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Design And Develop IOT Based Smart Device Detection System Using GSM

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Abstract—This project presents a novel system designed to enhance classroom learning environments by detecting cell phone usage. The system employs an ESP32 microcontroller, a GSM module, and a CA3130 IC to effectively identify the presence of cell phones within the classroom. The CA3130, a highly sensitive electromagnetic radiation detector, is capable of accurately sensing the signals emitted by cell phones, even when they are in silent or vibration mode. Upon detecting a cell phone, the ESP32 triggers the GSM module to send a text message to a designated authority, alerting them to the violation. This proactive approach offers a valuable solution to the pervasive issue of cell phone distractions in classrooms, fostering a more focused and engaging learning atmosphere for both students and teachers. The system's innovative design ensures its reliability and ease of implementation. The ESP32 microcontroller provides a versatile platform for con-trolling the system's functionality, while the GSM module enables real-time communication with designated authorities. The CA3130 IC, with its high sensitivity and accuracy, guarantees that even subtle cell phone signals can be detected. By combining these components into a cohesive system, this project of-fers a practical and effective means of addressing the challenge of cell phone distractions in educational settings.

Keywords— RF Detector Modules, ESP32 Microcontroller, GSM Module, CA3130 Op-Amp IC, Buzzer, SIM Card.

I. Introduction

The widespread use of cell phones has created challenges in environments where distractions should be minimized, such as classrooms and examination centers. Cell phones can disrupt the learning process, compromise the integrity of assessments, and create distractions for other students. This project presents the development of an IoT-based cell phone detection system designed to address these challenges. By utilizing an op-amp circuit and a GSM module, the system can detect the presence of cell phones and send alerts to administrators. The system aims to provide a proactive solution for maintaining a focused and distraction-free environment in designated areas. By detecting and alerting administrators about unauthorized cell phone use, the system can help to improve discipline and ensure the integrity of academic activities.

The Cell Phone Detection System aims to detect the presence of nearby mobile phones that are either making or receiving a call within a short range. The system will use two RF detector modules based on the CA3130 op-amp IC to detect the Radio Frequency (RF) signals generated by active mobile phones. When an active phone is detected, the system will trigger an alert via an ESP32 microcontroller, which will then send an SMS notification to the admin through a GSM module with a SIM card. The system will also activate a buzzer to provide an audible notification of detected mobile phones

II. Literature Survey

G.Preethi1, Patcha Hinduja,[1] Cell phones are widely used in the world. While people need to be connected to at least one another, there are situations or places where there usage is to be prohibited either thanks to security reasons or it's going to cause health hazards. Cell phone detection has been on investigation for an extended time. There are techniques which are formulated or proposed on how cell phones are often detected. Most of them use the features like sound system , RF system and customary materials of the phones and check out to seem into how they will be used as basis to detect mobile phones. This project utilizes the RF system of the telephone because the feature to be wont to detect its presence.

Taranjot Singh,[2] the work focuses on the evolution and design of a mobile phone detector, which is capable of detecting incoming and outgoing signals from mobile phones. This handy, pocket-size mobile transmission detector can sense the presence of an activated mobile phone from a distance of one-and-a-half meters. Due to this, it can be useful for preventing the use of mobile phones in examination halls, confidential rooms, petrol pumps, etc. Moreover, some illegal practises like spying, unauthorized video transmission can also be easily detected by this. The circuit can detect the incoming and outgoing calls, SMS and WhatsApp messages even if the mobile phone is kept in the do not disturb or silent mode.

Ayan Karajagi1, Rohit Lawand [3]Cell phones are broadly utilized within the world. Whereas individuals need to be associated to one another, there are circumstances or places where their utilization is to be disallowed either due to security reasons or it may cause wellbeing risks. These anticipated preferences, be that as it may, would have potential undesirable impacts on the off chance that mobile-phones are utilized in confined premises, such as exam scenes. Cell phone discovery has been on examination for a long time. There are procedures which have been defined or proposed on how cell phones can be identified. Most of them utilize the highlights such as sound framework, RF framework and common materials of the phones and attempt to see into how they can be utilized as premise to distinguish versatile phones.

Ajasa, A. A., Adenowo, A. A., Ogunlewe[4] This work involves the design and development of a digital signal detector which is capable of detecting incoming and outgoing signals from mobile phones. The presence of an activated mobile phone can be detected by this handy, pocket size mobile signal detector from a distance of one and a half meters, which could be used in preventing the use of mobile phones in examination halls, confidential rooms etc. It is also suitable for detecting the use of mobile phone for spying and unauthorized video transmission. The circuit can detect the incoming and outing calls, text messages, and video transmission even if the mobile is kept in the silent mode.

III.Objectives

- **Detect cell phone presence**: Utilize an op-amp circuit to detect the electromagnetic radiation emitted by cell phones.
- **Generate alerts:** Activate a buzzer and send SMS alerts to administrators when a cell phone is detected.
- **Integrate with IoT technology:** Leverage the GSM module for wireless communication and the Arduino platform for data processing.
- **Provide a user-friendly interface:** Develop a system that is easy to set up and use.
- Enhance discipline and focus: Improve the learning environment by minimizing distractions from cell phones.

IV. Methodology

This project focuses on the development of an IoT-based cell phone detection system. The system will be designed to Detect cell phone presence: Utilize an op-amp circuit to detect the electromagnetic radiation emitted by cell phones. Generate alerts Activate a buzzer and send SMS alerts to administrators when a cell phone is detected. Integrate with IoT technology: Leverage the GSM module for wireless communication and the Arduino platform for data processing. Provide a user-friendly interface: Develop a system that is easy to set up and use. Enhance discipline and focus: Improve the learning environment by minimizing distractions from cell phones.

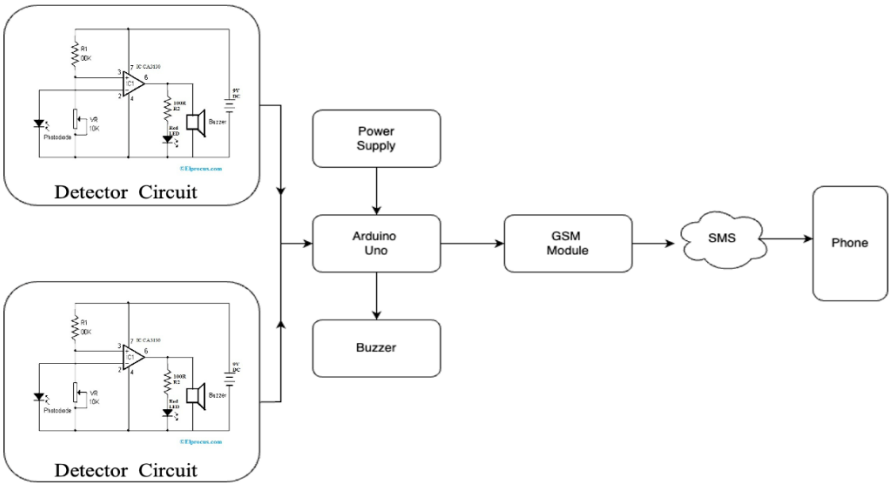

Fig.1 Block Diagram

A. Hardware Specification:

- **Op-amp IC 3130:** A high-gain operational amplifier used for signal amplification.
- **ESP32 Microcontroller:** Microcontroller for data processing and communication.

Fig.2 ESP32 Microcontroller

- **GSM module:** For sending SMS messages.

Fig.3 GSM Module

- **Buzzer:** Generates an audible alarm.
- **Power supply:** Provides power to the system.
- **PCB:** For prototyping and connecting components.
- **Jumper wires:** For connecting components on the breadboard.
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Fig.4 Jumper Wires

- **Resistors and capacitors:** For configuring the op-amp circuit.

Fig.5 Resistors and Capacitor

B. Software Specification:

- **ESP32 Microcontroller:** The ESP32 is a powerful, low cost microcontroller with built-in Wi-Fi and Bluetooth capabilities. It can be supported languages, frameworks and features commonly used in development.
- **GSM Library:** A pre-written collection of functions and routines that simplify the interaction between the Arduino Uno and the GSM module, providing a convenient interface for sending SMS messages.
- **Code:** A series of instructions written in the Arduino programming language that defines the behaviour of the system.

V. Result:

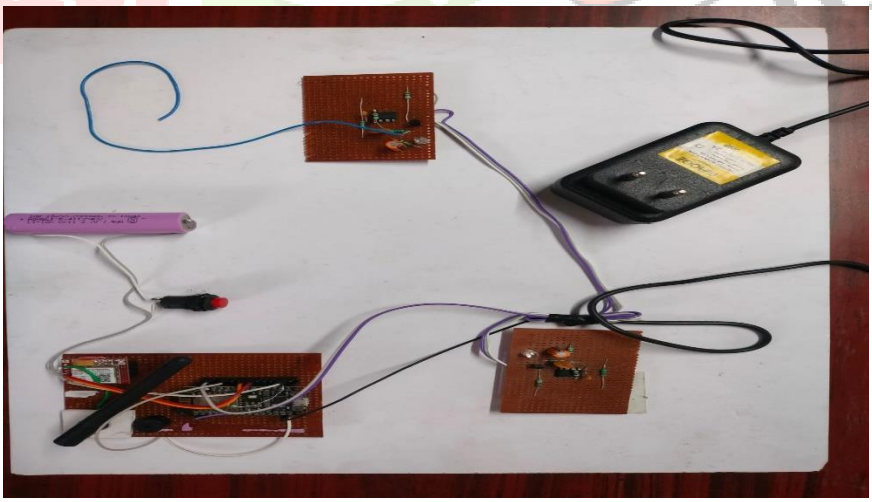

Fig.6 Project Model

Fig.7 Output of the Model

- **Power Supply**: The Arduino Uno and GSM module are powered on. The Arduino Uno initializes the GSM module and establishes a connection with the cellular network.
- **Cell Phone Detection:** The cell phone detection module continuously monitors for the presence of a cell phone. It uses the CA3130 IC to detect the electromagnetic radiation emitted by a cell phone.
- **Cell Phone Detected:** When a cell phone is detected, the module sends a signal to the Arduino Uno. The Arduino Uno processes the signal and verifies that it is indeed from a cell phone and not a false positive.
- **Message Transmission:** If the signal is confirmed to be from a cell phone, the Arduino Uno triggers the GSM module to send a pre-defined text message to a specified cell phone number. The GSM module sends the message over the cellular network to the recipient's device.
- **Possible Results:**
- **Successful Message Transmission:** The message is sent to the intended recipient, indicating that the cell phone detection module is working correctly and the GSM module can communicate with the cellular network.
- **Unsuccessful Message Transmission:** The message is not sent due to various reasons, such as network issues, incorrect GSM module configuration, or programming errors.

VI. Conclusion

The IoT-based cell phone detection system presented in this project offers a valuable solution for maintaining a focused and distraction-free environment in designated areas. By effectively detecting the presence of cell phones and generating alerts, the system can enhance discipline, improve academic performance, and ensure fairness. The integration of IoT technology enables remote monitoring and control, providing administrators with real-time information and the ability to take appropriate actions. While there may be concerns about privacy and potential false positives, the benefits of the system in terms of improving the learning environment and preventing disruptions outweigh these drawbacks. Future enhancements to the system could include exploring more advanced detection methods, integrating with other school management systems, and addressing privacy concerns through data encryption and anonymization. Overall, the IoT-based cell phone detection system demonstrates the potential of technology to improve educational environments and promote a more focused and productive learning atmosphere.

ACKNOWLEDGMENT

The preferred spelling of the word “acknowledgment” in America is without an “e” after the “g”. Avoid the stilted expression, “One of us (R. B. G.) thanks . . .” Instead, try “R. B. G. thanks”. Put applicable sponsor acknowledgments here; DO NOT place them on the first page of your paper or as a footnote.

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