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RF Tracking System for Assets Using IOT

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Abstract: ***Today's most well-known location tracking systems are GPS systems. These systems, on the other hand, are not capable of determining an entity's exact location within a building or on a certain floor or room. As a result, we propose a smart asset tracking system that enables for the tracking of things within a building or institution. To create this system, the proposed system makes use of rf technology as well as IOT. In addition, we are monitoring assets that are either ON or OFF, and we are implementing the asset control function using the IOT idea from anywhere on the planet. Using the ESP8266 module, the entire system data will be updated to the thing speak cloud.***

I. INTRODUCTION

Technology is rapidly evolving today, and it now supplies all essential and effective solutions to meet the needs. The issue of security is one of the most pressing concerns. In this scenario, an IOT Asset tracking system is being built to improve the protection of women, children, persons with mental illnesses, and any precious things by combining Radio Frequency and IoT technologies. Because crime is increasingly increasing around the world, one of the key concerns is safety. The safety and security of IOT Asset Tracking System is paramount. This system will aid in asset tracking and monitoring. The goal of the IoT Asset Tracking System is to follow the location of assets and deliver fast messages via Short Message Service, as well as make a phone call if it goes out of bounds. The main purpose is to maintain optimum security while also allowing tracking via current location. Microcontroller, GSM Module, WI-FI Module, Buzzer, LCD, RF transmitter & receiver, and Power supply are among the ATS components. The transmitter and receiver make up the Radio Frequency module. The transmitter is attached to the tracked object and transmits radio waves to the receiver. If the object being monitored moves out of the tracking frequency range, a message and a phone call will be issued to the designated guardians via the Global System for Mobile communication. Furthermore, the object's location can be tracked at any time via the Global Positioning System. Furthermore, the object's location can be tracked at any time via the Global Positioning System. Furthermore, sound and vibration sensors are employed to detect human behaviour such as loud voice and body movement. Messages are delivered to selected mobile numbers if the sensor reading exceeds the threshold value. The frequency range between transmitter and receiver, as well as the location of assets, are all factors to consider. Thing Speak, an open source IoT platform, is used to present the data. We can avoid malpractices and make assets safely using the offered process. Because crime is on the rise all across the world, one of the most pressing concerns is safety. The focus of the IOT Asset Tracking System is on safety and security. This technology will aid in the monitoring and tracking of asset locations. Today's quick technological advancements supply all necessary and effective solutions to requirements. Security is one of the most crucial topics of concern. In this scenario, an IOT Asset tracking system is being built to improve the protection of women, children, persons with mental illnesses, and any precious things by combining radio frequency technology with IOT.

II. LITERATURE SURVEY

People would be able to monitor and track the position of assets with the help of this system. Because crime is on the rise all across the world, one of the most pressing concerns is safety. Asset Management and Monitoring is a systematic approach to tracking and preserving key assets for any business entity or organisation. Human resources, moving assets like cranes and vehicle fleets, and non-moving assets like industrial equipment, raw materials, and finished commodities are all examples of human assets. A valuable asset could be as simple as a single gadget or as complex as a multi-sensor structure. These assets require electrical, mechanical, and hydraulicmaintenance in order to remain operational within a regulated framework.One of the first technologies used to track assets was the barcode. It's fairly efficient and dependable. A barcode is a series of black lines that run parallel to each other. They're quite cost-effective. It facilitates the encoding of data into barcode format, which can then be read by a bar code scanner or, more recently, a mobile phone. Typical identification numbers are complicated and must be unique. Manually entering them is inconvenient and time-consuming, but it is also an error-prone process. Scanning makes extracting information much easier and more precise.

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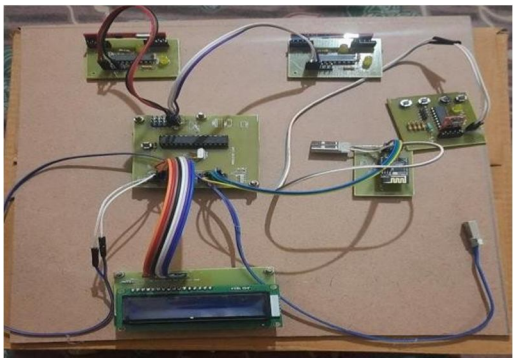

Fig 1 Assets Tracking System

III. PROPOSED METHODOLOGY

Asset Tracking and Its Importance One way to improve asset management quickly is to use Radio Frequency (RF) technology to automatically track assets. In a Radio Frequency Identification (RFID) asset tracking system, magnetic fields are employed to send data from an RF tag to a reader. The Radio Frequency module is made up of a transmitter and a receiver. The receiver receives radio waves from the transmitter, which is attached to the tracked object. If the monitored object goes out of the tracking frequency band, the chosen guardians will receive a message and a phone call via the Global System for Mobile communication. The location of the object can also be traced at any time using the Global Positioning System. The Internet of Things (IoT) is a critical component in the creation of a system that allows items to connect, communicate, and exchange data via the internet while being controlled and monitored remotely. There are numerous IoT platforms available. Thing Speak is an open-source Internet of Items programme that uses the HTTP protocol to store and retrieve data from things via the internet or over a local area network. IOT Thing Speak uses a widget on the phone to display all of the sensor data and location information.

IOT Asset Tracking System is implementedat two phases, namely,

- Tracking phase
- Monitoring phase.

A. Tracking Phase

The transmitter kit is kept with the tracked asset. The LCD display, sound sensor, vibration sensor, WIFI module, GSM module, and RF transmitter are all coupled to the core nano micro controller. When the system is turned on, the LCD screen reveals the device's appropriate operation. It also shows the asset's current condition. The data from the sensors is continuously read by the sound and vibration sensors. Calls and alarm messages indicating that the asset is in peril are sent to the designated cellphone numbers through GSM if the measured value exceeds the threshold value.

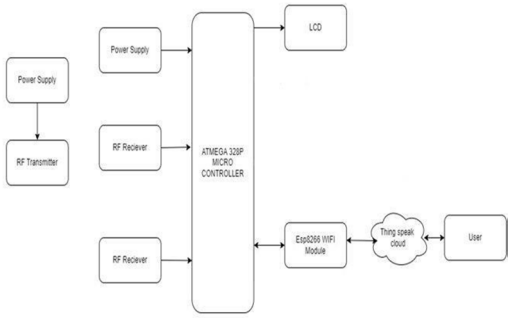

Fig 2 Block diagram of Assets TrackingSystem

By broadcasting radio signals, the RF transmitter modules in the transmitter phase communicate with the RF receiver module in the receiver phase. The maximum frequency range for the threshold is 433MHz. The signal strength between the transmitter and the receiver drops as the transmitter moves away from the receiver, and calls and alarm messages are sent to predefined cell numbers indicating that the asset has been lost. In addition, when the kit is detached, an alert message is issued.

B. Monitoring Phase

The receiver kit is in the possession of the person in charge of the asset. The LCD monitor, RF receiver module, and buzzer are all coupled to the core nano micro controller. When the distance between the transmitter and receiver exceeds the maximum threshold frequency range, as well as when the transmitter kit is removed, the LCD screen shows an alarm message stating that the asset has been lost. In addition, in such a case, a buzzer sound is emitted to indicate an alert. Thing Talk is a web-based open API IoT source information platform [04, 05, 06] that can store sensor data from a variety of "IoT applications" and display the sensed data in graphical form on the web. Thing speak communicates with the host microcontroller via an internet connection that acts as a 'data packet' carrier between the connected 'things' and the Thing speak cloud to retrieve, save/store, analyse, observe, and work on the sensed data from the connected sensor to the host microcontroller such as a 'Arduino, TI CC3200 module, Raspberry-pi,' and so on.

The Thing Speak aids in the formation of enthralling sensor-based logging applications, location/place tracing applications, and a'social network' of objects/things with updated status, or we can have control over 'Home automation' products that are connected to the public domain network (via Internet) from their point of origin. The word 'Channel,' which has a field for data, a field for location, and a field for status for various sensed data, is the most important component of Thing Talk functionality. Once the channels have been constructed in 'Thing speak,' the data can be implemented_ or the data may be processed and visualised using MATLAB, and the data can be responded to with tweets and other sorts of notifications.

Thing talk also has a feature that allows you to make a public based website. To engage the 'Things/Objects' in sensing the respective data and transmitting across the Internet, one must go beyond simply connecting data from a PC, objects to collect (sensors), and to do so, data must be network uploaded that are in the form of servers (that run applications), and such types are referred to as Cloud. The 'Cloud' employs graphical visualisation operations and is available in the form of a virtual server for users. Objects communicate with the cloud via possible 'wireless internet connections' available to users, with the majority of objects relying on sensors/actuators to provide information about our environmental analogue data. The Internet of Things (IoT) helps to connect everything and allows us to communicate with our own devices and more.

IV. RESULTS

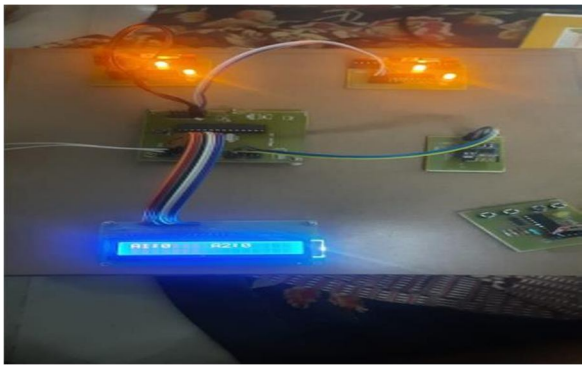

Fig: 3 Assets is not present

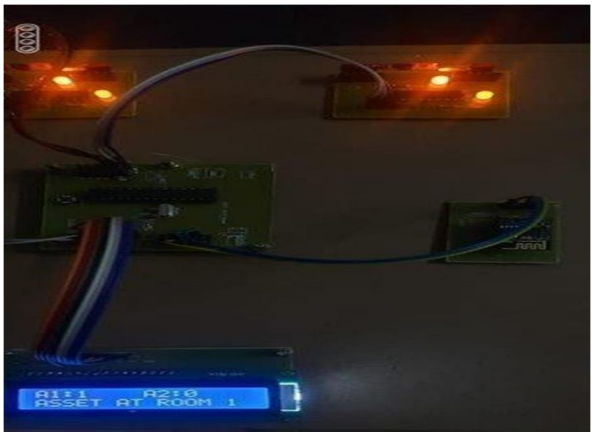

Fig: 4 Asset at room 2

Fig: 5 Asset at room 1

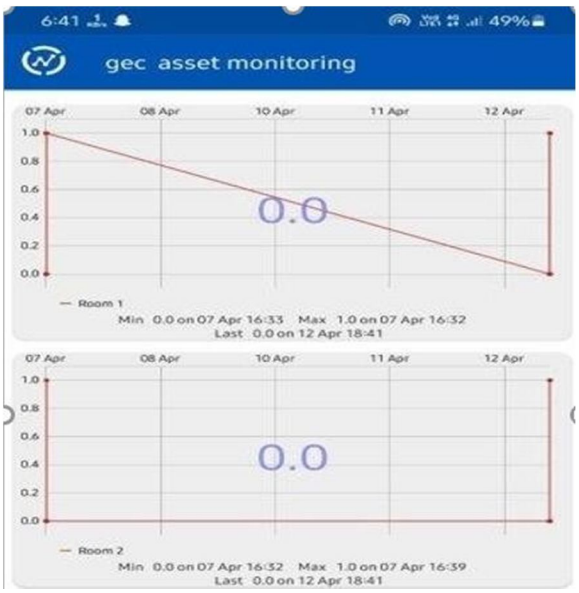

Fig: 6 Asset is not present

Fig: 7 Asset is at room 2

V. APPLICATIONS

1) Child Protection and Monitoring
2) System of Management
3) Vehicle tracking device
4) Human tracking in particular indoor and outdoor areas using RFID and GPS
5) Personal asset tracking with RFID

VI. FUTURE SCOPE

The suggested IOT Asset Tracking System was created to safeguard the safety and security of assets such as persons with mental illnesses, women, children, and other valuables. The employment of sensors that sense and alert, such as sound and vibration sensors, is a big benefit. The Internet of Things Asset Tracking System can be utilised for both personal and commercial purposes. IoT Asset Tracking System will play a significant role in our daily lives in the future. By expanding the memory of an EEPROM, it may store the previous navigation position for up to 256 locations. The cost of a GPS receiver can be increased to improve its accuracy. The kit's size can be lowered by combining GPS and GSM in a single module. The system may be expanded to track vehicles, and accidents can be spotted and reported to the owner, hospital, and police using high-sensitivity vibration sensors.

VII. CONCLUSION

The system employs radio frequency (RF) technology, which entails communicating via a wireless electromagnetic signal with a frequency range of 3 kHz to 300 GHz. RF modules are made up of two parts: an RF transmitter and an RF receiver. The transmitter is embedded in the item to be tracked, while the receiver is kept by the asset's owner or guardian. RF signals are used to communicate between the transmitter and receiver. When the transmitter is unable to communicate and transfer serial data to the receiver owing to a decrease in signal strength as it moves away from the receiver, GSM is used to send a message and make a phone call to the person who is monitoring the asset. The location of the object can be traced once the asset has left the frequency band. In the event of an emergency, the system also includes a sound and vibration sensor to detect human behaviour. The Internet of Things (IoT) is a critical component in the creation of a system that allows items to connect, communicate, and exchange data via the internet while being controlled and monitored remotely. There are numerous IoT platforms available. Thing Speak is an open-source Internet of Items programme that uses the HTTP protocol to store and retrieve data from things via the internet or over a local area network. IOT Thing Speak uses a widget on a smart phone to display all of the sensor data and location information.

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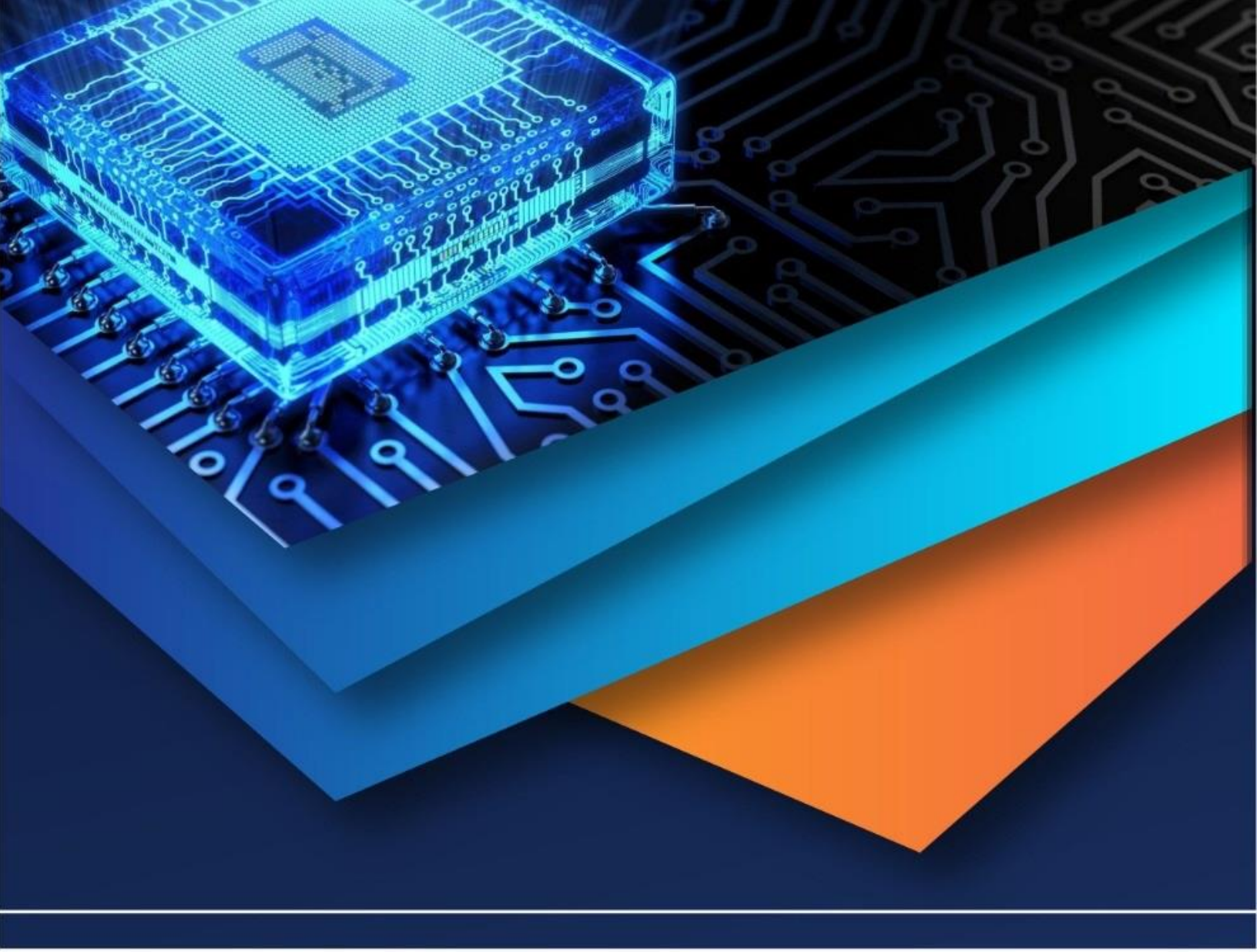

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