

# GSM and ADHAR based safety management system through Smart Poles: A step towards safety for humanistic Society (Women)

Sourav Kumar Pradhan<sup>1</sup>, Vivi Holo<sup>2</sup>, Shanti Bhusan Acharya<sup>3</sup>

<sup>1,2</sup> M. Planning (Urban), 2nd Year, Lovely Professional University, Phagwara, Punjab

<sup>3</sup>Associate Engineer, Qualcomm India Pvt. Ltd, Bangalore/ Former student, NIT Warangal

\*\*\*

**Abstract** - The past decade has been a tumultuous one with having civil wars, robbery, rapes, murder, harassment, molestation, dowry killing, eve teasing etc have put pressure on the quality of life around the world as well as in India. The country India, is becoming unsafe for human society in all aspects. The crime rates are increasing rapidly day by day in hourly basis. In India, the crime rates against women are growing at a higher rate with 6.4% growth rate. School going children, higher level students, the employed women, urban poor as well as pedestrianised are feeling unsafe due to increasing crime like; gang rapes, kidnaping, organ transplant, eve teasing, harassment etc. In the society, not only women but also other sectors people are also feeling unsafe due to increasing of different types of crimes. Although, the cities have been covered partially in the supervision of close circuit cameras, police patrolling, mobile based applications to reduce crime, still some where there is a lack in vigilance of those systems. This paper is recommending a quickly accessing mechanism technology along with the help of smart street light system which will be help full for women as well as road users during trouble. This plan can also be considering under smart city initiatives by Government of India. Under this project, a simple mechanism of switch will be available on the road side pole, which will be connected directed to the police control room or local police station through GSM network and microprocessor. The smart street pole, which will be having a Panic button, linked with city Adhar finger print system as well as a camera, LED bulb, GSM system, GPS and microcontroller (Arduino/Intel). Whenever, someone becomes the victim or witness any crime near the road side (in an empty road specially), it will be very easier for her/him to reach out to the police station with in fraction of seconds by those street pole switches, just by a simple click. The clicking button will give access with co-ordinate system through microprocessor ATMEGA32 on the monitor of police control room so that the nearby police can reach out there and search over there within few radii of the smart pole. This programme is giving real time response with certain programming module which provides quick access. Thus the victim can be safe and can feel protecting to become pedestrianise and further can achieve smart mobility and NMT.

**Key Words:** Smart pole, Smart city, GSM, microprocessor, microcontroller, Arduino, ATMEGA32, Adhar Finger Print, Police Control Room, NMT

## 1. INTRODUCTION

Crime is an action or can also be an omission which consist an offence and is to be sanctioned by the law. Crime is also a legal concept, where the legal wrong doings by an individual or a group, i.e., criminal proceedings will lead to a punishable result. As per Lord Atkins, "the criminal quality of an act cannot be discovered by reference to any standard but one: is the act prohibited with penal consequences". In India, the Criminal Procedure Code (Cr.P.C.) classifies all the crimes into two specific categories: (i) Cognizable {Sec.2(c) Cr.P.C} and (ii) Non- cognizable {sec (1) Cr.P.C}. In short, Cognizable offence or a case is defined at the one which an officer in-charge of a police station may investigate without the order of a magistrate and effect arrest without warrant and are classifies broadly under Indian Penal Code (IPC) or Special and Local Laws (SLL), while non - cognizable crimes are defines as those which cannot be investigated by police without the order of a competent magistrate<sup>1</sup>. Some broad classification of crimes under IPC are - Crime against body like murder, kidnapping and abduction, Crime against property like dacoity, robbery, burglary and theft, Crime against public order like riots and arson, Economic crimes, Crime against women like rape, dowry death, cruelty and assault, importation of girls from foreign country, Crime against children like child rape, kidnap and abduction, selling and buying, infanticide and feticide<sup>2</sup>.

The modern era we live in is with insecure environment especially towards women. They are now feeling insecure to step out of their houses alone due to increasing of crime rates like; Gang rapes, eve teasing, molestation, robbery, kidnapping etc. The metropolitan cities like; Delhi, Mumbai, Kolkata etc and large cities like; Bhopal, Jabalpur, Bhilai, Kota, Ludhiana, Raipur etc. When it comes to crime rates, it has been analyzed they are restricted to the influence of population. Also besides population, socio-economic factors can also be an influence to the increasing number of criminal offence. The crime rate is defined as "the number of crimes reported per 1,00,000 population in universally taken as a realistic indicator since it balances the effect of growth in the population and size of the state ". According to the Crime in India 2016- Statistics, the crime rate in India was reported to

<sup>1</sup> India. Ministry of Home Affairs Report, Crime in India, 2013, p.15

<sup>2</sup> Crime in India by Shashi Shekhar Singh, p.6

have increased to 2.6% over 2015, where Delhi was rated the highest followed by Kerala, Madhya Pradesh, Assam, Haryana as the top five states having the highest crime rates and the top five safest states were Nagaland, Tamil Nadu, Sikkim, Manipur, Meghalaya. Madhya Pradesh and Uttar Pradesh were also reported to have the highest incidence of rape, assault, abduction and kidnapping to women and children. Madhya Pradesh was accounted for 4882 rape cases out of 38,947 cases record across the county as per the record of NCRB, 2016. The state's overall crime rate stood at 348.3, much higher than the national average of 234. The state has been topping the sexual offences list for the last ten years. There was a slight respite this year, with the number of rapes and total sexual abuse cases decreasing by 11% and 15% respectively as compared to 2014. Back then, the state reported 5,076 rapes and 15,170 instances of sexual abuse.

### 1.1 To City

Bhopal is the capital city of Madhya Pradesh and is also the administrative headquarters of Bhopal district and Bhopal division. The area of the city is 285.88 sq.km and the population as per 2011 census is 17,98,218 with the density of 3887/sq.km. Total 9,36,168 males and 8,62,050 females are being residing in the city apart from migrate people and daily visitors as Bhopal is also known as the city of Lakes for its natural and artificial lakes. Bhopal was selected as one of the first twenty cities to be developed under the smart city mission. Apart from seeing the city by the developmental perspective, the city is also listed as the most unsafe city for women as per NCRB. The city is being kept his name on the top of the board as the most unsafe city. They have also reported that the crime has increased to 15,880 in 2013. It has the crime rate of 669.74 as compared to the National crime rate that is 218.67 in 2013. <sup>3</sup>Under this crime scenario, the women crimes are being increased in different sector which is listed below;

**Table 1: Crimes against women in Bhopal**

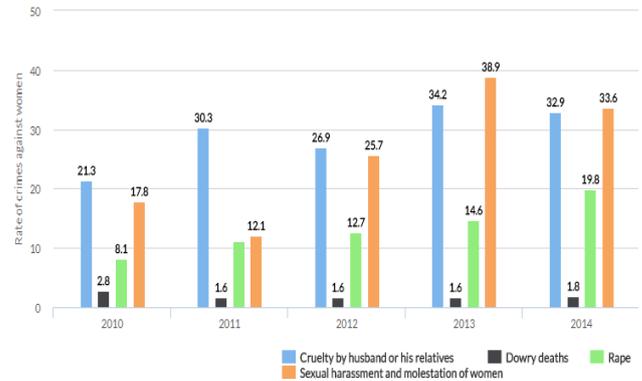
Crime	Category	2010	2011	2012	2013	2014
Cruelty husband his relatives	Crime Against women	21.3	20.3	26.9	34.2	32.9
Dowry death	-Do-	2.8	1.6	1.6	1.6	1.8
Rape	-Do-	8.1	11.1	12.7	14.6	19.8
Sexual harassment and molestation	-Do-	17.8	12.1	25.7	38.9	33.6

### 1.2 Crime rates in Bhopal

Last 22 months 2890 cases of eve teasing are being registered. Apart from that 133 rape cases and 322 cases of

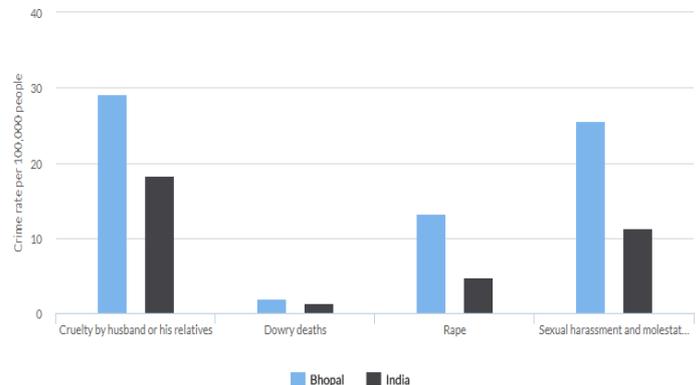
<sup>3</sup> <http://crime-in-india.github.io/cities/Bhopal/#women>

assault outraging the modesty of women has been identified in last few years. In the city, the upper-class, posh areas of Bhopal, including Arera Colony, Chuna Bhatti and Kolar, witness more crime against women in comparison to other parts of the city. The figure below describing the crime against women in women as well as compared with country scenario.



**Figure- 1: Rate of crime against women in Bhopal**

It has been identified that the city is unsafe towards women. Not in Bhopal but also in the other urban areas are also witnessed as the increasing ratio of women crimes.



**Figure- 2: Bhopal Vs. India on women crime**

## 2. RECOMMENDATION UNDER SMART CITY

The city is selected under the smart city initiative by the Central government India. Under the smart city, new initiatives are being taken by Government of India, where they are providing smart solution and infrastructure for better living. Under the smart city mission safety is also the prime consideration. Under this aspect, government has introduced smart solution like; Mobile application, CCTV cameras, Street lights etc. As the city is also selected under smart city mission, the recommendation for women safety in this paper is associated with smart street light system proposed under smart city. Here, by using of the street lights a new strategy is being created which will give quick access for women safety.

## 2.1 Recommendation: GSM and ADHAR based safety management system

The recommended project is more likely to be a safety management tools for women as well as for emergency situation. This system will be more helpful for commercial areas, posh areas, lonely roads etc. The whole project is divided into two basic parts: Transmitter and Receiver; and both will work on the principle of GSM network communication. Under this project the required materials and system are such as;

- Smart street poles
- Camera and LED bulbs
- GSM (SIM 900A) and GPS
- Emergency button
- Voltage regulator LM7805
- Microcontroller (Arduino/Intel) combination of Microprocessor (ATMEGA 32) with memory, clock and input, output blocks.
- Special box for protection.
- Solar system is also there green infrastructure.
- Cloud computing

Smart poles are being proposed under smart city mission. Adding up in the street lights a GSM and GPS controller with microcontroller system will be injected there with computer programming. A transmission module will be installed on the poles and will be connected to a switch. The switch in being installed at a height on 1.5 meter from ground level and the system will be available in one per four poles. By a simple click of that switch it will connect to the receiver station via GSM. The receiver station will be set up at the local police station or police control room with monitor system. It will be just like a mobile phone type having the contact/police control room saved of individual SIM card number with their locations. Upon getting signal from the transmitter, the receiver end in the police control room will activate some Alarm in the police station as well as with the exact information from where/which smart pole the signal is coming from in a display format on the monitor with the coordinate system of that location through GPS, so that the control room can send the patrolling team or the nearest un duty police officers in immediate way to protect the victim. The button will be with finger print accessing system, as the government Adhar card is also liked up with it, so that police control room can get the information of the victim through cloud computing and Adhar card information and will also send information to the victim family. Linking of Adhar will also help full for false pressing of button in funny approaches.

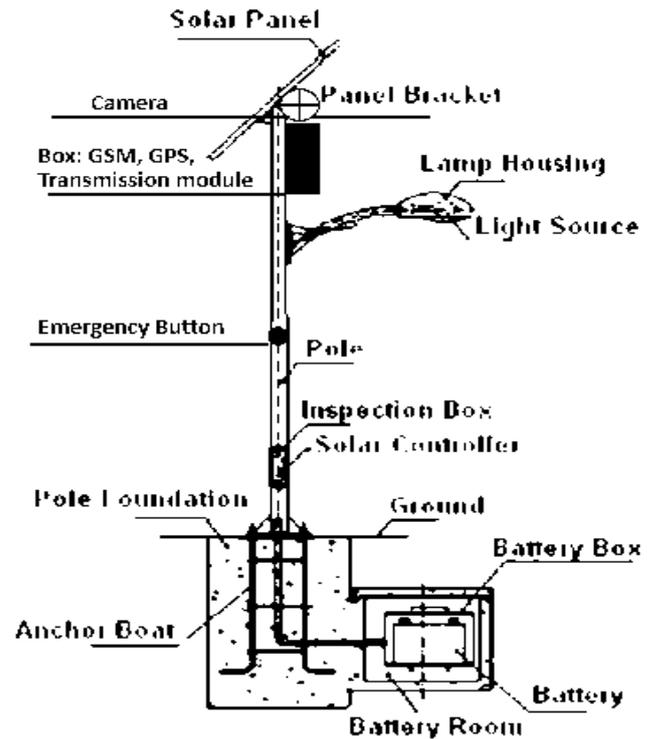


Figure- 3: Diagram of Smart pole

## 2.2 GSM

GSM is a mobile communication modem; it stands for Global System for Mobile communication (GSM). The idea of GSM was developed at Bell Laboratories in 1970. It is widely used mobile communication system in the world. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands. There are various cell sizes in a GSM system such as macro, micro, Pico and umbrella cells. Each cell varies as per the implementation domain. There are five different cell sizes in a GSM network macro, micro, Pico and umbrella cells. The coverage area of each cell varies according to the implementation environment.

## 2.3 GPS

The Global Positioning System (GPS) consists of six wires out of which three wires are used for connection. The transmitter wire which is connected to the 15th pin of the microcontroller. Voltage supply is about 3.3V to 5V. After connecting to internet system the GPS system will starts receiving signals from satellites. Once if the connection is established the latitude and longitude values of the current location are obtained. The GPS acts as a transmitter. This will helpul to provide the accurate location of the pole or area.



Figure- 4: GPS module

### 2.4 Time Division Multiple Access

TDMA technique relies on assigning different time slots to each user on the same frequency as well as access method for shared-medium networks. It can easily adapt to data transmission and voice communication and can carry 64kbps to 120Mbps of data rate.

### 3. WORKING PROCESS OF THE SYSTEM

After putting all the required components a programming know as C will be injected. Once the switch at the pole is pressed, it will trigger a small current signal to activate the transmitter. To do that, it need a microcontroller (Arduino) which is the combination of combination of Microprocessor with memory (control and logic unit), clock and input, output blocks. Here for the model Arduino is being considered where the microprocessor is ATMEGA 32. This model is being used as a prototype for the system else can be plan mass production by collaboration with companies like; Qualcomm, Intel, Texas Instruments or Atmel. Tell processor can be used instead of Arduino.

A voltage regulator LM7805 is being used in the process. Since the microcontroller can consume current till 5A, have to level down the input 9 Volt current from the battery to 5 Volt using that voltage regulator. That microprocessor must be programmed in such a way that, it takes the analog input from the switch and with an output signal it activates the GSM module (transmitter). Then the SIM present inside the GSM module makes blink police control roll monitors and along with phone calls.

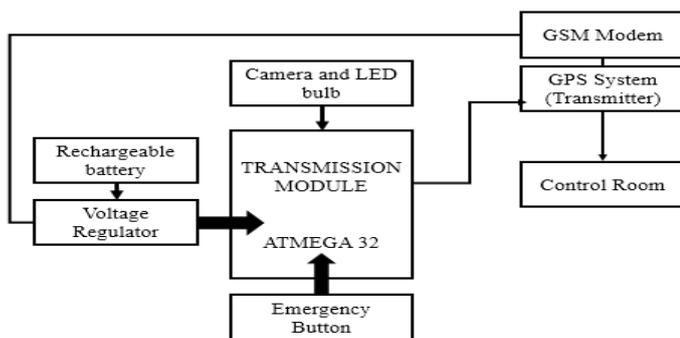


Figure- 5: Model Block diagram

Since, each pole will be having a unique SIM inbuilt in the GSM transmitter module, the police station can detect the exact location of the signal coming from poles through co-ordinate from GPS device. After that police control room can send the team or nearest on duty officer to protect the victim.

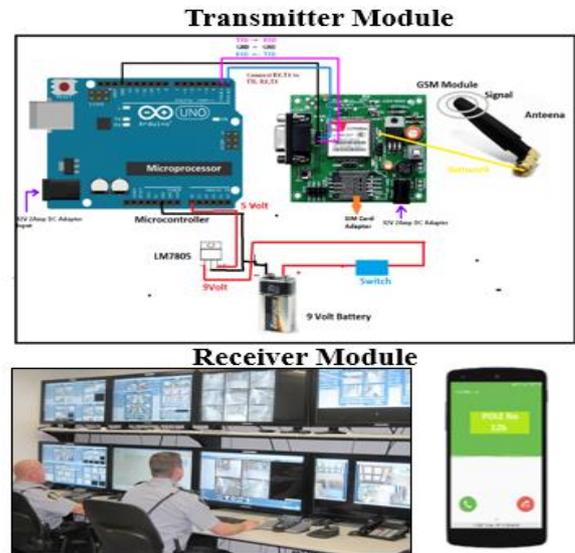


Figure- 6: Block diagram for transmission module

### 3.1 Cloud computing

The cloud computing is a small part of this process to keep the information of all citizen through linking of Adhar card system is the process. As all the citizen in every cities are being connected to Adahar system, it will be very easy to get all the information for the police department. Further this will also helpful for the police for immediate contact with the family members of the victim which will be in a parallel process with saving of victim from control room. So that the family member will also give there responds towards their family member. Else it can also stop the false button pressing identifying through Adhar and cameras and imprison him/her or can charges penalty.

### 4. OUTPUT OF THE MANAGEMENT SYSTEM

This is a new kind of concept although there number concept is being available by using GSM and GPS for safety consideration as well as from government side numbers of policies and development programmes are initiated towards safety. This safety concept is not being used in India till date. It is a very crucial phenomena for women safety especially in diagnosticate urban sectors where crime rates rapidly increasing. The city like Bhopal which being registered one of the top position in the table where crime rates in increasing faster especially in posh areas. The people in the city especially women can walk freely and further can bring revolution towards pedestrianised city.

#### 4.1 Advantages of the management system

- A safety consideration for women as well as the humanistic Society.
- Helpful for emergency situation like; disaster, accidents etc.
- It can be helpful for the legal evidence of crime with exact location.
- Can be used for the safety of physically challenged people.

#### 4.2 Application of recommended management system

- Easily monitoring and Faster service
- Low cost with high performances
- Wireless connectivity service
- Management will be parallel running through smart street poles.
- Environment friendly system with faster responds

#### 5. CONCLUSION

In the today's world being safe and secure is in the highly demand for livable cities. The city like Bhopal is also having the same prime demand in current era. The recommendation along with smart city initiation will give self security system towards women as well as other people during emergency situation. The concept and strategy will crucial as it will also dealing with many other social issues. It will also be helpful during emergency situation like; accidents, disasters, natural disaster, bank robbery and so on. The recommended mechanism or system provides viewing the location of poles and area where the victim finds trouble. This system will help to reduced crime rates especially for women in the city especially in market areas, lonely roads and vacant areas. If someone lost his/her phone during trouble and anything happen the smart pole will be the advantage for the victim to protect him/herself.

#### REFERENCES

- [1] <https://legalpointindia.blogspot.in/2016/02/relations-between-conventional-crime-and.html>, retrieved on 10/12/2017
- [2] Lok Sabha Secretariat, Parliament Library and Reference, Research, Documentation and Information Service, "Crime scenario in India", retrieved on 10/12/2017
- [3] Ministry of Home Affairs Report, "Crime in India, 2013".

- [4] Ministry of Home Affairs Report , "Crime in India 2016- Statistics", retrieved on 10/12/2017
- [5] National Crime Record Bureau (NCRB), GOI, " Crime Committed against women during 2015", retrieved on 10/12/2017
- [6] <http://www.neighbourhoodinfo.co.in/crime/Madhya-Pradesh/Bhopal>, retrieved on 12/12/2017
- [7] <http://www.hindustantimes.com/bhopal/mp-one-of-the-most-unsafe-places-for-women-and-children/story-BG1K1RCBoVBdBIjUPoZjO.html>, retrieve on 11/12/2017
- [8] Sriranjini R (2017) GPS and GSM Based Self Defense System for Women Safety. J Electr Electron Syst 6: 233. doi: 10.4172/2332-0796.1000233

#### BIOGRAPHIES



Pursuing Master in Urban Planning  
Lovely Professional University,  
Punjab



Pursuing Master in Urban Planning  
Lovely Professional University,  
Punjab



Associate Engineer,  
Qualcomm India Pvt. Ltd,  
Bangalore  
Former student, NIT Warangal