

A REVIEW ON PRISON BREAK MONITORING AND ALERTING SYSTEM

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ABSTRACT

In the present scenario we can easily find surveillance systems to safeguard public places such as banks, shopping malls, homes, etc. from robbers. People are well acquainted with current security systems of the Indian jails. Currently CCTVs, drones and guards are used to monitor the activities of the jail. But these surveillance systems are not sufficient to supervise such criminals and ensure that there is no chance of the escaping of these prisoners. As there are many problems with the modern security systems. Some of the detected issues with these CCTVs are deteriorated images at night, noisy camera footage, flickering videos, displaying horizontal lines on videos, getting no video signal, no recording by DVR, starting and annoying false alarms, bright spots on the monitor, etc. These troubles can create much chaos in the jails and prisoner can get a chance to flee as well as deployment of these techniques is quite costlier. This shows that there is a demand of such a secure system that is economical to use and can provide satisfactory surveillance solution to the Indian jails. Many systems have been introduced earlier to fulfill this demand that generally use Iot, Bluetooth, GSM, GPS but these systems are not steady and can be affected by cyber-attacks. Through this paper we came-up with an idea to design an advanced and reliable fix for this problem statement. The aspiration of our device is to implement an intact environment in the prison that supervise the motion of the prisoners and the outsiders and overcome the limitations of the security modules available in the market.

KEYWORDS — Prison Break Monitoring and Alerting System, Arduino, Prison Safety, GPS, GSM, Wearable device, Main Controlling Unit, Prisoner location, GSM mobile communication, SMS based, Prisoner tracking, Accelerometer, Security.

I. INTRODUCTION

This paper targets on the condition that if the prisoner tries to escape from the jail his/her movement can be detected as soon as his/her presence is not been found in the cell or the area he/she is supposed to be in. Geo-fencing has been done and Laser is used to fail the idea of escaping.

This paper gives a review on various Prison Security and Safety devices that are based on Wi-Fi, Bluetooth for Internet as communication mode, GPS and GSM for SMS as communication mode. But both of these systems have their own restrictions. Wi-Fi and Bluetooth devices have a primary flaw of limited range. Poor internet connectivity can be an issue in densely populated areas and multistory buildings.

Organization of the paper: This paper is branched into five sections- Section 1 illustrates the literature survey depicting about existing modules in the market and their pros and cons. Section 2 interprets the functioning of these currently available systems. Section 3 clarifies the points that should be examined to design an efficient setup. Whereas Section 4 concludes the paper and proposes a new problem statement based on the overlook of the currently used systems and Section 5 outlines the future aspects of the strive.

II. LITERATURE SURVEY

A. IoT Prison Break Alerting and Monitoring System (P-BAS). [1]

This paper presents the problem statement of making a digitally sound and useful system to alert the authorities in case of prison break and to monitor the inmates using IOT. This device aims to monitor the activities of the inmates on regular basis and detect their location and also the change in location of the prisoners through radio frequency and send the alert signal to the concerned department of the police if there is any case of prison break. The device comprises of Arduino and a radio frequency (RF) module. The main portal of the officer is designed using IoTGecko. The RF module is installed on each inmate that continuously tracks their location. Once the inmate is out of his/her validated location an alert signal is sent on the portal of the officer and also throughout the jail aiming to alert about the jailbreak.

B. IoT based Prisoner Escape Alert and Prevention System. [2]

This paper proposes an IoT based inmate detection technique that works on two main approaches: i) Light source based approach using Laser and GSM module to detect the movement near the boundary wall, ii) Geo-fencing based approach in which each prisoner will be provided with a wearable and non-detachable device that consists of GPS, GSM and Microcontroller. Geo-fencing will be done on the coordinates of the Jail's perimeter wall so that if somebody tries to reach the wall an alert signal would be broadcasted through repeated phone calls. In-case the inmate runs away from the jail then the physical location of his/her is tracked with the help of latitude and longitude of the location. The main challenge of this device was the shortage of the battery life.

C. Prison Monitoring using IBEACON and Arduino Microcontroller.[3]

This project monitors the activities of the prisoner in the prison with the help of Arduino and heart beat sensor. Ibeacon or GPS notifies and find outs the current location of the prisoner and maintains a record of the details. Ibeacon is generally used in many devices such as patient monitoring, store navigation and disaster recovery. The proof of the inmate obtained is transmitted to the validated user and the location is evaluated by calculating the speed and time of the person who crossed the road. Whereas heart beat sensor and ibeacon is installed on the prisoner's hand to monitor them to check that prisoner's location and health status is transmitted on the receiver side. The position of the Bluetooth transmitter signal level at a certain point is stored at the base stations.

D. GPS based Hadcuffs System (using PIC 18f4550 and GSM). [4]

The main aim of this project is to propose a surveillance system for the jails without any error caused by human with the help of GSM and GPS. Generally the police and law enforcement authorities need to supervise the movement of the suspicious person or when he/she is not allowed to roam out of a limited geographical area. In that case it is difficult to constantly watch the activities of the suspect. Even it is matter of concern to track the activities of a huge number of inmates and supervise each one to prevent the cases of escaping from an underground tunnel or by hiding behind an opaque object. So for such kind of conditions this system is designed which allows the prisoner to move in a particular area which is secured by RF wireless system. As soon as the inmate crosses the border of the specified area, the system detects that no signal is being received at the receiver side from the transmitter installed in the jail. An alert signal is broadcasted indicating the prison has escaped from the prison. GPS tracks the exact location of the inmate and sends to the concerned authorities.

E. A High Security Prison Management System Implementation Using RFID CARD. [5]

This paper proposes a solution to track the inmate going out of a specific boundary. It enables the security officers to keep a check on the activities of the prisoners with the help of RFID (Radio Frequency Identification) technology. This system is cost-effective and efficient which makes it reasonable. The system consists of a GSM and GPS module to trace the current location of the inmate. To ensure a reliable and secure system an encoded login is assigned which can be only used and explored by the intended officers. This system allocates a unique ID to every inmate residing in the prison to access the information about him/her. The system keeps a record of every legal procedures of the accused from the time of his imprisonment to release, etc. The system is efficient

in reaching the of reaching the remote outlying police stations and police stations and central prisons, so that important information can be shared like criminal history, FIR details of the culprits, etc. Whenever a prisoner tries to escape from the jail an alert message is send to the stations, coming under the control of the system.

III. HOW THESE DEVICES OPERATE?

Prison Break Prevention, Monitoring and Alerting Systems generally work on two modules: i) the first module is mainly a wearable device that is non-detachable and that can be installed anywhere on the prisoner's body or clothes. This device generally comprises of a Microcontroller, RF Module, GPS, GSM and various other sensors that send the data to the receiver side to know the status of the prisoner. These sensors send information to the receiver in the form of Data → Logic → Output. These sensors and modules are interfaced with the microcontroller. The microcontroller gathers the data fetched by the sensors from the environment and further analytics is done to extract information from the raw data. After this processing the information is transmitted to the receiver terminal. ii) The second module is primarily a control room that consists of a Microcontroller, Display unit (LCD), RF Module, Laser, Alarm, and Geo-fencing. A virtual fence is formed to monitor the movement near the boundary of the prison and LCD is used to display the information transmitted by the transmitter section. If the device detects any change in location of the inmate then an alert signal will be sent to the police officers to find and catch the culprit by calculating the coordinates of the real-time location.

IV. KEY POINTS TO BE CONSIDERED IN DESIGNING THIS DEVICE

It is significant to know the points that can be implemented to design a reliable and secure device.

a. Non-Removable

As module (i) is mainly constructed as a wearable so it is to be concerned that the device is not detachable. In case any how the inmate becomes successful in removing the device then the system will be of no use. So, the device should be designed in such a way that once it is installed it cannot be removed by anyone other than the person who installed it before.

b. Battery Life

These devices need ample battery to function. The performance of the device is somehow dependent on the battery life of the device.

c. Geo-fencing

It is an additional benefit to insure safety in the prison premises. As a virtual borderline is fixed to indicate the unwanted motion of the prisoners and sends an alert..

d. Range

Wi-Fi modules have a fixed range of operation and have more or less connectivity issues. They are suitable for near adjacency as long range communication can be insecure and unreliable.

e. Alerts and Notifications

Notification and Alert settings may differ in different types of GPS modules. Many GPS devices provide high speed location update while some take few minutes to show the location update.

f. Reliable Control Unit

It is a critical matter of concern to have a sound and secure control room. As it is the hub of various details related to the personal information. In-case of any exposure of these particulars it may result in providing a help to any mate of the culprit to plan his/her escape. So this part needs to be kept in a highly riskless zone to prevent it from any cyber-attack or any physical attempt to hamper the work of the system.

V. CONCLUSION

This paper asserts the review on distinct prison break prevention, monitoring and alerting systems.

Intrinsically, this paper explains the varied systems available for prison safety and security. Elemental prison safety and security systems constitutes of a Microcontroller, GSM, GPS, RF Module, Geo-fencing, Laser and sensors to track the real-time location of the prisoner to prevent prison breaks. There are major concerns that need to be corrected like limited range of the devices, battery backup, cost and reliability of the system.

VI. FUTURE ASPECTS

The issues with the previously existing system that this paper reviewed are mainly the range restriction of the Wi-Fi based systems. The devices that currently available in the market are not so economical and dependable in the long run. The matter of concern is the power life of the wearable device and the possibilities of cyber-attacks to fetch information from the culprit's database. So for implementing a guarded and satisfactory system these two problems need to be resolved.

REFERENCES

- [1]. Vaishali Rane, Harshada Vijay Gawde, Himanshu Sudhakar Kushwaha, Niragi Mahesh Masalia, Twinkle Rajesh Panchal, "IOT Prison Break Alerting and Monitoring System (P-BAS)"; Pramana Research Journal; ISSN: 2249-2976;|Volume-9 Issue-2 2019
- [2]. Dr. J.Cynthia, C.Bharathi Priya, Dr. Nageswara Guptha M; "IoT based Prisoner Escape Alert and Prevention System"; International Journal of Pure and Applied Mathematics; ISSN: 1314-3395; |Volume 120 No.6 2018, 11543-11554
- [3]. S. Abraar, S. Banuselvi, B. Kowsalya; "Prison Monitoring IBEACON and Arduino Microcontroller"; IJSDR1803026 International Journal of Scientific Development and Research (IJSDR); ISSN: 2455-2631; March 2018 IJSDR | Volume 3, Issue-3
- [4]. Ashish Baghel, Rushin Deshmukh, Vivek Kausadikar, "GPS based Hadcuffs System(using PIC 18f4550 and GSM)"; International Journal for Scientific Research & Development (IJSRD); ISSN:2321-0613 | Volume 5, Issue-4, 2017
- [5]. Anu PS, Shibu V, Jabir K V T, Preetha Mathew, "A High Security Prison Management System Implementation Using RFID CARD"; Anu PS et al, Int.J. Computer Technology & Applications(IJCTA); ISSN: 2229-6093 | Volume 6(1), 89-92
- [6]. K.V.S.S.S. Salram, N. Gunasekaran, and S. Rama Reddy, "Bluetooth in Wireless Communication"; IEEE Communications Magazine, June 2002, pp. 90-96.
- [7]. Pooja, Sneha ,Neha, "Monitoring System for Prisoner with GPS using Wireless Sensor Network (WSN)", IJCA; | Volume 91 No.13, April 2014.
- [8]. Badri Nath, Franklin Reynolds, Roy Want, "RFID Technology and Applications," IEEE CS and IEEE ComSoc, Vol. 5, No. 1, 2006, pp. 22-24.
- [9]. Pankaj Verma; J. S. Bhatia, "Design and Development of GPS-GSM Based Tracking System with Google Map Based Monitoring" International Journal of Computer Science, Engineering and Applications (IJCSEA) Vol. 3, No. 3, June 2013.
- [10].El-Medany ;Al- Omary ; Al-Hakim, "A cost Effective Real Time Tracking System Prototype Using integrated GPS/GSM Module", Wireless and mobile Communications (ICWMC),2010 , 6th International conference .Sept 10. International Journal of Computer science, Engineering and Application (IJCSEA) vol.3, no. 3, June 2013.