A Real Time Hi–Speed Tracker for Chain Snatcher

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Abstract-The word that is rampant in newspaper, television channel and in all our lives is “Chain snatching”. This is one of the crimes which are increasing as the river flows downstream. Back -to- Back chain snatching in the city put the cops on their toes. Even as chain snatchers go about their job with the spirit catch-me-if-you-can, police are working over-time to dent that spirit, but to no avail. Observing that the robberies have increased over the years, there is also a raise in chain snatching incidents. Thus chain snatching has become an urban phenomenon. Even though many cases have being lodged in the police station, but a very few cases have been solved, and many of the cases are still under investigation. In day-today newspaper by default front page reads “again a chain snatcher strikes the city”, a serious threat that scares the public to walk in and around city is “Chain snatching”, and has become a challenge for the Police Department in capturing the culprits. We being an engineers, there is no other Nobel way to thank our society, than giving helping hands to the society. So we came with an innovative idea of implementing a smart electronic gadget, so called, “ARM IMPLEMENTATION FOR REAL–TIME HI–SPEED TRACKER FOR CHAIN SNATCHER”. This innovation also pulls down the anti-social activities in public places.

Index Terms- MEMS Sensor, Speech Processor, ARM controller, Emergency Protocol, Public and Police end user, Wireless Communication, Track Down.

1 INTRODUCTION

The idea of our project is based on the news related to chain snatching which we often read in the newspapers as shown below.

No end yet to chain snatching cases

TIMES NEWS NETWORK

Mysore: Even as chain snatchers go about their job with a catch-me-if-you-can spirit, police are working over-time to dent that spirit, but to no avail.

Police commissioner Sunil Agarwal said on Monday that containing the menace is their priority. However, he denied it is the act of a crime syndicate.

"Our investigation has revealed that the culprits are first-time offenders and majority of them look like students. They have taken to robbery to make fast buck and finance their vices. Culprits are operating in all parts of the city," he said.

In Nazarbad police limits, 20 cases were reported in the previous year followed by 18 in Kuvempunagar, Vijayanagara (17) and Saraswathipuram (15). Agarwal said the period between October and December last year was a successful period as police succeeded in detecting many chain snatching cases.

Earlier, the city police returned the recovered stolen properties worth Rs 76 lakh to the owners.

Year	stolen valuables (in Rs)	No. of victims
2010	50,81,000	128
2009	30,69,450	95
2008	19,85000	-

Tips to women

- Don't travel alone in secluded and dark places
- Avoid going for a walk during power outage
- If you are going for a walk carry a stick with you
- When in public places, tie your gold chains to clothes/saris with safety pins
- If you notice any vehicle coming towards you from opposite direction, hold your gold jewellery in one hand and carefully move away from the road
- Raise an alarm in case of robbery attempts.
- Inform police immediately

Know how to file police complaint

Mysore: The city police have drawn up guidelines on filing of a police complaint, which will be circulated among people in the city, starting Tuesday.

Police commissioner Sunil Agarwal said it is aimed at facilitating people to file a complaint and educate them about the procedures. The guidelines will include how a complainant can approach approach senior officers; in case of minor complaints they need an acknowledgment from the police station; if their complaints are turned down by an officer they can approach the non-registration of complaint cell and people need not pay money either to file complaint or for investigation. Besides, they can keep track of the status of investigation of their cases every third Sunday.

Copies of guidelines will be pasted not only at police stations but all in public places like railway station, bus stand, zoo, Mysore Palace.

'Beware of chain snatchers' signboards in city soon

MYSORE: Police Commissioner Sunil Agarwal said that a signboard with guidelines to inform the public about the procedure of filing a complaint will be displayed at all police stations in the city.

Speaking on the sidelines of the property parade here on Monday, Agarwal said that apart from police stations, the information signboards will be displayed at prominent public offices such as Taluk and Zilla Panchayats, Deputy Commissioner's Office and other government offices.

He said that if any police station failed to register a case, then the public can lodge their complaint with the Non Registration Complaint Cell launched last year. Observing that robberies have increased over the years, Agarwal said that there is also a rise in chain snatching incidents. However, he opined that chain snatching was not an organised racket. He said that 70 per cent of the chain snatchers were first timers and college students. He termed the rise as an urban phenomenon.

In order to tackle the issue, he said that similar to the signboard 'Beware of pickpockets', a signboard 'Beware of chain snatchers' will be put-up in areas where the incidents have increased. Mentioning about the explosion that took place in the scrap yard in the city recently, Agarwal said that the owner Jabeer Pasha was still at large.

He said that the Managing Director Kiran Ranga and Manager Ramesh of Ripple Fragrance Private Limited have been arrested for illegally storing expired air fresheners. He said that a case of culpable homicide not amounting to murder has been booked against the duo.

Agarwal said that suitable action will be taken against shops which had failed to obtain licenses from Mysore City Corporation, Pollution Board and Fire Force Department. DCP (Law and Order) Basavaraj Malagatti said that a meeting will be held with heads of security agencies in the city. Furthermore, basic training will be provided to security guards, he added. Commenting on the issue of CCTV cameras in lodges, Malagatthi said that 90 per cent of the lodges have installed cameras. The licenses of the lodges without CCTV cameras will be cancelled, he added.

Police Commissioner Sunil Agarwal displays a chart meant for public awareness on lodging complaints at Non Registration Complaint Cell, in Mysore on Monday. DH PHOTO

Figure 1: News Paper Articles

These types of incidents are generally carried out by first time offenders who generally look like students and hence it’s difficult to track them .Security measures taken by the police department includes only “Beware of chain snatchers” signboards in and around the city which includes some tips to alert the public.

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YEAR	STOLEN VALUABLES (IN RS)	NO. OF VICTIMS
2010	50,81,000	128
2009	30,69,450	95
2008	19,85,000	-

Table 1: Statistics of chain snatching

The aim of this project is to develop a low power smart electronic gadget that is capable of tracking the chain snatcher and alert the police through the Real time transmission of video signals of the scene of crime which helps in solving the complicated cases. It also reduces many kinds of crimes taking place in and around the city and hence provides security for the public.The project design has two parts; a **Public end device (Smart electronic gadget/Transmitter)** mounted on the KEB pole and the **Police end device (receiver)** located at the police control room. The Public end device comprises of an ARM7TDMI-S (HOST), speech recognition unit and various peripheral units such as Night vision thermal Camera, LDRs, RF transceivers and Zigbee transceivers. The Police end device consists of a television/PC to display the real time video which is being captured by the transmitter section (Public end device/ smart electronic gadget).The **Public end device** is located at the top of the lamp post and Wireless Sensor Networks (WSN)

the entire city but alarms only the nearest police end device and the **Police end device** is located at the nearest police control room. The smart electronic gadget gets activated whenever the crime occurs and communicates with the nearest corresponding gadgets depending on the movement of the culprit and transmits an emergency signal to the nearest police end device.

2 Schematic Layouts -Smart Gadget (Public End Device)

The design consists of the ARM controller based system with peripheral devices and the speech processing unit as shown in Figure. The speech processing unit triggers the ARM controller which in turn activates the various peripheral units with which it is being interfaced with. DC regulated power supply of 12V is given to the speech processing unit and the ARM controller. The power supply requirement for the operation of the peripheral units is fulfilled by the host processor.

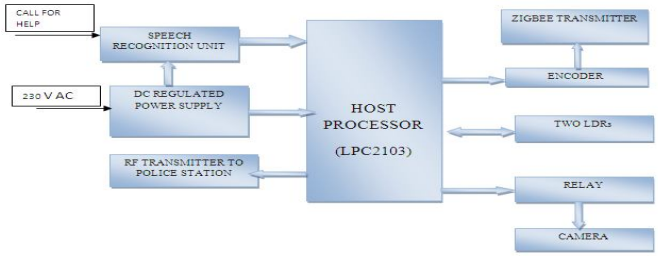
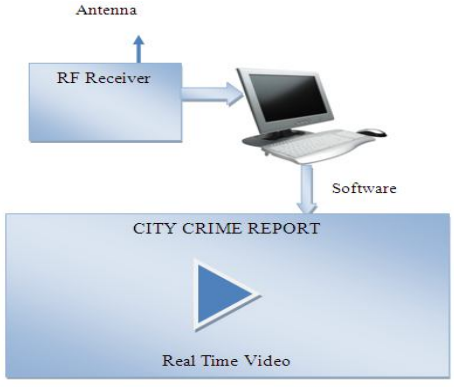


Figure 2: Smart Electronic Gadgets

Schematic Layout at the Police End Device

The receiver section consists of a receiver and the computer as shown in Figure 3. A software is designed in such a way that whenever an emergency signal is being received by the receiver, the person at the receiver section when clicked on this software icon will be fed with the details such as the nature of the crime and the video that has being recorded by the smart electronic gadget (transmitter). This helps the police in tracking the culprit within a short span of time.



Antenna

Figure 3: Block diagram of Receiver

3 PROCEDURES

Whenever the scene of crime occurs, the public end device which is placed on the street lights gets activated only if an unique emergency ID is transmitted from the gold link or the victim uttering some specific words say “POLICE”,”HELP” including local language isolated words like “kalla”, “kaapaadi“ with which the speech processor embedded is being trained with. Once the ID/word uttered by the victim is mapped successfully with the trained words, the speech processor triggers the ARM controller. The arm controller once triggered will activate the camera and the laser interface units. The night vision thermal camera with an inbuilt transmitter captures the videos of the crime and transmits the captured video to the nearest police station with in its viewing limits. The laser light is made to fall on the light dependent resistors which are placed on the either side of the module which is used as the reference base line cut-off to track down the motion of the culprit. The culprit can move in the either directions and thus the reference base line in the either direction of the module is cut, consequently an emergency signal is transmitted by the RF transmitter to the nearest smart gadget which is in the direction of the motion of the culprit. The triggered smart gadget will now be indulged in the tracking down process. Thus the previous module which has handover the control now goes to the sleep mode.

When an emergency signal transmitted by the Zigbee transceiver is being picked up by the receiver, a continuous beep sound will occur at the police end. This receiver is interfaced to a computer system. A software designed in such a way that whenever a beep sound occurs and when the person at the police station clicks on this icon, will be fed with the details such as the location of the scene of crime, nature of the crime such as chain snatching, murder, eve teasing etc and the video that has being recorded by the camera embedded in the public end device located on the street lights. This helps the Police in identifying the culprit within a short span of time.

RF transmitter pin 1 is connected to the pin 4 of HFT A and the HFT a pin 1 and 3 are connected to ARM processor to the port P0.10, P0.11. Transistor B pin 1 is connected to receiver B and transistor pin 4 is connected to receiver B. transistor B pin 5.3 is connected to ARM processor port P0.24 and P0.23.

4. Implementation

4.1 Serial Data Transfer

Devices that have a UART interface can connect directly to the pins of the RF module as shown in the Figure 4.

Data enters the module UART through the DIN (pin 3) as a synchronous serial signal. The signal should idle high when no data is being transmitted. Each data byte consists of a start bit (low), 8 data bits (least significant bit first) and a stop bit (high). The following figure illustrates the serial bit pattern of data passing through the module.

The module UART performs tasks, such as timing and parity checking, that are needed for data communications. Serial

communications depend on the two UARTs to be configured with compatible settings (baud rate, parity, start bits, stop bits, data bits).

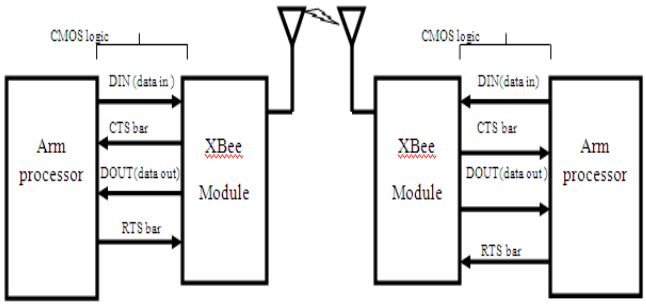


Figure 4: Communication Schematic Layout

4.2 Serial Receive Buffer

When serial data enters the RF module through the DIN Pin (pin 3), the data is stored in the serial receive buffer until it can be processed. Under certain conditions, the module may not be able to process data in the serial receive buffer immediately. If large amounts of serial data are sent to the module, CTS flow control may be required to avoid overflowing the serial receive buffer.

Cases in which the serial receive buffer may become full and possibly overflow:

1. If the module is receiving a continuous stream of RF data, the data in the serial receive buffer will not be transmitted until the module is no longer receiving RF data.
2. If the module is transmitting an RF data packet, the module may need to discover the destination address or establish a route to the destination. After transmitting the data, the module may need to retransmit the data if an acknowledgment is not received, or if the transmission is a broadcast. These issues could delay the processing of data in the serial receive buffer.

4.3 Serial Transmit Buffer

When RF data is received, the data is moved into the serial transmit buffer and is sent out the serial port. If the serial transmit buffer becomes full enough such that all data in a received RF packet won't fit in the serial transmit buffer, the entire RF data packet is dropped.

Cases in which the serial transmit buffer may become full resulting in dropped RF packets. If the RF data rate is set higher than the interface data rate of the module, the module could receive data faster than it can send the data to the host. If the host does not allow the module to transmit data out from the serial transmit buffer because of being held off by hardware flow control.

4.4 Thermal Sensitive Night Vision Camera

Night vision is the ability to see in a dark environment. Whether by biological or technological means, night vision is made possible by a combination of two approaches: sufficient spectral range, and sufficient intensity range. Humans have poor night vision compared to many animals, in part because the human eye lacks a tapetum lucidum. The camera mounted on the top of the light post has a viewing angle of horizontal 360 degrees including transmitter unit inside and views coming from the camera are being taken by receiver unit wirelessly which are shown in Figure . Voltage requirement of the camera has been provided by +9V DC battery mounted on the same platform with camera. Receiver unit has been connected to Digital Video Recorder Card installed on computer main board directly via BNC and video cable.

Figure 5: Night Vision Camera

4.5 Relay

A Relay is an **electrically operated switch.** Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The term **Relay** generally refers to a device that provides an electrical connection between two or more points in response to the application of a control signal as shown in Figure.

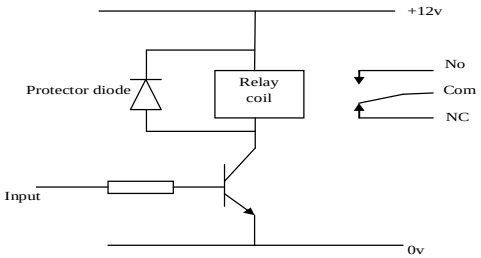


Figure 6: Relay connection to a Digital circuit

4.6 Laser Modules on Light Dependent Resistor

An LDR is a Light Dependent Resistor is very useful especially in light/dark sensor circuits. Normally the resistance of an LDR is very high. A simple circuit would be a voltage divider circuit with an LED connected in parallel with the LDR. When the

amount of light decreases the resistance of the LDR increases causing the bulb to light up.

Keil development tools for the ARM7 controller architecture supports every level of software developer from the professional applications engineer .The new IDE from Keil Software combines Project management, Source Code Editing and Program Debugging in one powerful environment. It acts as a CROSS-COMPILER.

4 PROGRAM FLOWCHARTS FOR THE PROJECT

UART

The flow diagram shown in Figure shows the procedure to set the baud rate for the UART.

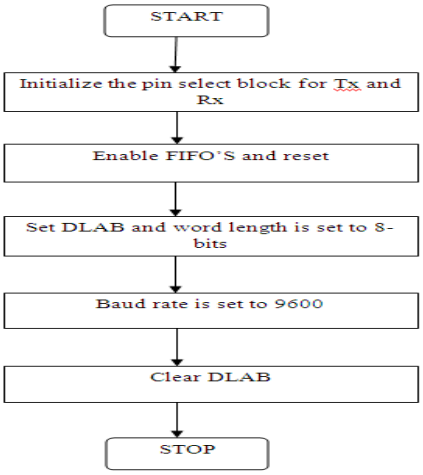


Figure 7: UART

RF Transmitter

The functional flow of RF transmitter is shown

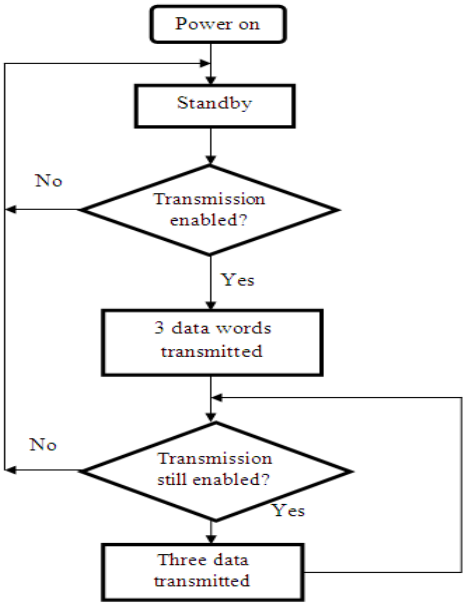


Figure 8: RF Transmitter

Light Emitting Diode

The flow diagram in the Figure 9 shows the control flow for the LED from the microcontroller.

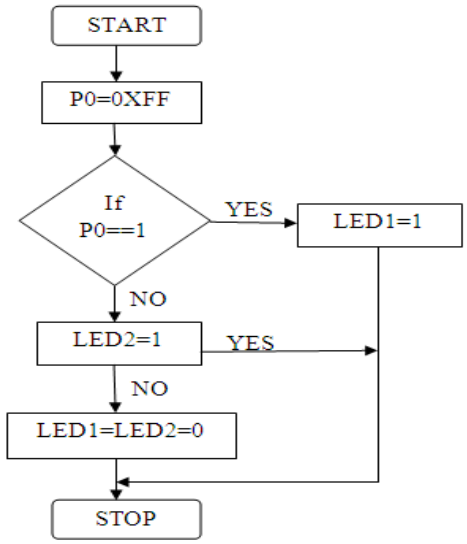


Figure 9: Light Emitting Diode

RF Receiver

The functional flow chart of RF receiver is as shown

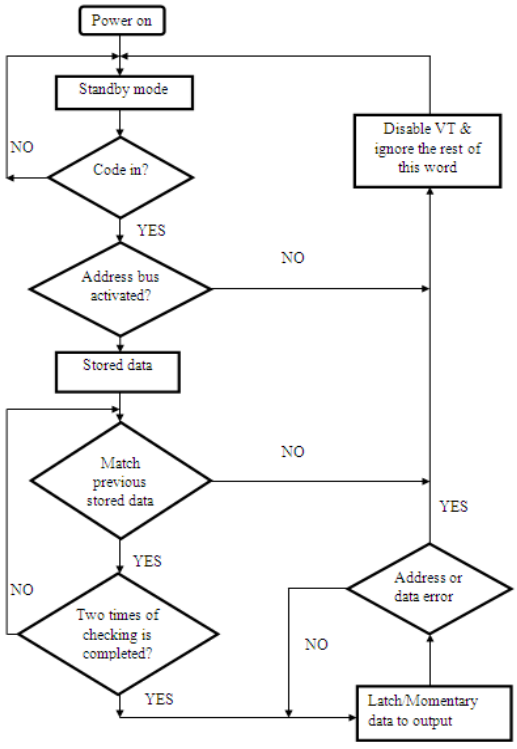


Figure 10: RF Receiver

5 RESULTS AND CONCLUSION

Test Result

The test results conducted for the prototype module is tabulated in the Table 2. The result is dependent on the words uttered as well as by emergency unique ID by the victim, the ARM and its peripheral working in transmitting the captured video signal to the nearest police control room and an emergency signal to the nearest smart electronic gadget in the direction of the movement of the chain snatcher.

WORD	HOST PROCESSOR TRIGGERED	LED-1	LED-2	VIDEO AT RECEIVER SECTION
HELP	YES	GLOW	NO SIGNAL	SUCCESS
THIEF	YES	NO SIGNAL	GLOW	SUCCESS
RAM	NO	NO SIGNAL	NO SIGNAL	FAIL

Table 2: Test Result Table

LED1 – Movement towards right,
LED2 – Movement towards left,
HELP – Trained word,
THIEF – Trained word.
RAM – Not a trained word.

a. Position of thief during the scene of crime

b. Position of thief after chain snatching

Case when thief is moving towards right, module belonging to that co-ordinate or location gets activated.

d. Case when thief is moving left, module module belonging to that co-ordinate or location gets activated.

6 Conclusion

The prototype model is tested and the result is encouraging. As per the test result table shown in the Table, whenever the word which is stored in the speech processor is uttered will successfully trigger the host processor. Thus either of the LED will glow showing which direction the culprit is moving and at the receiver section the video is played successfully.

7 Advantages

The Table shows the advantages of the smart electronic gadget over the existing measures,

Parameter	Existence	Our system
Chain snatching	"Beware of chain snatcher signboard"	Real time video signal
Murder	Investigation	Evidence
Accident	Investigation	Cause
Power consumption	-	Less

Table 3: Advantages

8 Applications

Apart from solving the problem of chain snatching, the model could be utilized as, as a safeguard measure in the public places. As a security systems for homes, offices and banks. As a tracking system for those who violates the traffic rules. As a life saver during accidents in remote areas.

9 Future Enhancements

Since this is a prototype module, lots of improvement can be made. The miniaturization of the module could be done with the help of VLSI technology and can make it cost efficient. As much as the module is miniaturized, it's easy to locate it in the area of interest. With the help of the combination of the sensors like the heat and the motion sensors along with networking concept the smart gadget can identify the culprit more efficiently from a crowded place.

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