**Advance Smart GPS & Electromagnetic Brake system**

**ABSTRACT**

Rising incidents of theft vehicles is an increasing concern in cities. The purpose of this project is to eliminate all possibility of theft by using ‘Advance Smart GPS System’. ‘Electromagnetic Brake Systems’ are the future of transportation safety using ‘Eddy Current Law’. Eddy current braking systems are a better alternative to the currently used friction based braking systems for instance disk and drum brakes. Electromagnetic brakes have become a wide regarded, technological advancement, in regards to the reduction of friction and heat energy produced, when braking heavy loads of matter. By Combining ‘Advance Smart GPS’ & ‘Electromagnetic Brake System’ technology can get all the stats of these two system into mobile by creating a Mobile App. These System can be controlled from Mobile app, Smart GPS System is a system in which can integrate all vehicles into one app to track data and analyze from different place regardless of vehicles location. This Smart GPS System Project is copyrighted (©) by ‘Dread Eye Studio’. This project definitively answers the question regarding elimination of theft & future proof. Further studies are needed to establish crucial for safety & preventative measures.

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**ABBREVIATIONS**

DES - Dread Eye Studio

DES MC - Dread Eye Studio Microcontroller

GSM - Global System for Mobile Communication

APN - Access Point Name

GPS - Global System for Mobile Communication

AVL - Automatic Vehicle Location

GIS - Geographic Information System

RF - Radio Frequency

AGPS - Assisted Global Positioning System

RDID - Radio Frequency Identification

DC - Direct Current

AC - Alternating Current

HTTP - Hypertext Transfer Protocol

HTML - Hypertext Markup Language

IDE - Integrated Development Environment

CSS - Cascade Style Sheet

SQL - Structure Query Language

DBMS - Database Management System

JDBC - Java Database connectivity

2D - Two Dimensional

3D - Three Dimensional

XML - Extensible Markup Language

POST - Power On Self Test

EEPROM- Electrically Erasable Programmable Read only Memory

SRAM - Static Random Access Memory

API - Application Programming Interface

**Chapter 1: Introduction**

**1. Introduction and History of Advance Smart GPS System**

**GPS Technology - Not a Recent Development**

Even before GPS was developed, fleet telematics was invented in 1974 -- or at least the origins of it. The U.S. automobile industry had begun a form of fleet telematics; as new cars rolled out of assembly plants via the Ford, Chrysler and General Motors manufacturers, they were cataloged using an electronic process. When orders were placed, a mainframe-to-mainframe method of communicating was used to process orders electronically, and vehicle status reports were generated using computer technology. This was the beginning of fleet tracking.

**Computer Technology and The Internet Pave the Way for Widespread Vehicle Tracking**

During the 1980s and 1990s, two major tech evolutions occurred that spawned fleet telematics systems that we have today. First, the production of the personal computer enabled businesses of all sizes to use this technology. No longer was it only accessible by government agencies, but small businesses could now use computers for handling fleet information. More importantly, personal computers made it easier for individuals with a limited computer science background to use this technology.

For fleet managers, computers that could fit on their office desk transformed the way they did business. By the early 1980s, fleet managers could connect with the mainframe of their management firm’s computer. This allowed an easy transmission of information both offline and online via a modem. In 1982, fleet company ARI designed the first-ever fleet maintenance management system to operate online. This greatly improved fleet managers’ ability to reduce lead times for vehicle deliveries.

Then, with the advent of computer accessories for storage — such as PC diskettes and later USB drives — fleet managers could increase their ability to share this information for research and billing purposes. In the 1980s, real-time updates on driver and fleet data were also enabled. This sped up the system of transmission to an even greater capability.

Early GPS technology was designed primarily for use by the military. The uses for the military were clear in the 1980s and 1990s, but public interest in GPS technology was minimal. In 1996, President Bill Clinton determined that the system would be an asset to civilians as well as the military, and issued a policy directive that would require the creation of a dual-use system benefitting the everyday user. This policy change made GPS technology available to the average individual, including fleet managers, who could see the benefit of using the technology to keep tabs on their vehicles.

Personal computers were transformed when the World Wide Web became accessible in the 1990s. In fact, the first Internet-based fleet management system called PHH InterActive was established in 1997. At a rapid pace, all fleet management programs on computers became web-enabled. As a result, fleet managers and drivers could share data pertaining to maintenance records, vehicle sales and vehicle ordering using the online portals. Also within this decade, General Electric created FleetTools, which was a type of fleet management software that also enabled management teams to run reports using fleet data.

In the 1990s, further modifications were made to GPS technology. These included policy and accessibility changes. In 2006, the last GPS satellite was launched.

**Modern GPS Vehicle Tracking (And a Look at the Future)**

Cellphones and tablets progressed right along with the use of GPS navigation technology. During the 2000s, mobile phones were able to perform GPS navigation and tracking processes using apps. Commercial vehicles were also equipped with dashboard computerized systems and communications platforms, such as Qualcomm.

These systems enable drivers to communicate directly with their dispatchers and fleet managers using in-cab, web-connected technology. At the same time, individuals in the office can locate drivers and freight from 1,000 miles away using these GPS-based fleet telematics systems.

The progression of telematics has advanced dramatically since the beginning of the 21st century. As a result of mobile technology, GPS, cloud computing and high-speed Internet capabilities, telematics can provide fleet managers with highly sophisticated data.

Managers have the tools to track trucks in real time using high-resolution maps updated on a regular basis. Thanks to monitoring software, these mapping systems can be accessed from anywhere on Earth via cloud computing.

The use of telematics helps fleets do more than just keep drivers safe. The technology allows fleet managers to monitor freight and provide secure geo-fencing zones. More secure freight leads to fewer losses and freight claims. As a result, shipping customers are more confident and ultimately satisfied with their freight services. This increases business operations and helps trucking companies improve return on their investment with telematics.

Telematics is combined with other technologies, such as routing, for increased optimization. For instance, managers can now use this data to determine how much fuel was used for a route and if an alternative route is more fuel-efficient. Fleet telematics also helps fleet managers monitor driver behaviors — such as speeding, hard braking and accelerating. By identifying these behaviors, managers have the data they need to implement driver training or other methods for correcting these issues.

Technologies involving GPS, big data and IoT will continue to evolve in the coming years. As such, we can expect to see far more from the use of fleet telematics systems in the trucking industry.

The modern fleet tracking system provides the necessary data to fleet managers allowing them to run their operations more efficiently. Reports on driver behavior, vehicle performance and fuel use all make it easier for the fleet manager to cut costs and increase efficiencies. These systems go beyond simple reporting of each vehicle’s location, offering fleet managers a wealth of information about their vehicles and their drivers

Today, fleet managers have a number of fleet tracking technologies they can use. These include:

* [**Cellular Tracking**](https://www.trackyourtruck.com/gps-tracking-devices/cellular-tracking/) — Cellular tracking taps into the growing cellular network to provide GPS data in real time.
* [**Satellite Tracking**](https://www.trackyourtruck.com/gps-tracking-devices/satellite-tracking/) — Ideal for fleets that regularly travel outside of cellular coverage. Satellite tracking uses traditional GPS satellites to track vehicles. Real-time satellite tracking is possible.
* [**Passive Tracking**](https://www.trackyourtruck.com/gps-tracking-devices/passive-tracking/) — Whether it be satellite or cellular based, passive tracking provides periodic location updates rather than real-time tracking data to help with asset management and vehicle tracking.

These three options show the clear evolution of the technology to the point that it now can accommodate fleets of all types and sizes. Today, GPS tracking is increasingly efficient, able to provide data in real time and able to be used on mobile devices for tracking on the go. Fleet management professionals can have as little or as much tracking data as they want at their fingertips, making it a viable option for small fleets as well as large corporations.

In December 2015, a new option for the modern fleet tracking system became necessary when the Federal Motor Carrier Safety Administration (FMCSA) published a ruling that will require all commercial vehicles to maintain electronic logs instead of paper logs. According to the mandate, electronic logging devices will have to replace paper record-of-duty logs in trucks by Dec. 16, 2017. Because electronic logging capabilities are built into most modern fleet tracking systems, this new mandate is expected to increase the use of GPS fleet tracking systems among fleets that are not currently using the technology.

What does the future of fleet tracking hold? Only time will tell, but based on its current evolution, we can expect to see an increased demand for accuracy, more data to track and improved mobile capabilities. If you are ready to embrace fleet tracking or if you need help ensuring that your fleet is operating in line with the FMCSA mandate, contact Track Your Truck to discuss your options. Our simple-to-use fleet tracking systems will make it easy for you to be compliant while offering all the benefits of GPS fleet tracking.

**2. Introduction and History of Electromagnetic Brake system**

**Introduction:**

Enhancement in Technology a lot of new technologies are arriving in the braking systems. The principle of braking is depending on the conversion of energy that is converted kinetic energy into thermal energy form of heat. In two wheeler Disc brake and drum brake are used in existing system, both braking are contact type braking as well as the frictional resistance braking. Dude to contact type braking losses are more like the wear and tear and so on. Also maintenance is required more like lubrication, replacement of auxiliary part due to wear and tear. There are few problems in the existing braking system. Realize the importance of the new braking system that reduced common problems mentioned earlier, experiment will be conducted to study of electromagnetic braking system. In this electromagnet electrical supply converted into magnetic field which act as magnetic force on the disc to be braked. In this braking system parameter influence to the braking force which is electrical current, air gap between the disc and the electromagnet etc. These are parameter will be design in this experiment. This type of braking system is more effective than the existing braking system. And all disadvantages of the existing braking system will be minimized in the electromagnetic braking system. Electromagnetic brakes are also called as Electro Mechanical Brakes. Stop motion using electromagnetic force to apply mechanical resistance form of frication. The original name was “Electro Mechanical Brakes” but over the years the name changed to “Electromagnetic Brakes”, referring to their actuation method. Since becoming popular in the mid 20th century especially in trains and trams, the variety of application and brakes designs has increased dramatically but the basic operation remains the same. Electromagnetic brakes are the brakes working on the electric power and magnetic power. They work on the principle of electromagnetism. ‘Electromagnetic Brake Systems’ are the future of transportation safety using ‘Eddy Current Law’. Eddy current braking systems are a better alternative to the currently used friction based braking systems for instance disk and drum brakes.

**History:**

It is found that electromagnetic brakes can develop a negative power which represents nearly twice the maximum power output of a typical engine, and at least three times the braking power of an exhaust brake. These performances of electromagnetic brakes make them much more competitive candidate for alternative retardation equipments compared with other retarders. By using the electromagnetic brakes are supplementary retardation equipment, the frictions brakes can be used less frequently and therefore practically never reach high temperatures. The brake linings would last considerably longer before requiring maintenance and the potentially brake fade problem could be avoided. In research conducted by a truck manufacturer, it was proved that the electromagnetic brake assumed 80% of the duty which would otherwise have been demanded of the regular service brake. Furthermore the electromagnetic brake prevents the danger that can arise from the prolonged use of brake beyond their capability to dissipate heat. This is most likely to occur while a vehicle descending a long gradient at high speed. Ina study with a vehicle with 5 axles and weighting 40 tones powered by a powered by an engine of 310 b.h.p travelling down a gradient of 6% at a steady speed between 35 and 40 m.h.p, it can be calculated that the braking power necessary to maintain this speed ot the order of 450 hp. The brakes, therefore, would have to absorb 300 hp, meaning that each brake in the 5 axels must absorb 30 hp, that a friction brake can normally absorb with self destruction. The magnetic brake is wall suited to such conditions since it will 9 independently absorb more than 300 hp. It therefore can exceed the requirements of continuous uninterrupted braking, leaving the friction brakes cool and ready for emergency braking in total safety. The installation of an electromagnetic brake is not very difficult if there is enough space between the gearbox and the rear axle. If did not need a subsidiary cooling system. It relay on the efficiency of engine components for its use, so do exhaust and hydrokinetic brakes. The exhaust brake is an on/off device and hydrokinetic brakes have very complex control system. The electromagnetic brake control system is an electric switching system which gives it superior controllability.

**Chapter 2: Literature Review**

**1. Literature Review of Advance Smart GPS System**

GPS technology can be embedded into many portable, low-cost electronic devices nowadays to track the movements of mobile objects. This implication has greatly impacted the transportation field by creating a novel and rich source of traffic data. Wolf (2000) concluded that GPS devices could be used to substitute, rather than supplement, the traditional travel diary. GPS devices have since then become an essential contributor to location-based services and intelligent transportation systems for traffic management and control, transportation routing and planning, as well as transportation policy and travel behavior analysis.

Although the promise offered by GPS devices to overcome problems like underreporting, time inaccuracies, respondent fatigue, and other human errors in data collection is significant, the fact that the technology is relatively new raises many issues for potential users as well. These issues tend to revolve around the following areas: reliability, data processing and the related application of the results. 2 GPS hardware is evolving rapidly with smaller size, higher compact units and lighter weight to improve the accuracy of data. A key issue in the accuracy of GPS devices is the number of available satellites. Research to-date suggests that, for travel mobility analysis, a GPS device should be capable of simultaneously tracking four or more satellites in order to maintain an acceptable accuracy. As GPS devices become more accurate, efficient, and cost-effective, can it be entirely reliable in real applications? There are shortcomings found in the GPS data, for instance.

* 1. **Active and Passive Tracking System**

**Active Tracking System:**

**“Active” GPS tracking devices**generally collect the same information, but are enabled to work with cellular or satellite networks. Using these wireless networks, they’re able to transmit data to a computer or data center for further evaluation. Additionally, these systems are commonly web-based so tracking data can be accessed from any capable device with an internet connection.

Many modern GPS tracking systems combine active and passive tracking capabilities so that when a cellular network is available, the device will connect to it and transmit data to a server. When a network is not available, the device will store data using internal memory and will store this information until it can be downloaded using a WIFI network (must be in range, usually when parked) or when a cellular network is available. To reduce costs, systems are usually set to transmit data at certain time intervals such as 1 minute, 5 minutes, or 10 minutes.

**Passive Tracking System:**

**“Passive” GPS tracking devices** store information such as GPS location, vehicle speed, and can trigger events such as start/stop or ignition on/off. When a vehicle returns to a predetermined location, the tracking device’s information is wirelessly sent to a host computer. Typical passive systems will automatically send data wirelessly, however these devices are not capable of real-time tracking.

**1.2. Type of Tracking System**

Keeping track of people or valuable items has never been easier, thanks to advancements in communication technology. A tracking device is an electronic unit designed to broadcast its location, either in response to a signal or at set intervals. Tracking devices can allow you to monitor merchandise, locate endangered animals, or help rescue workers find you in an emergency.

**RFID**

Radio frequency identification, or RFID, uses small tags containing a microchip or transistor with encoded information and an antenna for receiving and sending signals. When the tag detects a signal on the proper frequency, it absorbs the energy and uses it to respond with the encoded information. This allows a scanner to identify a tagged item from a few feet away, and is a common form of inventory control. The antishoplifting tags on expensive merchandise are RFID trackers, designed to go off if they come near the scanning bars at the entrance and exit of a retail store.

**Radio Tracking**

By adding a power source to a RFID tracker, you can greatly increase the range its signal will travel. These “active” trackers can respond to a wide-band scanning signal, or you can set them to go off periodically for long-term tracking purposes. A common use of this type of tracker is in the field of biology, when scientists tag animals for the purpose of tracking their behaviors or monitoring their health. This type of tracker is easy to implement, but it only provides a directional signal, requiring triangulation and estimation of the signal strength to provide a rough location of the device.

**GPS and Satellite Tracking**

The advent of the Global Positioning System has led to the development of incredibly accurate tracking devices. A GPS receiver compares signals from a network of satellites overhead to pinpoint its location to within a few meters, providing real-time positional data. Paired with a satellite radio, this can allow a tracking device to report its location anywhere in the world almost instantly, making it a valuable tool in rescue operations. Survival beacons and personal tracking devices often incorporate GPS technology to speed rescue operations, and many cell phones contain GPS trackers to help authorities locate 911 callers in an emergency.

**Cell-Phone Triangulation**

Even if your cell phone is not GPS enabled, it may contain technology designed to help the provider track the device. If you need to call for help in an unfamiliar location, 911 services can contact your provider and identify which cell towers can pick up your phone’s signal. By comparing the signal strength at each of these known locations, they can estimate your phone’s approximate location, which may be enough to direct emergency services to your location. This type of tracking is not as effective in urban environments, however, where signal clutter and echoes from buildings can make it difficult to pinpoint a location to within a few blocks.

**2. Literature Review of Electromagnetic Brake System**

**Principle of Electromagnetic Brake System**

If a piece of copper wire wound around the nail bar and then connected to the electrical supply, it would create that substance to act as an electro magnet. The magnetic field that is generated in the wire, from the current is known as “Right Hand Thumb Rule”. The Strength of the magnetic field can be changed by changing both wire size and the amount of wire turns. An Electromagnet is type of temporary magnet in which magnetic field is produced by a flow of electric current. The magnetic fields disappear when the current is lost. The wire produces loops of magnetic field lines around it, the current represents the movement of bar and resulting field line direction is the direction of turning. If a wire is wound into a coil, then the field lines add up in such a way as to produce a set of field lines surround the coil in a similar way to those that surrounds as a permanent bar magnet. If further a piece of soft iron is placed inside the coil, they themselves serve as many little bar magnets in the iron, creating a strong bar magnet as long as the current is switch on.

**Working of Electromagnetic Brake System**

A soft iron core that is magnetized by passing a current through a coil of wire wound on the core. Electromagnets are used to lift heavy masses of magnetic material and to attract movable magnetic parts like iron disc and ferrous material. When electric supply given to the electromagnet then it act as a temporary magnet this magnetic field exerted the force on rotation disc in the direction of perpendicular to the disc. In an engineering sense the word electromagnet does not refer to the electromagnetic brakes and clutches, and in attractive and lifting or holding magnets and magnetic chucks.

**Electromagnets may be classified into two types:**

* Traction Magnets:

In which the pull is to be exerted over a distance and work is done by reducing the air gap.

* Lifting or holding magnets:

In which the material is initially placed in contact with the magnet For Examples of the latter type are magnetic chucks and circular lifting magnets.

**Design and Practical Working:**

Theoretically, it is divided into three main units are Base unit, Driving unity and Braking Unit. Base unit consist of structural foundation of base unit, driving unit consist of an electrical motor, power control and bearing. Braking unit consists of an electromagnet. Electromagnetic brakes also called as Electro Mechanical Brakes. Stop motion using electromagnetic force to apply mechanical resistance by friction. The original name was “Electro Mechanical Brakes” referring to their actuation method. Since becoming popular in the mid 20th century especially in trains and trolleys, the variety of application and brake current brakes use electromagnetic force but electromagnetic brakes ultimately depend on friction and eddy current brakes use magnetic force directly.

**Material Selection:**

Material Selection process is depending on application of where the brake is used. Generally plate is mostly used in aluminum because it is very efficient to produce eddy current in plate. Preferred to use most effective copper plate but it is not cost efficient.

**2.1. Type of Brake System**

* **Electromagnetic Brake System:**

Rising style of brake system, electromagnetic brakes use an electric motor that is included in the automobile which help the vehicle come to stop. These types of brakes are in most hybrid vehicles and use an electric motor to charge the batteries and regenerative brakes. On occasion some buses will use it as a secondary retarder brake.

* **Frictional Brake System:**

Frictional brake system is found in many automobiles. It is typically found in two forms pads and shoes. As the name implies these brakes use friction to stop the automobile from moving. They typically include a rotating device with a stationary pad and a rotating weather surface. On most band brakes the shoe will constrict and rub against the outside of the rotating drum. Alternatively on a drum brake, a rotating drum with shoes will expand and rub against the inside of the drum.

* **Hydraulic Brake System:**

A hydraulic brake system is composed of a master cylinder that is fed by a reservoir of hydraulic braking fluid. This is connected by an assortment of metal pipes and rubber fittings which are attached to the cylinders of the wheels. The wheels contain two opposite pistons which are located on the band or drum brakes which pressure to push the pistons apart forcing the brake pads into the cylinders, thus causing the wheel to stop moving.

**2.2. Signification/Scopes of Electromagnetic Brake System**

* Electromagnetic brakes satisfy all the energy requirements of braking without the use of friction. They have better heat dissipation capability to avoid problems that friction brakes faces times.
* They can also be used as supplementary retardation equipment in addition to the regular friction brakes on heavy vehicles.
* These brake component cost is less so these brakes are cheap.
* They can be used as an alternative method for the future crisis of the crude oils.

**2.3. Limitations of Electromagnetic Brake System**

* The installation of an electromagnetic brake is very difficult if there is not enough space between the gearbox and rear axle.
* It cannot use grease or oil.
* Electromagnetic brakes are good at slowing things down, not completely stopping them.

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**2. List of Components**

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**2.2. SIM 908 Module**

**2.3. GPS and GSM antenna**

**2.4. Relay Switch**

**2.5. Battery**

**2.6. Wheel**

**2.7. Frame**

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**2.4. Mobile App Build**

**2.5. Visual Studio**

**2.6. Arduino IDE**

**Chapter 5: Result Analysis \*\*\***