Using Arduino- Anti-Theft System for Vehicle

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Abstract – This is an anti-theft system that is used to track the location of the lost vehicle and to stop the vehicle. This proposed work is an attempt to develop a smart system that helps us to protect our vehicle by tracking it remotely through global system for mobile communication (GSM) and Global positioning system (GPS).Basically, the system is providing the owner of the vehicle to stop his moving vehicle whenever he finds it riding by an unknown person.The owner of the vehicle can thus stop the moving vehicle by sending a command to the mobile phone hidden in the car to stop the engine. This mobile phone is connected and communicates with the Micro controller (Arduino) using the Bluetooth module. The movement of the vehicle is identified by tapping the Accelerometer,GPS and SMS sensors from the hidden mobile by using 1Sheeld technology. The ceasing of the vehicle will be done through relays (10v) and measures like engine ignition cutoff are installed in the vehicle.The owner can get the latitude and longitude of the vehicle's location which can be directly opened in Google maps to track the actual location. This system also proves fruitful for tracking and controlling the vehicle by using Arduino and 1Sheeld technology .The main objective is to install the system within the vehicle, so that it provides the users the flexibility to track the location of the lost vehicle and to control it. This complete system is designed taking into consideration the low range vehicles to provide them extreme security.

Index Terms – Global positioning system,Global system for mobile communication, microcontroller(Arduino), 1sheeld technology

1. INTRODUCTION

1.1 DOMAIN INTRODUCTION

1.1.1 Embedded Systems

An embedded system is a computer system with a dedicated function within a larger mechanical or electrical system, often with real-time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts. Embedded systems control many devices in common use today. Ninety-eight percent of all microprocessors are manufactured as components of embedded systems. Modern embedded systems are often based on microcontrollers (i.e. CPU's with integrated memory or peripheral interfaces), but ordinary microprocessors (using external chips for memory and peripheral interface circuits) are also common, especially in more-complex systems. In either case, the processor(s) used may be types ranging from general purpose to those specialized in certain class of computations, or even custom designed for the application at hand.

Since the embedded system is dedicated to specific tasks, design engineers can optimize it to reduce the size and cost of the product and increase the reliability and performance. Embedded systems range from portable devices such as digital watches and MP3 players, to large stationary installations like traffic lights, factory controllers, and largely complex systems like hybrid vehicles, MRI, and avionics. Complexity varies from low, with a single microcontroller chip, to very high with multiple units, peripherals and networks mounted inside a large chassis or enclosure

1.1.2 Arduino

Arduino is an open source, computer hardware and software company, project, and user community that designs and manufactures microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world. The project's products are distributed as open-source hardware and software. Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (*shields*) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler tool chains, the Arduino project provides an integrated

development environment (IDE) based on the Processing language project. The Arduino project provides the Arduino integrated development environment (IDE), which is a cross-platform application written in the programming language Java.

1.2 PROJECT DESCRIPTION

Automobile thefts are increasing at an alarming rate all over the world. This system emphasis on creation of a real time system to overcome the problems faced due to vehicle thefts. The various issues that we face due to vehicle thefts are:

A) To identify the running thief with the stolen vehicle.

B) To recover important things present in the vehicle.

C) To track the location and to stop the running vehicle.

In order to protect our vehicles, a system is developed by using Arduino, and several other technologies such as GPS and GSM. Once the vehicle starts moving, the accelerometer sensors automatically detect motion and communicates to the hidden mobile phone via. Bluetooth.The user can send a 'STOP' message to the hidden phone in the vehicle. Therefore, the arduino controls the relays that are connected in parallel and turns the engine off. After switching off the engine once, it cannot be turned on. Hence the vehicle stops and location of the vehicle can be traced. The system is user friendly, simple and easily installable.

2. LITERATURE SURVEY

[1] Charu Saxena, Pankaj Bhardwaj, Adesh Sharma, Arpit Rastogi, Bobby Arya Final Year Students of MIT(2015) on 'Real Time Vehicle Ceasing and Tracking using GSM and GPS technology' Vol.2,No.1,pp.72-77.

The paper published is an anti-theft system that not only stops your vehicle but also track the location of your lost vehicle, This system provides users the capability to track the vehicle remotely through the mobile network. This is the anti-theft system that not only stop your vehicle but also track the location of your lost vehicle. We have made a system which will provide users the capability to track vehicle remotely through the mobile network. Specifically, the system is providing the owner of the vehicle to stop his moving vehicle whenever he found it riding by the unknown person. This is done by sending a command to the GSM modem present in the system to stop the engine. The ceasing o the vehicle will be done through relay Moreover he can utilize the GPS receiver to obtain his vehicle's location anytime and transmit it using the GSM modem to his cell phone through the mobile network.

[2] El-Medany, W Al-Omary (2010), 'A Cost Effective Real-Time Tracking System Prototype Using Integrated GPS/GPRS Module', ICWMC Vol.6, No.2,pp.20-25.

A real time tracking system that provides accurate locations of the tracked vehicle with low monetary value. GM862 cellular quad band module is used for implementation. A monitoring server and a graphical user interface on a website is also developed using Microsoft SQL Server 2003 and ASP.net to view the proper location of a vehicle on a specific map. The paper also provides information regarding the vehicle status such as speed, mileage. The system provides information regarding the vehicle status such as speed, mileage. The prototype has been tested experimentally and the results are analyzed and discussed.

3. SYSTEM ANALYSIS

3.1 EXISTING SYSTEM

In many previous research works, Global positioning system (GPS) and GSM modules were separately used as global navigation satellite system. This system is generally used to locate the vehicles if stolen. The location information is sent in the form of a message containing latitude and longitude and speed information of the vehicle can also be sent to the owner of the vehicle. The utilization of ARM 7 microcontroller, GSM and GPS module together with an accelerometer and temperature sensor are used to track the vehicle's location. Some of the other works used GPS-GSM framework to track vehicles using Google Earth application and to view the current area and status of the vehicles that are being stolen.

3.2 PROPOSED SYSTEM

Similar to the existing practice, this system acts as an anti-theft system that is used to track the location of the stolen vehicle and to stop the vehicle. This proposed system is a smart system that helps us to protect our vehicle by tracking it remotely by using our mobile phone. The owner of the car can track and stop the moving car by sending a SMS command through his mobile phone to the hidden mobile in the car. The movement of the vehicle is identified by tapping the Accelerometer, GPS and SMS sensors from the hidden mobile by using 1Sheeld technology. The ceasing of the vehicle is done through relays (10 v), and moreover the user can know the exact location of the vehicle anytime and anywhere by using Google maps.

3.3 FEASIBILITY STUDY

The feasibility of the project is analyzed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, some understanding of the major requirements for the system is essential.

3.3.1 Technical Feasibility

This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system

developed must not have a high demand on the available technical resources. This will lead to high demands on the available technical resources. This will lead to high demands being placed on the client. The developed system must have a modest requirements, as only minimal or null changes are required for implementing this system.

4. SYSTEM REQUIREMENTS

4.1 HARDWARE REQUIREMENTS

The hardware requirements may serve as the basis for a contract for the implementation of the system and should therefore be a complete engineers as the starting point for the system design.

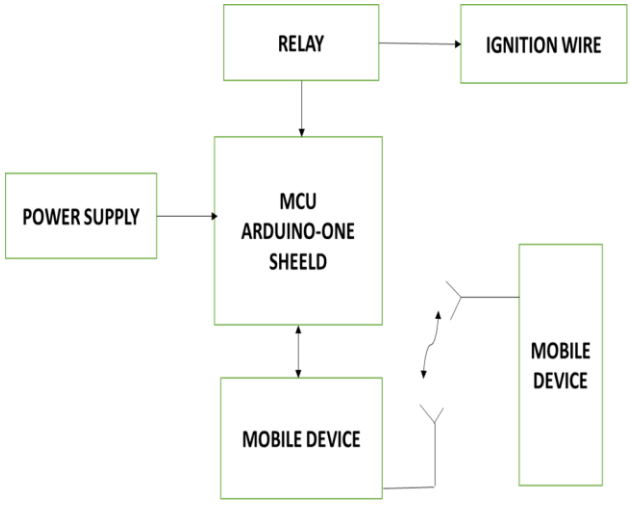
- Micro Controller : Arduino UNO
- Motor Controller : L298N Dual H Bridge
- Shields :1Sheeld
- System : Android Mobile Phone
- Switch : Relays(10 V)
- Power Supply : Battery(9 V)
- Connector : Jumper Wires

4.2 SOFTWARE REQUIREMENTS

- Operating system : Android
- Coding Language : C/C++
- Front End Tool : 1Sheeld Application
- Back End Tool : Arduino IDE

5. SYSTEM DESIGN

5.1 ARCHITECTURE DIAGRAM



The architecture diagram consists of two units, one is the transmitting unit (Vehicle) with Arduino,1 Sheeld, relays, ignition wire, power supply and a hidden mobile phone and other one is monitoring unit(User) mobile phone.

LIST OF MODULES

- Communication
- Tracking
- Control

5.2 MODULES DESCRIPTION

5.2.1 Communication

- GPS-Google Maps

GPS modules are popularly used for navigation, positioning, time and other purposes. GPS module is inbuilt within the mobile device and it receives the location in the form of latitude and longitude from the satellites.

- GSM

GSM is used for transmitting and receiving the data. The GSM SIM is inserted in the mobile device and communication takes place in between the user's mobile phone and the hidden one. The information is sent in the form of text message on the registered mobile number.

- Bluetooth

Bluetooth module is generally used with the Arduino board. This module is used for the transmitting and receiving of data between the mobile device and the controller.

5.2.2 Tracking

Tracking is generally based on mobile communication. When the user sends a message to the hidden mobile in the car, the 1sheeld activates the sensors and pings back the location of the stolen vehicle in the form of latitude and longitude. It can be further viewed by using google maps.

5.2.3 Control

Controlling the vehicle by turning the engine off is generally based on the functions of the relays and the ignition wire. Once the user sends 'Stop' message to the hidden phone, the message is transmitted to the arduino via Bluetooth and it controls the relays to cut the engine off.

6. SYSTEM IMPLEMENTATION

6.1 SOFTWARE DESCRIPTION

6.1.1 Arduino IDE

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and

communicate with them. Programs written using Arduino Software (IDE) are called **sketches**. These sketches are written in the text editor and are saved with the file extension .ino. The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom righthand corner of the window displays the configured board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor.

6.1.2 1Sheeld

1Sheeld is a platform for Arduino that allows you to tap into your smartphone's sensors and capabilities and lets you use them in your Arduino projects. Basically, It is a hardware shield that sits on top of your Arduino board and communicates over Bluetooth to this iOS app, to transfer data between it and your smartphone.

Instead of buying an accelerometer sensor, use the one in your smartphone, want to connect Arduino to the internet? no need to buy a WiFi shield, use your smartphone as a gateway to access the internet. 1Sheeld makes you use all your smartphone's sensors and capabilities for hardware prototyping.

7. CONCLUSION AND FUTURE ENHANCEMENT

7.1 CONCLUSION

A model to track and control the theft vehicle by using Arduino and 1Sheeld technology. This system works when the theft is identified, the user sends an SMS to the mobile phone hidden in the car for locating the vehicle. The hidden mobile phone in the car communicates with the Arduino via. Bluetooth and gets the LAT and LONG. It provides flexibility to the user to control the engine of the car, once the user sends

'Stop' to the hidden mobile phone. The Arduino receives the command and using the relays, it stops the engine motor. After that, engine of the vehicle gets off or ceased.

This model is an efficient one for tracking and controlling theft of a vehicle. The system is about making vehicle more secure by the use of Mobile technologies like GSM,GPS and mobile applications. The model can be further developed by using a face recognition system to capture live streaming inside the vehicle which makes us to recognize the person and a convenient method for the user to track the location and control the vehicle.

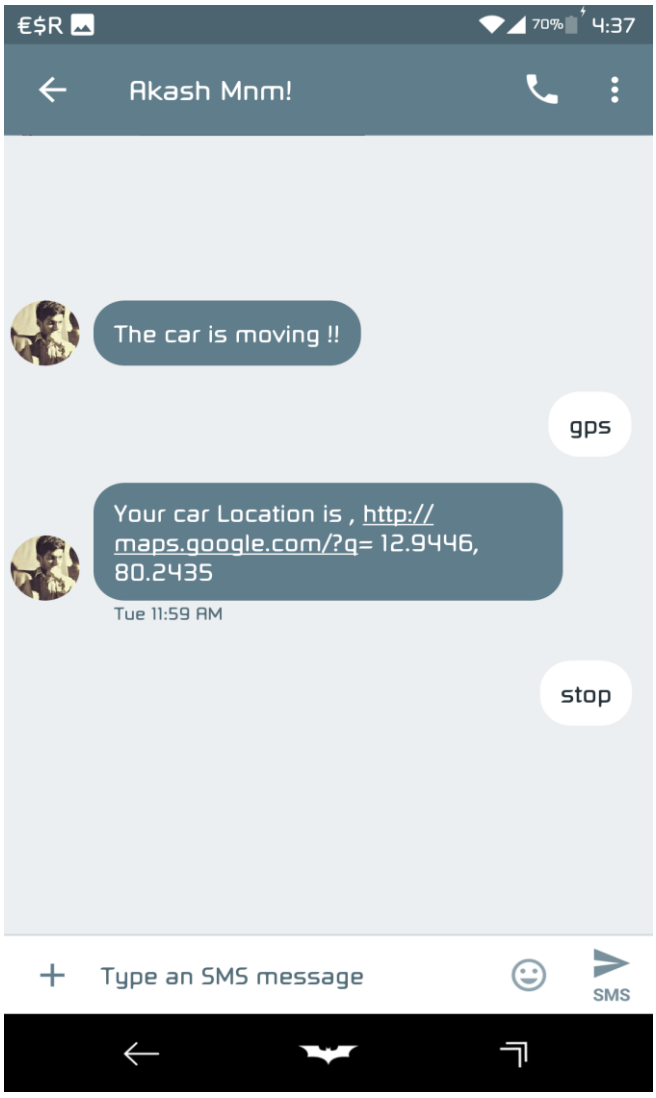
7.2 FUTURE ENHANCEMENT

A remote door locking system can be implemented in the vehicle to capture the thief. By implementing a digital camera recorder, the owner can record the face of the thief. This will help in identifying and capturing the thief. An accident detection system can also be implemented in the vehicle that detects accident and generates message to the family members about the location of the vehicle.

8. SAMPLE

8.1 TEXT MESSAGES :

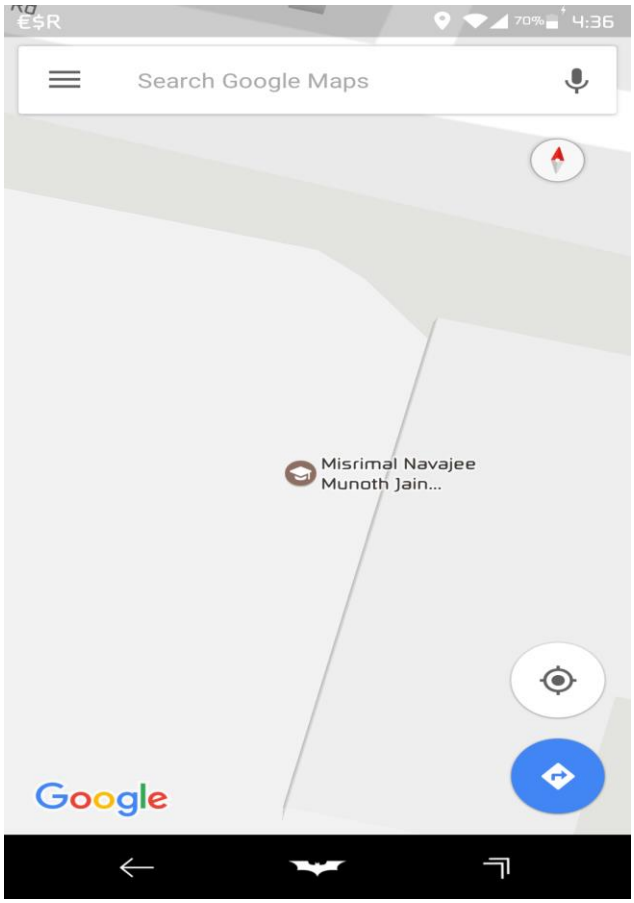
These are the SMS screenshots of the communication between the user's mobile phone and the hidden mobile phone inside the vehicle.



TEXT MESSAGES

GOOGLE MAPS:

This shows us the exact location of the stolen car in the form of latitude and longitude by using Google maps.



GOOGLE MAPS

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