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SUSTAINABLE ECOSYSTEM FOR ELECTRONIC WALLETS

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ABSTRACT

In this paper,i am going to discuss, the need of Security systems for our Electronic Wallets, ATM's which become a part of our regular lives. In present scenarios there is no specific security mechanism for physical machines, some of ATMcabins/rooms have entry detectors but maximum situation these methods are fail due to the policies of banks, such any bank card can use for transaction at any ATM's, certain number of attempts, the verification and validations can be done twice in each and every entry, (ones for door detector and second is transaction of a process) the Execution time of a process increases, obviously it will reflect on time complexity. So to provide security for physical machine by using the GSM/GPS [9] module connected to ATM machine which can use to trace the current location of the Machine is read and it sent through message to the server or a control room, by which it is possible to provide security for physical Attack on Machines. As result we can reduce the thefts and misusing's.

Keywords: Global positioning system(GPS), Automated Teller Machine(ATM), Vibration Sensing, Global system for mobile communication(GSM).

Introduction:

All Electronic systems, Automatic Teller Machines are particularly hard to protect in physical sense,these are easily concealable by thieve with latest technologies, the loss of even a single machine can induce dramatically costs tothe organization. Thus, Organizations are investing huge amount of money towards provide security to their machines, which causes interlinked with stockholder's burden as maintenance charges of transaction of customers.

The all main Centres of cities and hospitals, university campus, shopping malls such are the key points of physical existences of ATM's which provides technology serving to the society. for example, [8],accessnumber of people that can wander in the turf everyday uses out that 72% of data opening occur in all open to the public. So it becomehighly accessible in these environments. So, the problem for securityprofessionalsto face the challenge as, how to protect and provide secure mechanism in such opensituation.

- Measuring the physical machine parameters such as position[9], time, andvelocity and so on by the help of wireless sensors, the sensor in thissystem is GPS sensor.
- Recording the obtained parameters by the temporary loggerunit [9].Microcontroller acts as temporary login/logger unit.
- Uploading / accessing the recorded data [9]. The process involvedis called telemetry which is achieve by GPRS.
- Finally, analysis and presentation of recorded data throughinternet [9] or through the response to the SMS request by thesubscriber.

Case study: As per statisticalanalysis many as one in fiftyATM Machines will befacing insecurity in physical senses over the lifetime of eachmachine. That's 10% of ATM 's is replacing machine by this effects. And thisdismal scenario is extremely common around 60% oforganisations are affected.

Yet it's worrying that most ATM's58% are stolen attempts fromrural areas and crud less areas. The research shows that the most likely places identifications for a thief to strike. Shopping complex lobbies may seem to be the most dangerous places for ATMthefts because of unknown strangers.The average cost to a business of Teller machines loss is $1,48,000.

Objectives:

The main objective of the project is foremost building amachine tracking device that would be used in a real world. Thedevice could be used for wide object such as tracking,navigation, fleet and traffic management etc. Also the projecthelps us to get more familiar with existing GPS and GSM/GPRS [9]networks. So far we have only been able to view the theoreticalside of the system but after the project completion we are sure toget familiar with practical side of it. The GPS and GSM/GPRSservices have not been fully exploited yet. Therefore, we wish tobuild a base upon which more excellent application of themachine tracking systems are built in future. Therefore, we can saythat our project is both research and application based. To bemore specific the objectives of the project can be categorised asfollows.

- To implement a data logging system, which can be used fortelemetry.
- To shine how systems can be combined for the purpose oftelemetry.
- To shine light about how new technologies can be exploitedfor the benefit of human beings.
- To understand in detail, the electronics behind the GPS andGSM/GPRS

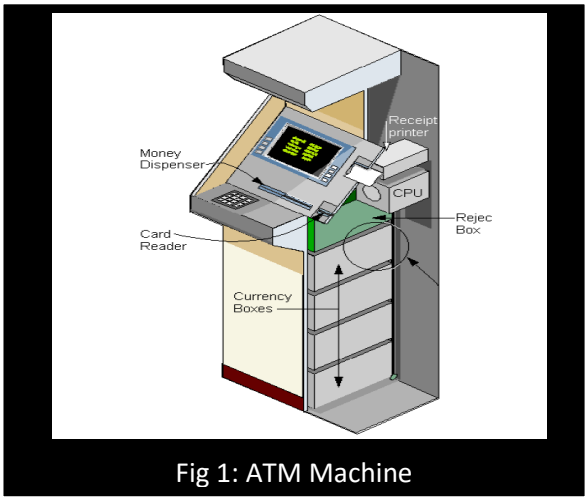


Fig 1: ATM Machine

GPS Technology overview:

GPS is a network of satellites that constantly transmitcoded information, which makes it impossible to preciselyidentify locations on earth by measuring distance from thesatellites. As stated in the definition above, GPS stands forGlobal Positioning System [9], and refers to a group of U.S.Department of Defence satellite continuously circling the earth [2].The satellites transmit very low power radio signals allowinganyone with a GPS recipient to determine their location.

GPS Working Strategies:

GPS satellites circle the earth twice a day in a very preciseorbit and transmit signal information to earth. GPS receiverstake this information and use triangulation to calculate the user'sexact location. Essentially, the GPS receiver compares the timea signal was transmitted by a satellite with the time it wasreceived. The time difference tells the GPS receiver how faraway the satellite is. Now, with distance measurements from afew more satellites, the receiver can determine the user'sposition and display it on the unit's electronic map. A GPSreceiver must be locked on to the signal of at least threesatellites to calculate a 2D position (latitude and longitude) andtrack movement [9]. With four or more satellites in view, thereceiver can determine the user's 3D position (latitude, longitudeand altitude). Once the user's position has been determined, theGPS unit can calculate other information, such as speed,distance to destination, sunrise and sunset time and more.Recent developments in GPS like DGPS have made thepositioning even more accurate. The USCG beacons and theWAAS

systems are the kinds of DGPS which correct the datafrom the satellites with appropriate environmental error models.

GPS Sensor:

The GPS receiver used for our purpose is the GARMIN 15LGPS receiver. The sensor first has to be initialized according tothe formats in which we required the data. There are certainNMEA: National Marine Electronics Association, sentencesthat help us to communicates with the receiver. These sentencesare the Garmin proprietary NMEA sentences.

Sensor countenance:

- 12-channel GPS receiver tracks and uses up to 12 satellites forfast, accurate positioning and low power consumption.
- Differential DGPS capability yielding 3–5-meter positionaccuracy.
- Compact, rugged design ideal for applications with minimalspace.
- Beneficiary status information can be displayed directly on a PC.
- User initialization is not required. Once installed and a fix isobtained, the unit automatically produces navigation data.
- User-configurable navigation mode (2-dimensional or 3-dimensional fix).
- In Built backup battery to maintain real-time clock for up to21 days. Provision for external power to maintain the real-timeclock for longer intervals.
- Non-volatile memory and FLASHbased program. Newsoftware revisions upgradeable through Website download andserial interface. Any secondary storage memory does not require batterybackup.

Technical Specifications:

• It requires an 8-pinJSTconnector and 1-milimeterpitch, Mating wire harness
• A MCX male antenna has to be connected with the femaleMCX connector in the sensor
• Required voltage range is 3.3 VDC to 5.4VDC(must have lessthan 100mV (peak-to-peak ripple)
• Input current is 100 mA peak, 85 mA nominal at 3.3 to 5.0 VDC.

GSM (Global System for Mobile communications) **Technologies:**

GSM is thetechnology that underpins most of the world's mobile phonenetworks. The GSM platform is a hugely successful wirelesstechnology and an unprecedented story of global achievementand cooperation. GSM has become the world's fastest growingcommunications technology of all time and the leading globalmobile standard, spanning 218 countries. GSM is an open,digital cellular technology used for transmitting mobile voiceand data services. GSM operates in the 900MHz and 1.8GHzbands GSM supports data transfer speeds of up to 9.6 kbps,allowing the transmission of basic data services such as SMS.

A GSM modem is a specialized type of modem whichaccepts a SIM card, and operates over a subscription to a mobileoperator, just like a mobile phone. GSM (Global system formobile) uses a process called circuit switching. This method ofcommunication allows a path to be established between twodevices. Once the two devices are connected, a constant streamof digital data is relayed. GSM networks consist of three majorsystems the Switching System (SS), The Base Station(BSS) andthe Mobile station(MS).

a. The Switching System

The Switching system is very operative system in whichmany crucial operations are conducted, SS systems holds fivedatabases with in it which performs different functions. If we
talk about major tasks of SS system it performs call processingand subscriber related functions. These databases from SSsystems are HLR, MSC, VLR, AUC and EIR. The MSC incooperation with Home Location register (HLR) and Visitorlocation register (VLR), take care of mobile calls and routing ofphone calls. Authentication centre (AUC) is small unit whichhandles the security end of the system and Equipment identityregister (EIR) is another important database which holds crucialinformation regarding mobile equipment's.

b. The Base Station System (BSS):

The base station system have very important role in mobilecommunication. BSS are basically outdoor units which consistof iron rods and are usually of high length. BSS are

responsiblefor connecting subscribers (MS) to mobile networks. All thecommunication is made in Radio transmission. The Base StationSystem is further divided in two systems. These two systems,they are BTS and BSC. BTS (Base Transceiver station) handlescommunication using radio transmission with mobile station andBSC (Base station controller) creates physical link betweensubscriber (MS) and BTS, then manage and controls functionsof it.

c. Mobile Station (Subscriber):

MS consist of a mobile unit and a smart card which is alsoreferred as a subscriber Identity Module (SIM) card. This cardfitted with the GSM Modem and gives the user more personalmobility. The equipment itself is identified by a unique numberknown as the International Mobile Equipment Identity (IMEI).

GSM-GRPS terminal (GM862-GPRS):

Featur:

The GSM/GPRS device that we are using is Telit GM862The GM862-GPRS with its EASY GPRS feature is a specialdevice. It embeds and controls the PPP/ (UDP) TCP/IP protocolstack inside itself. In this way the local-host sees a "virtual serialline" connection with the application software on the servermachine. Differently from other GPRS devices that embed theTCP/IP protocol stack; an EASY GPRS device, such as theGM862-GPRS, does not provide a set of API functions tointerface with the protocol stack but it automatically manages itinternally as specified when starting the connection. It alsoincludes all the features of a standard GSM device.

Specifications:

Quad-band 900 / 1800 MHz or 850 / 1900 MHz GSM / GPRSModem

• Internet, Data, SMS, Voice, Fax, TCP/IP Services and EASYGPRS Commands
• Remote Control by AT Commands (according to GSM 07.07and GSM 07.05)
• Input voltage 5.5 V to 12 V DCCurrent 1.8A peak at 5.5 V, 330 mA average at 5.5

• SIM Interface 3V / 5 V
• Weight125 gram

Input/Output Format:

AT-Command (ATtention, used to start a command line**):**

Mobile phone or GSM/GPRS modem are controlled andbriefed through commands called AT commands. The AT isanconsideration commands and is use as a prefix to other parameterin a string. The AT command combine with other parameterscan be set up in the communication package or typed inmanually as a command line instruction A terminal program'sfunction is like this: It sends the data that you typed to themobile phone or GSM/GPRS modem. It then displays theresponse it receives from the mobile phone or GSM/GPRSmodem on the screen. The terminal program on MicrosoftWindows is called HyperTerminal which was used for therequired setting of the GPRS device. The Telit GM862 wirelessmodule can be consumed via the serial interface using the standardAT commands. The Telit GM862 wireless module is complaintwith Hayes standard AT command set (to maintaincompatibility with existing programs), GSM specific ATcommands and GPRS specific commands. This module alsosupports proprietary AT commands for special purposes.

Some AT commands used with Telit GM862 module

The carriage return<CR> and line feed <LF> after everycommand is implied.

The AT commands used were:

• **AT(**ATtention, used to start a command line**) +CMGF: Message Format**
AT+CMGF=<[mode]>
Select the SMS format to be used in reading and writing
messages.
<[mode]>

<[Mode]>	
0	PDU mode
1	text mode

Test command:

AT+CMGF=? Reports the supported value of <[mode]>

parameter.

For example:

AT+CMGF=1

The above command will select the SMS format as text mode.

• **AT+CMGS: Send message**

AT+CMGS=<[da]>

<[da]>=destination address number.

The device respond to the command with the prompt '>' andwaits for message text (max 160 character)[2]. To complete theoperation, send ctrl-Z char (0x1A).

For example:

AT+CMGF=1[Enter]

AT+CMGS="+491711234567"[Enter] >Please call office ^ZHere +CMGF=1 will set the modem in text mode.

After the+CMGS you enterthe number the message is intended to inbetween quotation signs [1]. The message in ourcase "Please calloffice" is written in the next line and terminated by ctrl+Z (^Zequals ctrl+Z).

• **AT+CNMI: New message indications to terminalequipment**

AT+CNMI=<[mode]>[,<mt>[,<bm>[,<ds>[,<bfr>]]]]

The MCU does not require any new message indication. Hencethe indications are disabled with the command:

AT+CNMI=0,0,0,0,0

The above command will indicate the first 0 as bufferunsolicited result codes buffering option buffer is full [7]. Second 0-no SMS-deliver indications are reported to the TE. Third 0-Cellbroadcast message are not send to the DTE. Forth 0- Statusreport receiving is not reported to the DTE.And last 0- TA buffer of unsolicited result codes define withinthis commands is flushed to the TE.

• **AT+CMGR: Read message**

AT+CMGR=<[index]>Read the message with location valueindex.

Example:

AT+CMGR=4 This command will read the message on locationno 4 of the sim card.

• **AT+CMGD:Delete message**

AT+CMGD=<[index]>[<deflag>]
<[index]>-message position index in the selected storage

<deflag>	Delete mode selection flag
0	Delete all message at position index
1	Delete all received messages
2	Delete all received read and all send messages
3	Delete all received and all written messages
4	Delete all messages

Example:

AT+CMGD=1,0

This command will deleted the message of stored location no.1

AT+IPR=4800

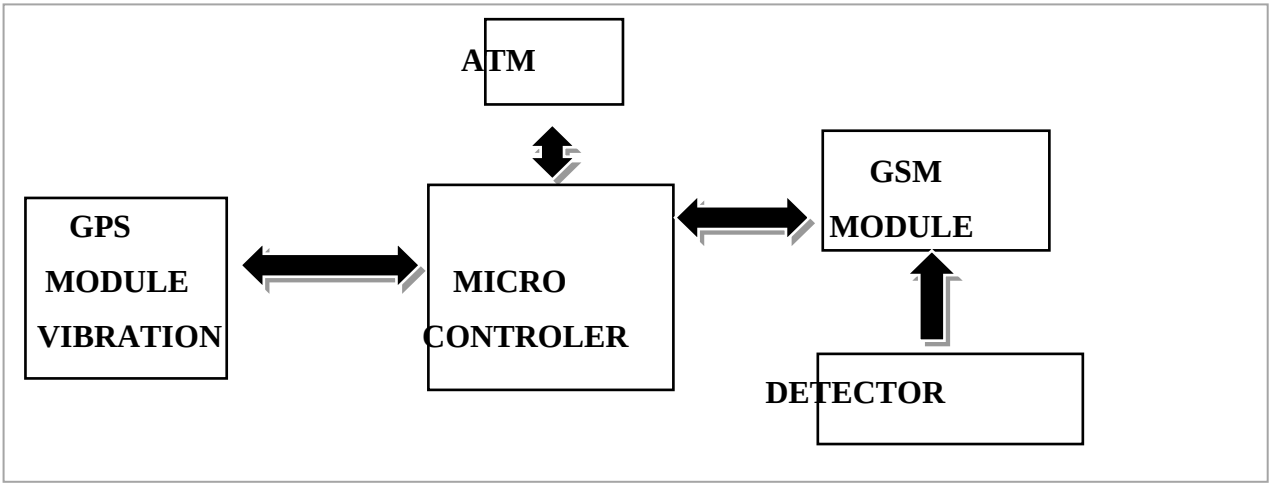
This command sets the baud rate of the GPRS device to 4800.

Microcontroller:

The microcontroller is the heart of this device. It is theinterface between the GSM module and the GPS receiver. Amicrocontroller is a small computer on a single integrated circuitcontaining a processor core, data memory, A/D converter andprogrammable input/output peripherals. In this device themicrocontroller is programmed in such a way that it stimulatesthe GSM modem in message forwarding when a request is sendby the user. Microcontrollers are much smaller and simplified sothat they can include all the functions required on a single chip.Having the microcontroller is of great use, as it has low designcost and add intelligence to the system.

Vibrated Sensor: In this applications we have to embed a vibrated sensorto ATM machines, it can also be the one of input value for GSM module, which uses the GSM module respond automatically too. In present days the vibration sensors increasing the sensitivity accuracy increasing, so we can embed with our design it gives us sophisticated results for real time.

Design of Tracking system:



Conclusion:

In this paper we evaluate, the current design is anembedded application, which will continuously monitor Machineand report the status of the ATM on demand. For doing so anARM7 microcontroller is interfaced serially to a GSM Modemand GPS Receiver. The GPS modem will continuously give thedata i.e. the latitude and longitude indicating the position of theMachine. The GPS modem gives many parameters as the output desired demand.

When the request by user is sent to the number at the internal unit,the system automatically sends a return reply to that mobileindicating the position of the machine in terms of latitude andlongitude. The block diagram of tracking system using GPS andGSM technology is presented in figure. The project is machinepositioning and navigation system we can locate the machinearound the globe with micro controller, GPS receiver, GSMmodem. Microcontroller preferred is ARM7. The code is written inthe internal memory of Microcontroller i.e. ROM. With help ofinstruction set it processes the instructions and it acts asinterface between GSM and GPS with help of serialcommunication of ARM7. GPS always transmits the data andGSM transmits and receive the data.

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