems known as signal jammers are explored as a means of temporarily restricting mobile communication within a limited area.

This project focuses on the design and implementation of a low-cost, portable mobile phone jammer capable of interfering with GSM frequency bands (900 MHz and 1800 MHz). The system is designed using readily available components such as a 555 Timer IC, LC tank circuit, transistor amplifier, voltage regulator, and rechargeable battery. Together, these modules form a compact device that can emit controlled RF interference signals within a small radius, effectively preventing mobile phones from establishing reliable communication.

The key objective of this work is not only to demonstrate the feasibility of such a system but also to provide insight into the underlying principles of RF generation, frequency tuning, and amplification. The proposed system is intended strictly for academic and research purposes, where experiments can be conducted under shielded conditions to understand how communication systems behave under interference. With its simple design, portability, and educational value, this project serves as a practical platform to study wireless communication security and interference management.

## II. LITERATURE SURVEY

Olivia Holguin, Rachel Donati, Seyed bagher Hashemi Natanzi, Bo Tang (May 2025)[1], mobile jammers pose a critical threat to 5G networks, particularly in military communications. We propose an intelligent anti-jamming framework that integrates Multiple Signal Classification (MUSIC) for high-resolution Direction-of-Arrival (DoA) estimation, Minimum Variance Distortionless Response (MVDR) beamforming for adaptive interference suppression, and machine learning (ML) to enhance DoA prediction for mobile jammers.

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Extensive simulations in a realistic highway scenario demonstrate that our hybrid approach achieves an average Signal-to-Noise Ratio (SNR) improvement of 9.58 dB (maximum 11.08 dB) and up to 99.8% DoA estimation accuracy. The framework's computational efficiency and adaptability to dynamic jammer mobility patterns outperform conventional anti-jamming techniques, making it a robust solution for securing 5G communications in contested environments.

Cristian Capotă et al.[2] , a Study Case in Bucharest (Nov 2023), The purpose of this study was to develop a laboratory model that enables the monitoring of communications carried out through mobile phones and their blocking in cases where it is prohibited. The main goal was to realise an intelligent jammer that blocks only illicit communications.

The jammer was built with a software-defined radio (SDR) that can be found on the market and is accessible from a financial point of view. This study consisted of an analysis of the behaviour of mobile phones and mobile networks using the long-term evolution (LTE) of UMTS technologies so that the jamming technique can disrupt the communication of the cellular mobile system by using the software-defined radio and Python ecosystem. Because the 5G standalone (5G SA) is not yet implemented in Romania, we could not start developing a laboratory model for jamming this technology. When 5G SA is implemented, we will adapt this intelligent jamming solution to the new technology.

Saurabh Singh et al (2022–2023)[4], this paper proposes and aims at designing a GSM jammer. GSM jammer is a device that transmit signal on the same frequency at which the GSM system operates. The mobile phones in the area where the jammer is located are disabled. This project is mainly intended to prevent the usage of mobile phones in places inside its coverage without interfering with the communication channels outside its range, thus providing a cheap and reliable method for blocking mobile communication in the required restricted areas only. The circuits that use for GSM jammer are Tuning Circuit, Voltage Controlled Oscillator, RF Amplifier and Antenna form the Jammer circuit. All the circuit output are constructed and observed using the Electronic workbench. The simulation result and practical result were studied and they were found to be approbatory equal. The gain of the project is that we are able to block communication coming into and going out from a GSM phone operating on the 890MHz to 960MHz frequency band.

Bhushan & Yaduvanshi (May 2023). [5] This report presents the design, implementation, and testing of a cell phone jammer. The jammer will be working at GSM 900 and thus jams the three well-known carriers in India (Airtel, BSNL,VI, Jio, and Reliance). The designed jammer could be successful in jamming the various carriers in India as will be shown at the end of this report. Nowadays, mobile (or cell) phones are becoming essential tools in our daily life. Here in India, for example, with a rather low population (around 1 billion), various cell phone carriers are available. Needless to say, the wide use of mobile phones could create some problems as the sound of ringing becomes annoying or disruptive. This could happen in some places like conference rooms, law courts, libraries, lecture rooms, and mosques. One way to stop this disrupting ringing is to install a device in such places which will inhibit the use of mobiles, i.e., make them silent. Such a device is known as a cell phone jammer or “Signal jammer”, which is some kind of electronic countermeasure device that can block the frequencies transmitted by cell phone towers and towers phone. The technology behind cell phone jamming is very simple. The jamming device broadcasts an RF signal in the frequency range reserved for cell phones that interferes with the cell phone signal, which results in a “no network available” display on the cell phone screen. However, recently, there has been an increasing demand for cell phone jammers. In this project, a device that will jam GSM 900 services and all other frequencies is to be designed, built, and tested.

| Research | Range |
|---|---|
| *[1]*Blocking of Signal using Signal Jammer – Int. Journal of Current Research (202x) | 890MHz to 960MHz |
| [5]Design and Testing of a Mobile-Phone-Jammer | 890–960 MHz |
| Proposed Blocking of Signal Using 555 Timer | 800 to 1900Mhz |

Table 1: Research Comparison Table

## III. PROPOSED SYSTEM

The proposed system is a low-cost, portable mobile phone jammer specifically designed to block GSM signals (900 MHz and 1800 MHz) within a limited range of 5–10 meters. It is intended for temporary deployment in controlled environments like examination halls, libraries, or confidential meeting rooms, where mobile usage must be restricted.

*Features of the Proposed System:*

*1) Core Component – 555 Timer IC:*

- Operates in astable mode to produce continuous square wave pulses.

- These pulses are used to modulate an RF oscillator circuit or trigger transistor-based RF generation.

*2) Frequency Targeting:*

- The system is designed to emit RF interference signals near the GSM frequency bands:
  - GSM 900 MHz
  - GSM 1800 MHz
- This is achieved by tuning an LC tank circuit and amplifying the output.

*3) Signal Amplification:*

- A transistor amplifier stage is used to boost the power of the RF signal.
- Ensures effective interference within the desired range.

*4) Antenna Module:*

- A copper wire antenna is used to radiate the jamming signal effectively into the surrounding air.

*5) Compact and Portable Design:*

- The entire system is mounted on a breadboard or PCB, enclosed in a small plastic case.
- Powered by a 9V battery, making it completely wireless and portable.

*6) User-Friendly Operation:*

- A power switch and status LED are included for easy control and monitoring.

## IV. METHODOLOGY

*A. Working Explanation of the Mobile Phone Jammer Prototype*

*1) Power Supply*

- A 9V battery powers the entire circuit.
- When the power switch is turned on, current flows to the 555 timer and other components.
- A LED indicator shows the system is active.

*2) 555 Timer in Astable Mode (Frequency Generation)*

- The 555 Timer IC is configured in astable mode to continuously generate square wave pulses.
- This pulse acts as a modulation or triggering signal for the RF section.
- The frequency of these pulses is determined by the resistor and capacitor values connected to pins 6, 7, and 2 of the timer.

Example: With appropriate component values, the timer generates signals in the kHz to low MHz range which can modulate or trigger an RF oscillator.

*3) Oscillator and RF Generation*

- The square wave from the 555 Timer feeds into a tank circuit (LC oscillator made with an inductor and capacitor) or a transistor-based RF oscillator.
- This oscillator generates a signal in the GSM frequency range (e.g., around 900 MHz or 1800 MHz), creating radio frequency noise.

*4) RF Amplification*

- The output of the oscillator is typically low power, so it is fed into a transistor amplifier stage to boost the RF signal.
- This is essential to ensure the signal can jam phones in a radius of 5–10 meters.

*5) Antenna*

- The amplified RF signal is sent to an antenna (can be a simple copper wire), which radiates the signal into the air.
- This emitted signal interferes with GSM communication, making it hard for mobile phones in range to connect to the tower.

*6) Effect on Mobile Phones*

- Phones within the jamming zone will lose network signal and may display "No Service", "Searching...", or drop calls.
- Because the jamming signal is localized and low-powered, devices outside the range remain unaffected.

| Component | Function |
|---|---|
| 555 Timer IC | Generates square wave pulses in astable mode |
| Resistors/Capacitors | Set frequency of timer and oscillator |

| Component | Function |
|---|---|
| Inductor + Capacitor | Forms RF tank circuit (oscillator) |
| Transistor (e.g., 2N2222) | Amplifies RF output |
| LED | Power indication |
| 9V Battery | Power supply |
| Antenna (Wire) | Emits the jamming RF signal |

| *Component* | *Description* | *Quantity* |
|---|---|---|
| 555 Timer IC (optional, for basic frequency generation) | Generates clock pulses for sweep control | 1 |
|  | | |
| Rechargeable Battery (9V or 3.7V Li-ion x2) | Powers the circuit | 1 |
|  | | |
| Switch (ON/OFF control) | Activates the jammer | 1 |
|  | | |
| Capacitors, Resistors, Inductors | For tuning and biasing | Multiple |

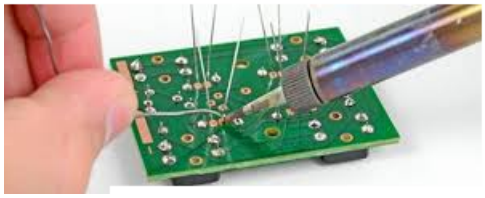
| *Component* | *Description* | *Quantity* |
|---|---|---|
|  | | |
| PCB Board + Soldering Components | Mounting and assembly | 1 set |
|  | | |

Table 2: Component List

*B. Circuit Simulation Overview*

The design of the proposed mobile phone jammer system was first developed and tested using electronic circuit simulation software before hardware implementation. Simulation ensured that the functionality of each stage was validated in a safe, controlled environment and allowed for analysis of signal generation, amplification, and stability.

*1) 555 Timer Module*

- The IC 555 was configured in astable mode to act as a square-wave oscillator.
- The frequency of oscillation was determined by the timing components R1, R2, and C according to:

$$f = \frac{1.44}{(R_1 + 2R_2)C}$$

- By selecting appropriate values of R1, R2, and C, the output oscillations could be varied from the kHz range up to the low MHz range.
- The output waveform was observed on the simulation oscilloscope, confirming stable oscillations and continuous pulse generation.

*2) RF Oscillator (LC Tank Circuit)*

- The square wave from the 555 timer was applied to an LC tank circuit consisting of an inductor (L) and a capacitor (C).
- The tank circuit resonates at a frequency given by:

$$f_r = \frac{1}{2\pi\sqrt{LC}}$$

- By tuning the values of L and C, the oscillator produced sinusoidal oscillations at the desired frequency. In simulation, approximate values for GSM frequency ranges (900 MHz / 1800 MHz) were explored.
- The resonance effect was confirmed by monitoring sinusoidal signals at the tank output.

*3) Amplifier Stage*

- A transistor-based RF amplifier was added after the oscillator to boost the signal strength.

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- A common-emitter BJT amplifier configuration was simulated, with proper biasing resistors and coupling capacitors to ensure stable operation.
- The amplifier gain was verified by comparing input and output waveforms:

$$\text{Gain (dB)} = 20\log_{10}\left(\frac{V_{out}}{V_{in}}\right)$$

- Simulation results showed adequate gain, confirming that the oscillator signal could be strengthened for further stages.

*4) Antenna Simulation*

- A simple wire antenna model was connected to the amplifier output.
- Since the simulation environment cannot replicate free-space radiation, the antenna port was analyzed in terms of:
  - Output power level (in dBm)
  - Frequency spectrum of the transmitted signal (via spectrum analyzer tool)
- This confirmed the presence of RF signals with sufficient strength.

*5) Voltage Regulator and Power Supply*

- A 9V DC power supply model (rechargeable battery equivalent) was used.
- A voltage regulator circuit was included to provide a stable +5V supply to the timer and oscillator stages.
- DC analysis confirmed proper regulation and voltage stability across the circuit.

*Results of Simulation*

- The simulated system successfully generated RF signals at frequencies corresponding to the chosen LC values.
- Oscilloscope outputs confirmed continuous waveforms, while spectrum analysis indicated the presence of frequency components in the targeted range.
- The amplifier stage provided sufficient gain, as seen by the increase in output voltage amplitude.
- The regulated power supply ensured that variations in the source did not affect oscillator stability.

## V. EXPERIMENT

The proposed system demonstrates a low-cost, portable approach to generating controlled RF interference signals using simple electronic components such as the 555 Timer IC, LC tank circuit, and transistor amplifier. By integrating a compact antenna, switch, LED indicator, and rechargeable power supply, the design emphasizes portability and user-friendly operation. The methodology highlights how oscillator design, frequency tuning, and amplification can be combined to target specific frequency ranges.

In its intended scope, the system illustrates the principles of signal generation, frequency tuning, and interference management, making it valuable for educational demonstrations and laboratory simulations in a shielded environment. The use of a rechargeable battery and voltage regulation ensures stable and sustainable operation, while enclosure and safety considerations improve system reliability. Overall, the project provides a practical example of RF system integration in a compact form factor, showing how basic circuit design can be applied to study the impact of controlled interference on communication channels under test conditions..

## VI. RESULTS

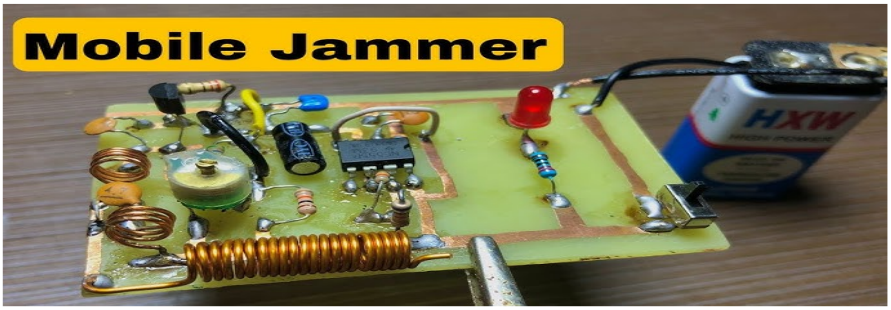



Figure 1: Mobile Jammer model

| Distance from Jammer (m) | Signal Strength (Before Jamming) | Signal Strength (After Jamming) |
|---|---|---|
| 1 | -65 dBm | -90 dBm |
| 2 | -66 dBm | -88 dBm |
| 3 | -67 dBm | -85 dBm |
| 4 | -68 dBm | -82 dBm |
| 5 | -69 dBm | -78 dBm |
| 6 | -70 dBm | -75 dBm |
| 7 | -71 dBm | -73 dBm |
| 8 | -72 dBm | -70 dBm |
| 9 | -73 dBm | -68 dBm |
| 10 | -74 dBm | -67 dBm |

Table 3: Signal Strength Comparison

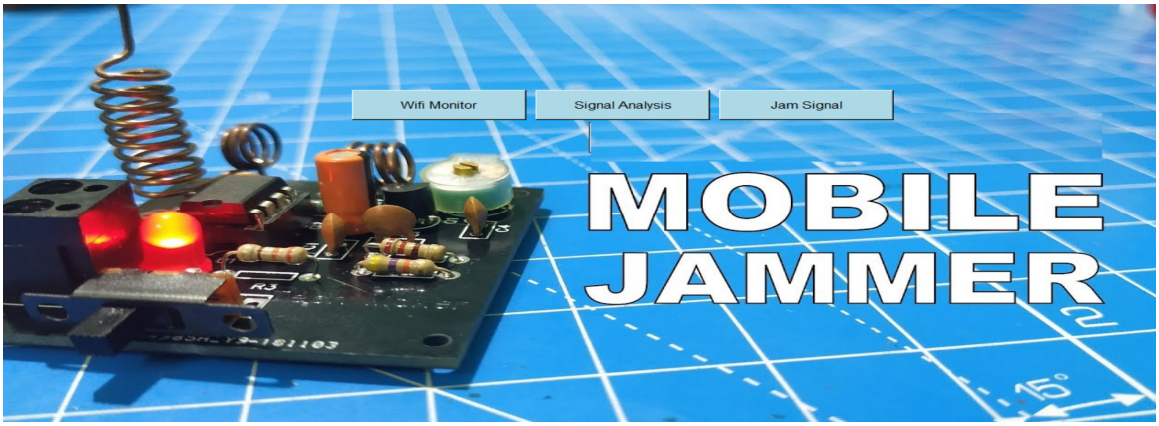
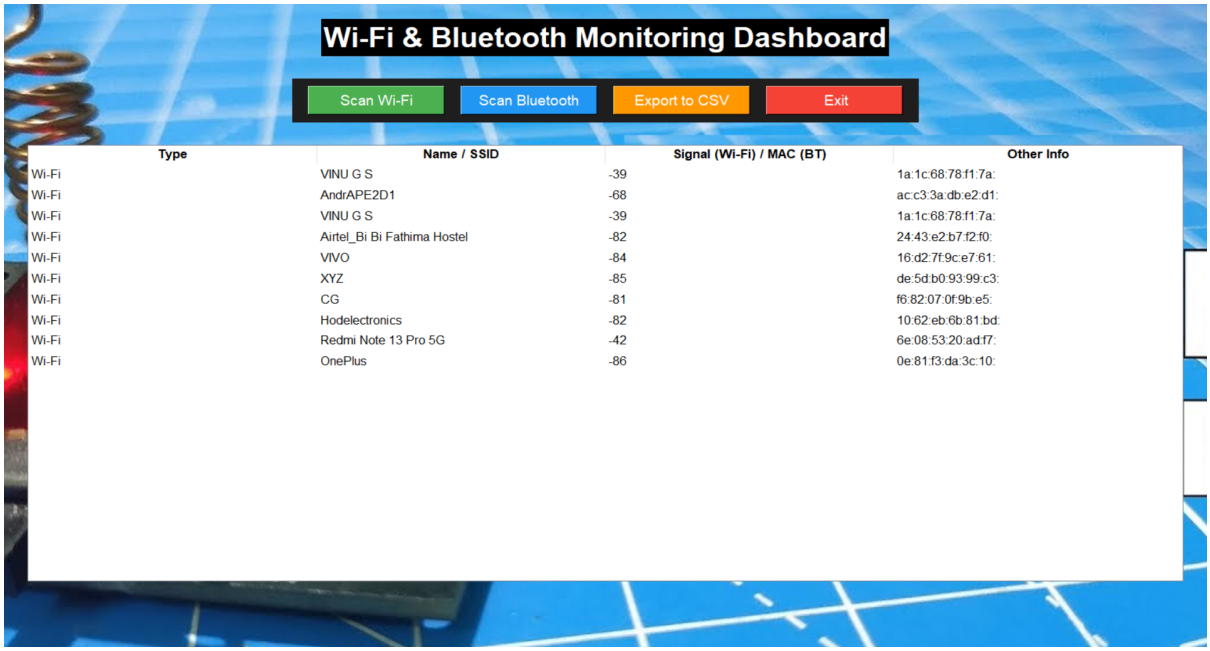



Figure 2: Simulation Toolkit




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Figure 3: Wifi & Bluetooth Monitoring

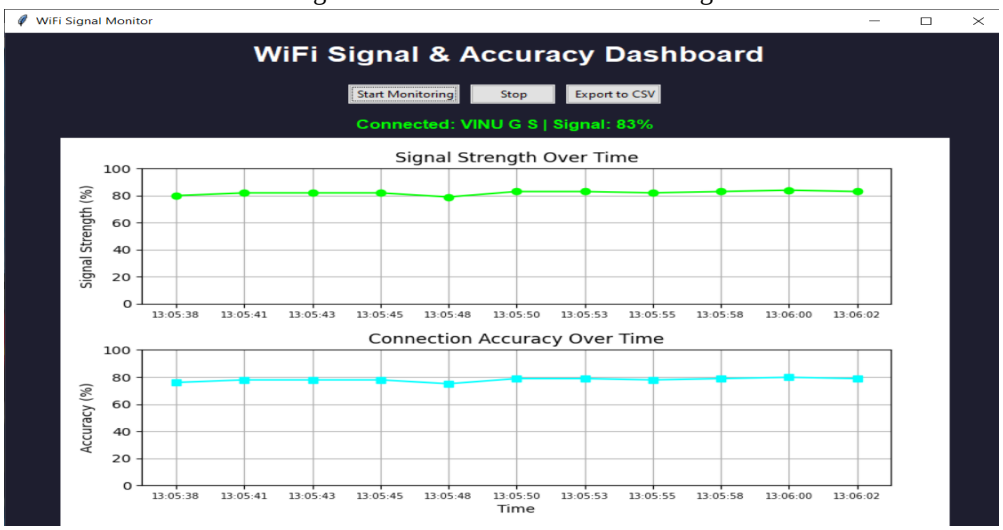
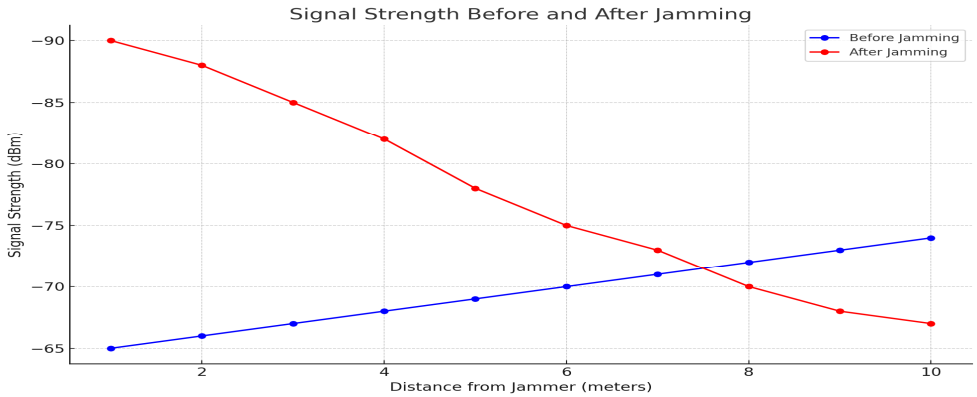



Figure 4: Signal Analysis




Graph 1: Signal strength before and after Jamming

## VII. CONCLUSION AND FUTURE WORKS

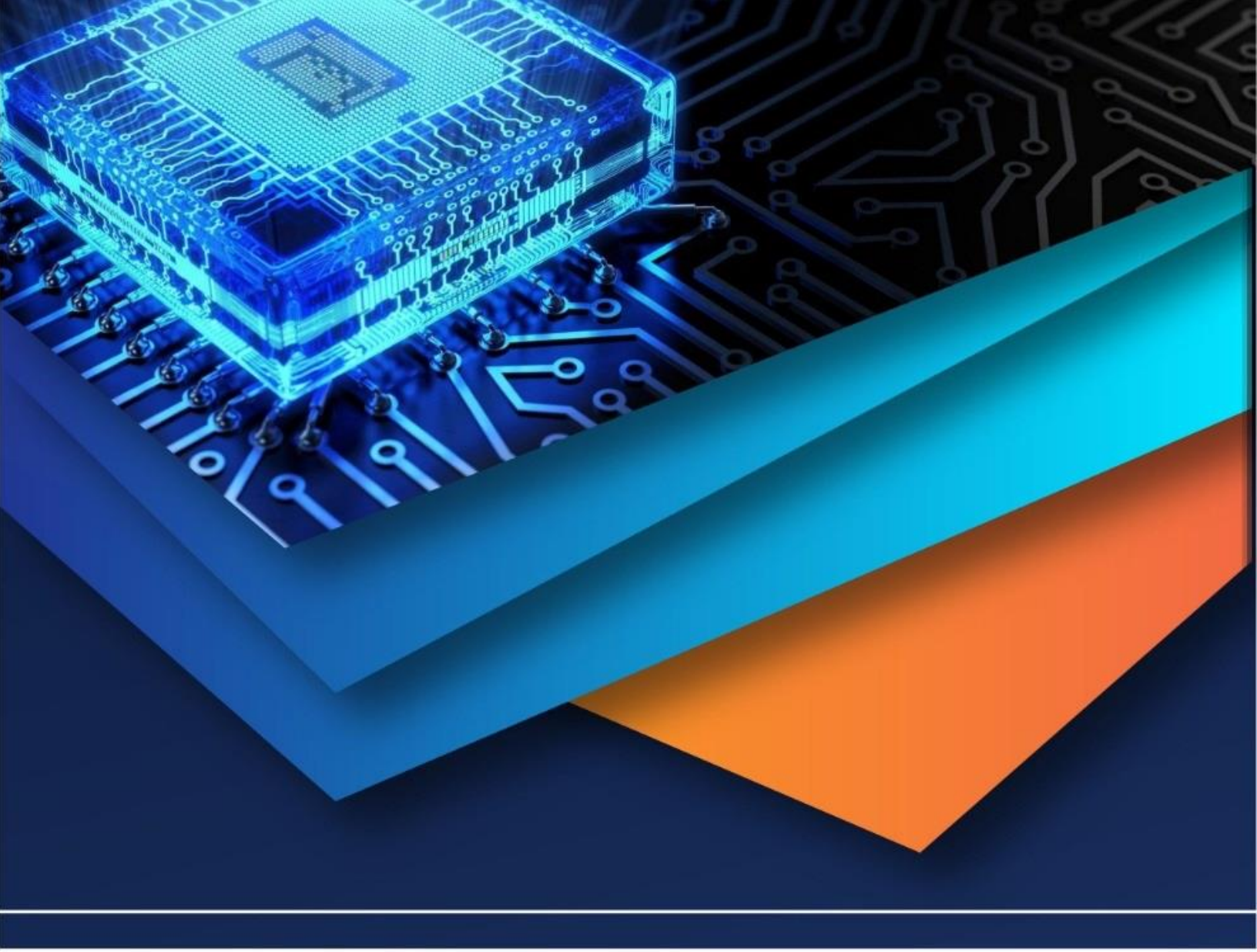
The integration of a mobile phone jammer in examination halls offers an effective solution to combat the rising concerns of academic dishonesty and electronic cheating. By actively blocking mobile signals (GSM, 3G, 4G, LTE) within a defined radius, the jammer ensures a distraction-free and fair environment for students during exams.

This system operates by transmitting radio frequency noise that interferes with communication between mobile phones and cell towers, effectively rendering mobile devices useless for calls, messaging, and data during the examination period. The compact and portable design allows easy deployment without permanent infrastructure changes.

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