

Theft Detection and Alert System

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ABSTRACT: In our project we aim to detect any attempt to steal the inventory from an agricultural land. We have used an RFID Reader and Tag, Arduino Uno Microcontroller, a GPS and a GSM module. Additionally, we have also developed an Android application that lets the user track the whereabouts of his inventory, in the event of it being stolen. In the app a message will be sent at a fixed interval, the message contains GPS Co-ordinates of the missing Inventory and an Alert message.

KEYWORDS: Theft, Detection, Alert.

I. INTRODUCTION

RFID (Radio Frequency Identification) is an extremely fast growing technology that employs electromagnetic fields to transfer data. Mostly this data transfer consists of identification and/or tracking of target object wirelessly through 'tags'. These tags have electronically imprinted data which may be read using a variety of different methods, depending upon which the tags may be classified as active, passive or battery assisted. The data is read using two-way radio transmitter- receiver. RFID technology is used in many applications such as tracking of shipment, animals, vehicles and more recently even humans. Unlike the barcode, RFID doesn't require a clear line of sight between the tag and the reader. The RFID market is expected to grow to over 20 billion USD by 2014. Our main aim would be to employ low power, long range RFID smart tags to track mechanized farming equipment, other farm inventory and to develop a Smartphone application for the same. Traditional means of monitoring may prove to be too cumbersome and have many loopholes which may be exploited. The Smartphone application will provide real time monitoring of the inventory as well as generate an anti-theft alarm should the need be. In this project we try to minimize the cost of the monitoring system. Main objective is to design a system that can be easily installed and to provide platform for further enhancement.

II. RELATED WORK

Our project requires equipment that can communicate with the user in a duplex way. So that when the alert message has been tackled by the user, the user can send a simple message and can turn off the alert system. So we decided to choose the following components.

- An RFID READER AND CARD (EM 18)
- A GSM module (SIM 900A)
- A GPS module
- Arduino Uno ATMEGA 328.

Each component has the following features

ARDUINO UNO ATMEGA 328
3.3V Electric current: 50mA
Input Voltage: 7-12V
Six 10-bit ADC inputs

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Three timers/counters

GSM MODULE SIM900A

Built in RS232 to TTL or vice versa logic converter (MAX232)

Configurable Baud Rate

Audio Interface connectors (in and out)

Input Voltage 5V to 12V DC

GPS MODULE

165dBm tracking Sensitivity

Full ESD protection in all pins

Embedded with one 4 MBits flash memory

USB 2.0 Full speed compliant interface

RFID READER AND CARD EM18

Serial TTL Output

Along with two RFID cards

Excellent read performance without any external circuit.

Compact Size, Cost Effective.

Because of all the above features of the components, the system has optimal performance and can send alert messages to the user at a predefined interval of time.

III. BLOCK DIAGRAM OF THE SYSTEM AND ITS DESCRIPTION

A detailed block diagram of our system has been shown below in fig.1 the block diagram describes the order in which the detection takes place. It also cites in all the Components that we have used in the System. The logical flow of events can also be pointed out using the block diagram.

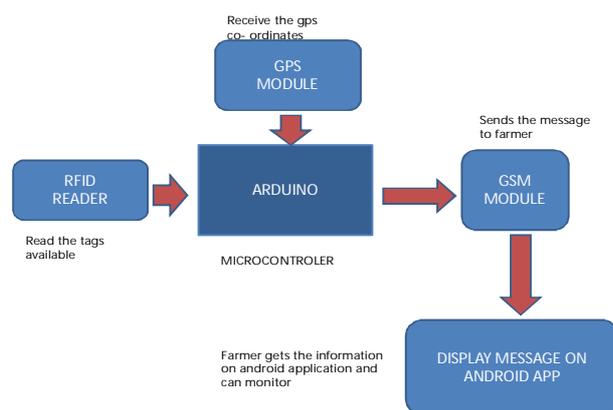


Fig. 1 Block Diagram

As seen in the block diagram we have interfaced a microcontroller (ARDUINO) with the RFID tags and a GPS module.

When the agricultural instrument is attempted to be stolen the RFID tags come into play and the equipment which is been stolen gets activated.

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By using the GPS (GLOBAL POSITIONING SYSTEM) we get the co-ordinates i.e. the latitude and longitude .Now by using GSM (GLOBAL SYSTEM FOR MOBILE COMMUNICATION) we are sending message to the farmer.

The farmer receives the message on the android application and is informed that his instrument is being stolen.

Due to the GPS the user is able to track the whereabouts of his instruments, thus enabling the perpetrators of crime to be caught.

IV. SYSTEM DESIGN

The system design that is proposed below, gives a detailed view of the elements in this system, and the interconnections between them. It gives the details about the various GPIO Pins used in Arduino Microcontroller as well as the various components used.

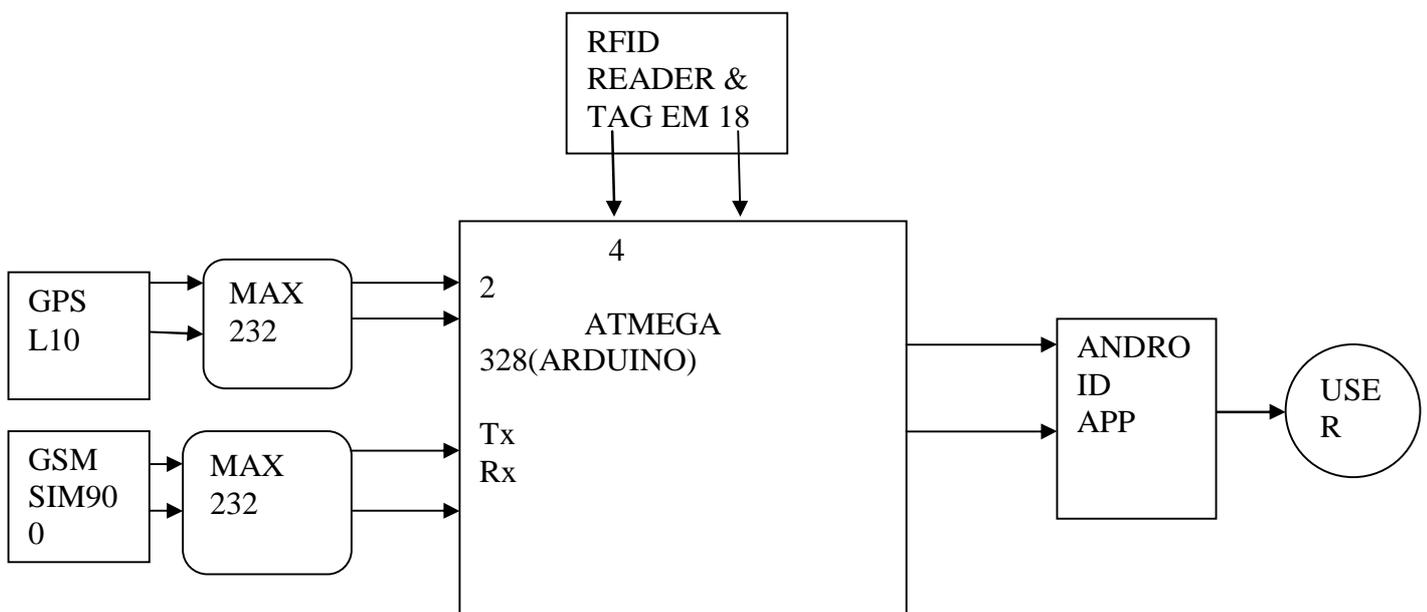


Fig 2. System Design

As seen from the System Design Block Diagram, the GSM module SIM 900 Communicates with the ATMEGA 328, using the RS232 protocol, so we use MAX 232 line converter.

Similarly the GPS module communicates with the ATMEGA 328 using the MAX 232 line converter.

We use MAX 232 to convert RS232 signals to TTL compatible Voltage levels.

So it eases the communication.

Similarly the RFID reader module sends signal to ATMEGA 328 When it sends the signal that the RFID card is read, it triggers the GPS module, when the co-ordinates are obtained , an SMS is sent along with the coordinates to the Android application, which the user can use.

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V. IMPLEMENTATION OF THE SYSTEM.

This project mainly consists of four units: A GPS Module, A GSM Module, RFID READER and Arduino microcontroller. When the equipment is being stolen the RFID tag gets triggered. Once it gets activated the GPS and GSM starts. GPS is one of the technologies that are used in a huge number of applications today. One of the applications is tracking your vehicle and keeps regular monitoring on them. This tracking system can inform you the location and route travelled by thief, and that information can be observed from any other remote location. It also includes the web application that provides you exact location of target. This system enables us to track target in any weather conditions. This system uses GPS and GSM technologies.

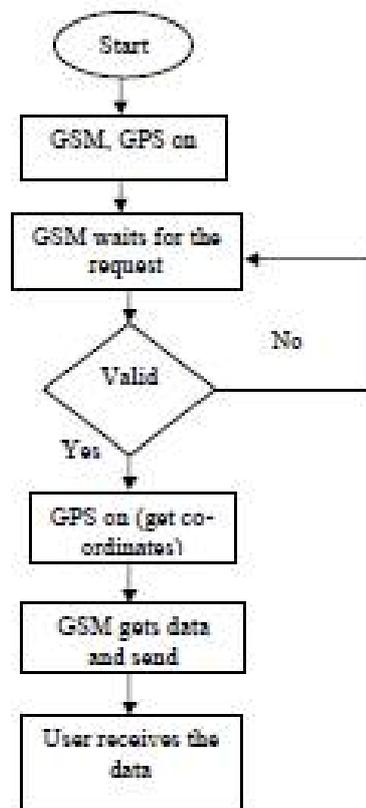


Fig 3: GPS AND GSM WORKING

The farmer now receives the message on his cell phone. The message will be displayed on his android app. Since this message is of higher priority the android app will beep and alert the farmer.

The farmer will now be able to know the position of his item and will be able to monitor it on his android app. The android application will constantly update the farmer about his item.

The farmer will also be able to track the path followed and know where the thief is actually taking the equipments

VI. RESULTS

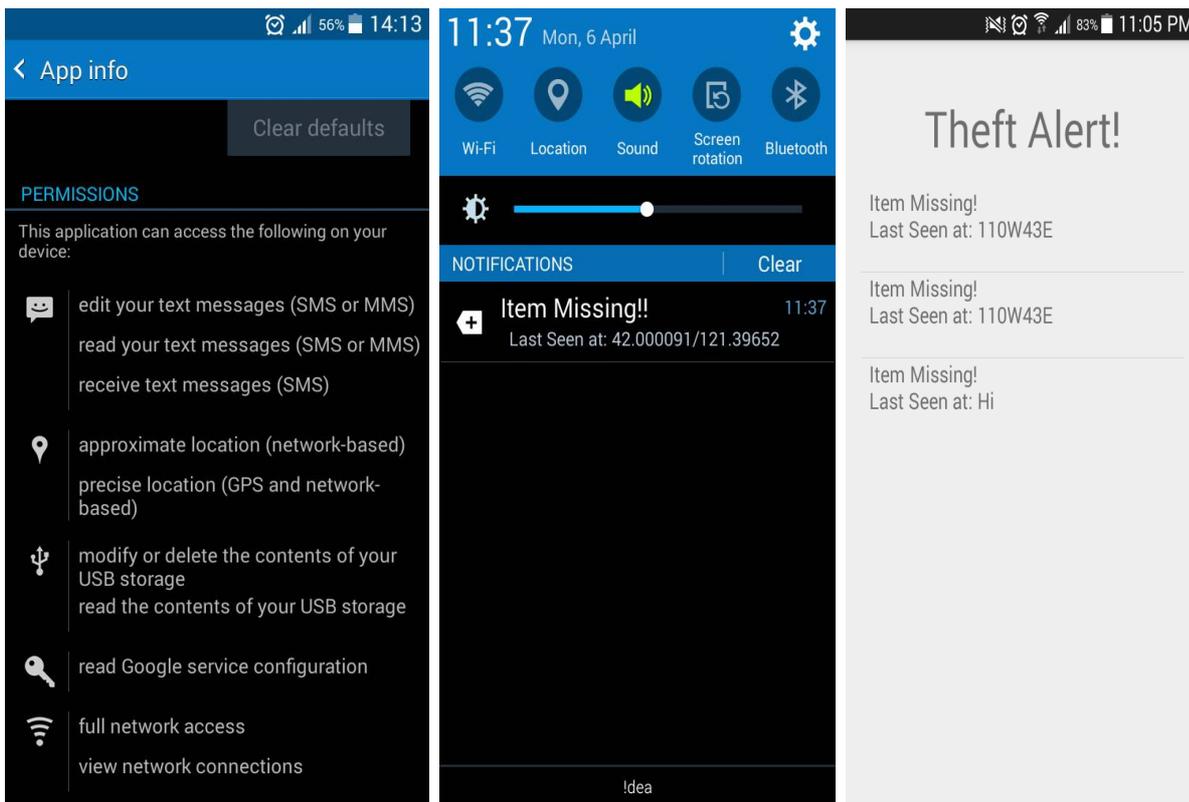
We have tested our project in real life conditions. As soon as the Inventory is stolen from the Farm and is detected by the RFID reader our in-system GPS starts Transmitting GPS co-ordinates of the Inventory to the android app. The farmer gets these co-ordinates and can open the co-ordinates within the app itself using Google Maps.

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Here is a Screenshot of the App Interface with the Alert Message and Google maps co-ordinates of the stolen Inventory.



(a)

(b)

(c)

Fig 4 The Application Interface (a) the permissions required while installation (b) the toggle bar notification generated by the application (c) the application interface with alerts messages.

VII. CONCLUSION

In this project, we focused on the ability of the GPS and GSM module to detect the range of objects on the farm. The experiments indicate that the low cost GPS and GSM module are able to give reliable information to the farmer. The results obtained show satisfactory results. Tracking system is becoming increasingly important in large cities and it is more secured than other systems. It is completely integrated so that once it is implemented in all tractors, water-pumps, farming equipments then it is possible to track anytime from anywhere. It has real-time capability. This system has many advantages such as large capability, wide areas Range, low operation costs, effective, Strong expandability and Easy to use in vehicle traffic administration. Upgrading this setup is very easy which makes it open to future a requirement which also makes it more efficient

VIII. ACKNOWLEDGEMENT

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