

A system for monitoring and alerting during prison escapes

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Abstract : A prisoner tracking system is proposed to identify prison break-ins and immediately notify authorities. It uses RF technology and two central monitoring devices to continuously monitor each prisoner. Each prisoner has a radio frequency tracker that wirelessly transmits a special prisoner code. The system then sends the prisoner's information to an online alerting portal system that can show alerts and play alarm sounds. Prison escapes pose a significant threat to public safety and the integrity of correctional facilities. To mitigate these risks, there is a growing need for advanced monitoring and alerting systems that can effectively detect and respond to prison escapes in real-time. This research paper presents a comprehensive system for monitoring and alerting during prison escapes, leveraging modern technologies such as video surveillance, biometric identification, and intelligent analytics. The proposed system aims to enhance the overall security measures of correctional facilities and facilitate prompt responses to escape incidents.

Keywords —IOT, Monitoring, prisoner, Tracking system, Technology, Escapes

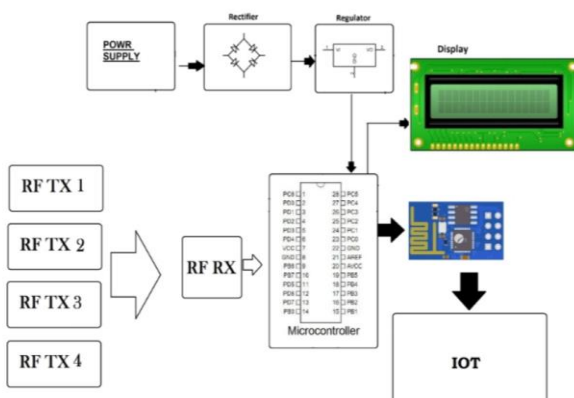
I. INTRODUCTION

Even though some people might find it surprising, jailbreaks do occur periodically. There isn't a definite number of jail breaks, but we've all heard about them and we still do on a global level. It is unsettling to think that there could still be convicts living among us. The essential point of this text is that if a prisoner tries to escape from custody, his or her movement can be immediately seen even if a presence hasn't been prearranged. in the room or space that they should be in. Although it may come as a shock to some, captive escapes are not at all unusual. There is no precise data count, but we have all heard and continue to hear of numerous captive escapes that have occurred. Poor internet access can be a problem in places with high population density and multi-storey buildings. It is unsettling to think that we may still be dealing with a comparable amount of issues. In order to detect confinement breakouts and imperceptibly warn authorities, we propose employing IOT. The system uses RF technology and grounded circuits on the microcontroller to do the operation. This will help to calm them down. The main drawback of Wi-Fi and Bluetooth devices is their shown order to send out an immediate warning and capture the prisoner before he runs even 50 metres from the institution, the system now sends the prisoner's information to the officers' alerting portal. Here, we utilise IOTGecko to create an online alerting portal system that can show alerts and play alarm sounds over the internet after receiving data from monitoring equipment range. In multi-storey buildings

and heavily populated places, poor internet access might be a concern So, utilising IOT, we suggest a prisoner tracking system that assists in identifying prison break-ins and immediately notifies authorities. The system employs RF technology to complete the task utilizing a microcontroller-based circuit. To identify each prisoner's presence on the property, we deploy RF trackers. The two central monitoring devices are utilized to continuously monitor each prisoner and scan through all detainees based on information given to them. Each prisoner is equipped with an RF tracker that wirelessly transmits a special prisoner code. The centralized system cannot receive a prisoner's code when they leave the institution. The receiver circuitry then gives the controller the go-ahead to take action against a specific prisoner. The primary goal of the project is to track inmate behaviour and mobility within the jail, as well as whether or not any odd conduct is endangering the security of the facility. Geo-fencing has been done for this reason, and laser technology is being employed to disprove any notion of escape. This project is built on gadgets for prison security and safety that use Bluetooth for internet connectivity, Wi-Fi for Internet communication, GPS for SMS communication, and GSM for SMS communication between higher authority and the jail alert system. They each have specific limitations imposed upon them. The amount of signal that Wi-Fi and Bluetooth devices may send and exchange is restricted. Additionally, prisons can be found in a variety of settings, including rural or densely populated areas with multi-storey buildings that hinder internet access and reduce efficiency. Structure of the

Project: To learn about their advantages and disadvantages in the market, a literature review was conducted while working on the project. Additionally, we have observed how these systems operate at the moment. Knowing the present system will make clear the areas that should be looked at to create an effective configuration, and then we will get to work on it. Additionally, we are familiar with the project and offer a new issue statement based on an overview of the systems that are presently in use, as well as future parts of the given project. As is well known, India's jail system is not as effective as it is in our films or in diplomatic discussions of politics. In the age of everything becoming digital, India is so conservative when it comes to security that the jail system has not been updated, and there is now no concern expressed over the upgrading of prison security. Because of this orthodox system situation, jail breakouts are becoming one of the most frequent occurrences in modern times. Prison escapes continue to occur, whether on a major or small scale, and there is no proof to support this at this time. The idea that inmates are prowling throughout our community is frightening in and of itself. We should work with the human and digital safety systems in order to solve this situation since we know that machines can be more precise than humans. As long as human power is there, we can overcome this situation.

The modern jail system needs certain improvements, namely a slight digitalization that would make it a more secure and dependable institution. The digital system that will be utilised may be made trustworthy so that it cannot be subject to a cyber assault, since there are those who seek to undermine the legitimacy of the government and others who want to help prisoners for their own reasons. There are more factors that may be employed to increase this system's security and dependability against cyber attacks.



In order to help identify prison break-ins and alert authorities right away, we propose an IOT-based prisoner tracking system. The system employs rf technology and a microcontroller-based circuit to carry out its function. We use RF trackers to detect each prisoner's presence on the site. Based on information provided to them, the two central monitoring devices are used to continually monitor each

prisoner and search through all of the inmates. A radio frequency tracker that wirelessly broadcasts a unique prisoner code has been implanted on each prisoner. When a prisoner leaves the facility, the central system cannot receive their code. The controller is then given permission to take action against a particular prisoner via the receiver circuitry. The technology now transmits the prisoner's details to the officers' alerting portal so that an immediate warning may be sent out and the prisoner can be apprehended before he runs even 50 yards from the institution. Here, we use IOTGecko to build an online alerting portal system that, upon receiving data from monitoring equipment, may display alerts and play alarm sounds via the internet.

II. LITERATURE REVIEW

Many academics have been interested in the real-time tracking and management of cars, and a lot of study has been done on tracking systems. Numerous anti-theft devices, including steering wheel locks, network tracking systems, and conventional electronic alarms, have recently been created. They also include client identification and real-time performance tracking.

- Author: HOD Vaishali Rane, Harshada Vijay Gawde, Himanshu Sudhakar Kushwaha, Niragi Mahesh Masalia , Everyone is aware that India's prison system is not up to par with what we see in the movies. Knowing that the jail system is quite traditional in a nation as technologically advanced as India is rather astonishing. Therefore, jailbreaks are both highly common and most prevalent in such a traditional system. There is no such figure, yet jail breaks do occur, whether they are major or little. Even just the idea of these convicts still being free to wander within us is really terrifying. The correctional system of today has to be modified so that convicts are guarded less by humans and more by technology. It can be trusted that the digital system being utilised won't be vulnerable to a cyber attack. The effectiveness of this system against cyber attacks may be improved in a number of additional ways.

- El-Medany, W.; Al-Omary, et al.'s work discusses a real-time tracking system that offers precise localizations of the tracked vehicle at a reasonable price. For implementation, a GM862 cellular quad band module is employed. To observe a vehicle's accurate location on a particular map, Microsoft SQL Server 2003 and ASP.net were also used to construct a monitoring server and graphical user interface on a website. The certificate also gives details about the condition of the car, such its speed and mileage. Using GSM and GPS, Hu Jian-ming, Li Jie, and Li Guang-Hui describe an automotive anti-theft system. The system uses a high-speed mixed-type single-chip C8051F120, and a vibration sensor is used to identify stolen vehicles. For the safety and dependability of the car, the system keeps in touch with the owner via the GSM module.

Global Positioning System/Global System for Mobile Communications (GPS/GSM) based Vehicle Tracking and Alert System development and implementation are discussed by Fleischer, P.B. Nelson, et al. This technology offers protection against armed robberies and accident occurrences while enabling intercity transportation businesses to track their cars in real-time.

- Author : Neha Yadav, Pankaj Bhardwaj, Monika Chauhan, Mehak Ali. In the contemporary environment, it is simple to locate surveillance systems to deter robberies at public locations like banks, shopping centres, and homes. The existing jail security measures in India are widely known. Currently, CCTV drones, and guards are employed to keep an eye on jail operations. However, to keep a watch on such offenders and guarantee that these convicts have no possibility of escape, current surveillance technologies are insufficient. Since contemporary security systems have several issues. Inadequate video signal, no DVR recording, noisy camera footage, flickering, horizontal lines appearing on movies, deteriorated night time vision, triggering and irritating false alarms, bright spots on the display, etc. are some of the issues with these CCTVs that have been discovered. Because of these issues, jails may become very chaotic, prisoners may have a possibility to escape, and the adoption of these approaches is often more expensive. This demonstrates that there is a need for a security system that is affordable to deploy and can offer Indian jails a reliable monitoring option. Numerous systems that often employ IOT, Bluetooth, GSM, and GPS have been developed in the past to satisfy this requirement, however they are unstable and susceptible to cyber attacks. Through this paper, we were able to generate the concept for a cutting-edge, dependable solution to this issue. Our technology aims to construct a secure jail environment that will track inmates' and visitors' movements and get beyond the drawbacks of security modules already on the market.
- GPS based Handcuffs System (using PIC 18f4550 and GSM). The primary goal of this research is to utilise GSM and GPS to suggest a correctional monitoring system free of human mistake. Typically, when a suspected individual is not permitted to leave a specific geographic region, the police and other law enforcement officials must monitor their movements. In the situation, it is challenging to continuously monitor the suspect's activities. To avoid incidents of escape through an underground tunnel or by hiding behind an opaque item, it is also important to monitor the actions of a large number of prisoners. Therefore, a system that permits the prisoner to roam around in a specific area that is guarded by an RF wireless system was created specifically for these kinds of circumstances. The technology identifies that no signal is being received at

the receiver side from the transmitter situated in the jail as soon as the convict crosses the boundary of the designated region. When a prisoner escapes from the jail, an alert signal is transmitted. GPS pinpoints the detainee's precise position and notifies the relevant authorities.

IoT based Prisoner Escape Alert and Prevention System:

In order to keep an eye on inmates moving illegally towards the outer wall with the purpose of escaping from jail, the prison now employs a few security personnel and has a surveillance camera. Prisoners may readily sabotage these attempts to persuade the officials to change their viewpoints. Inmates take advantage of this chance to escape from custody. Techniques like installing pressure sensors in the perimeter wall, using drones, CCTV monitoring with image processing-based solutions, and more are available to control this undesired scenario. The use of these procedures is expensive and does not reveal the prisoner's precise location. So, in this study, an IOT-based prisoner escape detection system has been presented. Two methods were covered in this study: The first solution uses a laser and GSM module to detect intrusions close to the perimeter wall. The second option uses geo-fencing. A wearable, non-detachable component with GPS, GSM, and a microcontroller would be provided to each prisoner. Jail perimeter walls are geo-fenced and any effort to cross them will trigger warning systems and a series of repeated phone calls to the jail administration. Latitude and longitude data may be used to track the prisoner's physical position even while he is not within the facility. Battery life is the main issue in deploying this module. The battery would be depleted since the gadget retrieves latitude and longitude data rather often. Battery life is the module. The battery would be depleted since the gadget retrieves latitude and longitude data rather often. The wearable gadget can therefore be powered by solar energy, kinetic energy, wireless charging, etc.

III. METHODOLOGY

Our two types of OSF systems allow us to either install a detecting system on a moving item or to create a zone and alert a stationary object when movement is detected. In a similar vein, there are two different types of prison break prevention, monitoring, and alerting systems:

1. The module primarily consists of a wearable gadget that is non-detachable, that may be mounted anywhere on the prisoner's body or clothing, and that is designed to mount a moving object detecting device. A Microcontroller, RF Module, GPS, GSM, and other motion-detecting sensors are typically utilized in this device. These components convey data to the receiver side so that they may determine the status of the prisoner or other moving item. These sensors use data signals to provide information to the receiver. The microcontroller is connected to these modules and sensors. The

microcontroller collects the data from the sensors that are on moving objects, and then does further analysis to draw out information from the raw data obtained from the prisoner. Following this processing, the data is sent to the receiving terminal, which now displays the prisoner status.

2. The second module is essentially a control room that includes gadgets like a Microcontroller, LCD, RF Module, Laser, Alarm, and Geo-fencing, which is based on second type and will generate and transfer data to stationary objects. A virtual fence is created to track activity close to the prison's perimeter, and an LCD is utilized to show the data the transmitter section transmits. If the device notices that the prisoner has moved away from the designated area, an alert signal will be sent to the police or higher authorities, who will use it to calculate the coordinates of the real-time location and find and apprehend the offender. It will be simple to track the system by utilising both modules.

The model of the work flow as depicted in Figure. The model has the ability to detect jail, so if something strange were to occur inside of a prison like a prison break system, it would monitor it and alert the authorities via an app on a mobile device, along with a buzzer that would sound and an LCD 16x2 that would display a message. This will occur when the resistor, capacitor, and diode transfer more value than the threshold value, which will occur under specific circumstances when a specific individual is not there. Then the achieved threshold value will start all the alarm systems, informing the authorities so that the jail system can be readily monitored.

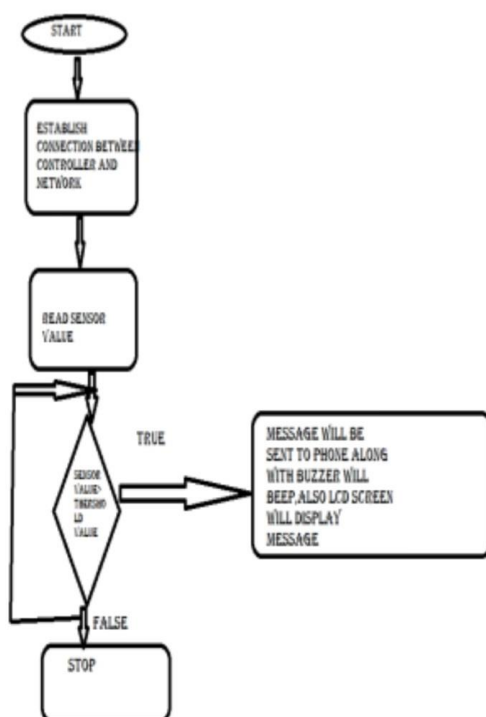


Figure:- Flow Chart Describing the Workflow

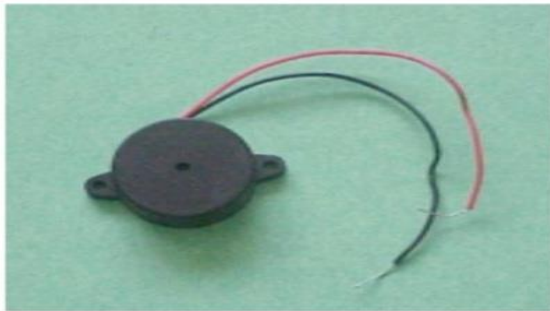
A resistor, four diodes, a capacitor, a transformer, and an at mega controller are used in this to create a value greater than the threshold by detecting the absence of the sensor. This 16x2 LCD screen, buzzer, and mobile messaging system are included for display.

LCD module:-

1. We use an LCD module to show interactive messages. We look at a two-line, 16-character intelligent LCD display that is connected to the controllers.
2. The display's handshake protocol is as shown. The data lines are D0 through D7th bit, the control lines are RS, RW, and EN, and the remaining supply pins are +5V, -5V, and GND.
3. RS stands for Register Select, RW for Read Write, and EN for Enable. The display has two internal bytes-wide registers: a command register (RS=0) and a character register (RS=1).
4. Additionally, it has a user-programmable RAM space called the "character RAM" that can be set up to create any character that can be created using a dot matrix.
5. The display RAM address 00h will be selected by using the hex command byte 80 to differentiate between these two data sections.
6. The command or data type is provided by port 1, and the register select and read/write levels are provided by ports 3.2 to 3.4. The functions shown on the display are completed in varied times. To make sure the display is overwritten, LCD bit 7 is checked for logic high (busy).
7. The LCD, often known as a liquid crystal display, is particularly useful for debugging and for providing user interface. The HITACHI 44780 is the most popular model of LCD controller and offers a straightforward interface between the controller and an LCD. These LCDs are both reasonably priced and have a very straightforward controller interface.



Beeper: A beeper, often known as a buzzer, is a mechanical, electromechanical, or electronic auditory signalling device. Buzzers and beepers are frequently used for alerts, timers, and user input confirmation, such as mouse clicks and keystrokes.



In simple words it makes us alert by notifying about wrong happenings.

IV. RESULTS AND CONCLUSION

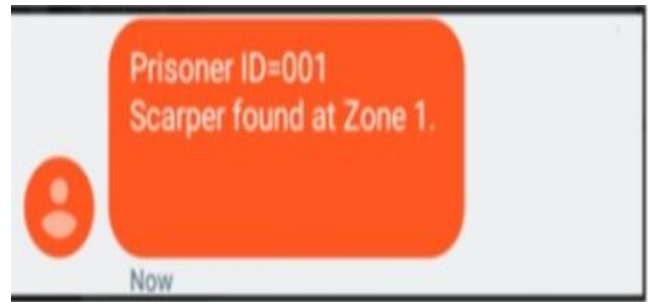
It is suggested to use an IoT-based alerting system that functions as real-time equipment and displays real-time status utilising an Arduino compiler, an RF transistor, and a Microcontroller. Arduino is the compiler used when programming using sensors. The project system of this system includes RFID Technology, which would change the sound. If a prisoner tries to escape, the device will alert the authorities with a message and a changing sound. Using this module method makes it simpler to determine the detainees' longitude and latitude.

So, utilising IOT, we provide a prisoner tracking system that aids in the detection of prison break-ins and immediately alerts authorities. The system employs RF technology to complete the task utilising a microcontroller-based circuit. RF trackers are placed on each prisoner to detect their presence on the property or, as we might say, in a certain region. If they are not present, a signal is issued.

The two central monitoring units are employed to continuously monitor each prisoner and scan through all of the detainees based on information given to them. Each prisoner is equipped with an RF tracker that wirelessly transmits a special prisoner code.

The centralised system cannot receive a prisoner's code when they leave the institution. When the receiver circuitry receives the signal at that point, It will give the controller the go-ahead to act right away against the specific prisoner from whom the signal was received.

The system now sends the prisoner's information to the officers or higher authorities who are on duty for monitoring.



This alerting portal enables the officers to send out an immediate alert and apprehend the prisoner before he escapes even 50 metres from the facility or the lockup, where it will be impossible to apprehend him. Here, we're going to utilise IOT Gecko to create an online alerting portal system that will take input from monitoring devices, display alerts and sound alarms over the internet, as well as show messages on LCD screens and send messages to mobile devices.

V. FUTURE SCOPE

Integration with cutting-edge technologies: To recognise anomalous patterns or behaviours of prisoners, the system may be combined with cutting-edge technologies like AI and machine learning algorithms. This can assist in spotting any escape attempts and notifying the appropriate authorities.

Real-time tracking: To follow convicts' movements in real-time, the system can be fitted with sensors and GPS tracking gadgets. This can aid in finding an escaped prisoner swiftly and averting damage.

Biometric identification: To detect escapees, the system can use biometric identification methods like facial recognition or fingerprint scanning. This can aid in reducing false alerts and enhancing the system's precision.

Infrastructure hosted in the cloud: The system is capable of hosting an infrastructure in the cloud, enabling remote access and real-time upgrades. This can speed up reaction times in the event of an escape by enabling authorities to concurrently monitor many sites.

Mobile application: The system might support the creation of a mobile application that would enable authorised workers to get notifications and updates on their cellphones. This might aid in enhancing departmental collaboration and communication.

If this system is ever put into use, nanotechnology can be used to make the transmitter smaller enough that it fits on a single chip. This chip may be hidden anywhere on the prisoner's clothing without the prisoner knowing about it. Even a GPS system may be attached to the chip to facilitate tracking.

A system for tracking and warning when inmates escape has a bright future ahead of it, with the ability to increase prison security and avert deadly situations.

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