

## Design and Development Of Anti-Theft Steering Mechanism Using A Smart System

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### Abstract

*The steering mechanism is one of the important parameters for any automobile vehicle since from its inception. The steering mechanism has evolved a during past many years. There are various kinds of steering mechanisms used in automobiles which have been evolved from mechanical systems to hydraulic, electric, and its automation. At present improved steering systems of automobile cannot work until the vehicle starts. Though it has been observed from many incidences that without the key the vehicles were stolen. For these reasons manufactures have primary focus on improving the overall security to prevent the theft of vehicle. From various incidences, reports it is clear that there still remains a scope for improvement in steering mechanism to avoid/minimize the theft of automobile. It was also observed when the team participated for Go-kart racing to avoid the kart theft. Considering this problem in mind it was decided to focus on this point which will avoid the theft by locking the steering mechanism. It will also give additional feature for enhanced security such that if it is started unlawfully the steering would not respond unless the user authorizes it.*

*This paper brief about the concept is to reduce the theft of vehicle by locking the steering of the Go-kart with the help of electromechanical system. In addition, for enhanced security will be provided for the comfort of the individuals by using GSM technology and biometrics which may be helpful for any automobile.*

*your own text.*

**Keywords—** *Steering mechanisms, GSM, Bio-metrics, Anti-theft*

### I. INTRODUCTION

Automobile theft is the biggest problem in the remote location of the city. For safety there are various features provided like beepers, activation of steering after vehicle starts etc. Despite of all these solutions there remains possibility of theft. To control these situation anti-theft systems have been developed over the few decades.

The steering systems which are currently deployed in the vehicles are combination of fluid with electronic arrangements and are used in the form of power steering. The conventional steering system were of pitman's type, ball and screw type, worm and worm wheel type, rack and pinion type which are upgraded by the fluid links in order to achieve the directional stability of the vehicle. The steering locking system has an additive advantage of inbuilt locking system, higher vehicle stability with low noise-vibration-harshness effects. This setup of central locking consists of an immobilizer which is the master element of this central locking unit. If this immobilizer is deactivated or if the connection

between immobilizer and ignition coil is cracked, the vehicle can be steal.

In addition to the steering locking mechanism, the central locking system and the ignition actuators of the vehicle can also be improved in the security by implementation of the electronic systems in the vehicle. Nowadays Automation occupies various electronic sections by its comfortable nature. This is an era of automation where it is broadly defined as replacement of manual effort by electronic power in all degrees of automation. Elimination of the key with the fingerprint module is much more convenient and secure for the vehicle. Fingerprint recognition technology allows access to only those whose fingerprints that are pre stored in the memory. These eliminates the need for keeping track of keys or remembering a combination password, or PIN. It can only be opened when an authorized user is present. Also, the implementation of the fingerprint recognition system is easy and cheap than the other ones.

The center locking or the steering column locks are not so efficient and hence vehicle can be stolen if the hot wiring is done. Hence, It is necessary to install system that will disable the vehicle by locking steering when parked, to prevent it from being unlawfully driven away even if hot wiring is done. Thus, based on the situation observed during Go-kart racing by various teams after interaction with them it was decided to develop a system which will prevent theft of kart. In addition to this feature like PIN, will be now, as entering the vehicle, turning the ignition on is more secure and even if someone manages to do so, the steering locking mechanism will immobilize the vehicle and protect it from theft.

## II. LITERATURE REVIEW

Vikas Sharma et al [March2013] studied that the steering systems which are currently deployed in the vehicles are combination of fluid with electronic arrangements and are used in the form of power steering. The conventional steering system were of pitman's type, ball and screw type, worm & worm wheel type, rack and pin-ion type which are upgraded by the fluid links in order to achieve the directional stability of the vehicle. Proposed system will work more effectively as it is also an illustration of power steering mechanism. This system not only serves the dynamic balancing of a vehicle with pure rolling of wheels without skidding but also induces the locking technology in itself. This locking is highly effective as it can lock the vehicle movement for even one millimeter of displacement. This steering system has an additive advantage of inbuilt locking system, higher vehicle stability with low noise-vibration-harshness effects. Higher thrust absorption capability as because of induction of fluid. Efficient performance at higher speeds and high degree of control. With this system, power steering is engineered and also the inbuilt locking system is evolved by which the vehicle will be constrained and will not move in any case. It gives an additive advantage to its safety measures of anti-theft.[1]

K. M. Arunraja1 [2017] The objective of this work is to design and fabricate an anti-lock steering control system by locking the steering of the car with the help of micro-controller. This is very useful for anti-theft, because steering unit is locked when vehicle is in the parking condition. Steering is released when the password is matched with the owner's password. And if the password is mismatched at the attempt of three times, the alarm is switched ON. When the vehicle is parked, anti-lock steering system is activated by the micro-controller. This motivates people to develop the technology into regular use. In this proposed system, password is incorporated existing vehicle security system. The model is to be constructed in modular form thus allowing the replacement/interchange of the various blocks and their associated technologies.[2]

Dr.V.Nandagopal et al[2018] studied fingerprint recognition technology allows access to only those whose fingerprints that are pre stored in the memory. When any user prompt to use hardware via fingerprint then correspondence checking is done, no need to remember any PIN, password to unlock

system. It can only be opened when an authorized user is present, since there are no keys or combinations to be copied or stolen, or locks that can be picked. Bio-metric systems have over-time served as robust security mechanisms in various domains. Arduino is used in many educational programs around the world, particularly by designers and artists who want to easily create prototypes but do not need a deep understanding of the technical details behind their creations. Because it is designed to be used by nontechnical people, the software includes plenty of example code to demonstrate how to use the Arduino board's various facilities. Fingerprint processing includes two parts: fingerprint enrollment and fingerprint matching. The system requests for user's finger, process it and give appropriate output based on if the finger is stored in the fingerprint module or not. The system is also able to enroll new user's finger at request but prompt for pass-code before it could be done. Pass-code editing can also be done on request in the system. Biometric recognition systems present security and convenience than conventional methods of personal recognition.[3]

G.Srikanth et al[July 2017] studied that fingerprint is a boon solution for these problems which provides high level of recognition accuracy. The skin on our palms and soles exhibits a low like pattern of ridges called friction ridges. The pattern of friction ridges on each finger is unique and immutable. This makes fingerprint a unique identification for everyone. Fingerprint scanner scans the fingerprints of users and used for ensuring authentication. Fingerprint scanning is more accurate and cost-effective method and duplication is virtually impossible. A Fingerprint recognition system can easily perform verification. In verification, the system compares an input fingerprint to the enrolled fingerprint of specific user to determine if they are from the same finger. An Engine Control Unit (ECU) is connected to the Info-Security Circuit Board and sensors inside the vehicle. The bus communicates with other vehicles, road-side transportation and mobile phones with wireless interfaces. The shortcoming of this system is that the data timeliness and network delays to apprehend reliable secure car communications.

[4]

From the review it has been observed that either the system is expensive or there still remains drawbacks which can lead to theft of vehicle. Hence, the aim of this project is to develop a system for Go-kart which may be cost effective and may be able to prevent theft.



Fig. 1 Our team Glycon's racing go kart on which we will perform our trials of the project.

### III. METHODOLOGY & SUMMARY

The Anti-theft steering system and vehicle information system through pass-word serves as a best safety and convenience system for the vehicle users to protect themselves from impending danger. The research work widens the area of safety and comfort systems in the field of automobile engineering providing various benefits such as accident prevention and passenger safety installations. From this report we think that this arrangement of locking suits good to make a vehicle theft free. As when the

wheels of the vehicle are kept in the position of toe-out it will be difficult for anyone to toe the vehicle. As the whole setup is hydraulic and mechanical so less chances of being tampered. If hotwiring is done even then the wheels will not come to straight ahead position for the movement.

From the review it is observed that use of the proposed security system may provide better alternative solution for prevention of vehicle theft in city. Hence to provide better solution there is an utmost need to design and develop a machine / system that will completely immobilize the moment of the vehicle by locking the steering column of the automobile if any kind of attempt of stealing or tampering with the wires is done by a thief. Also enhanced security will be provided by the biometrics, GPS and GSM technology.

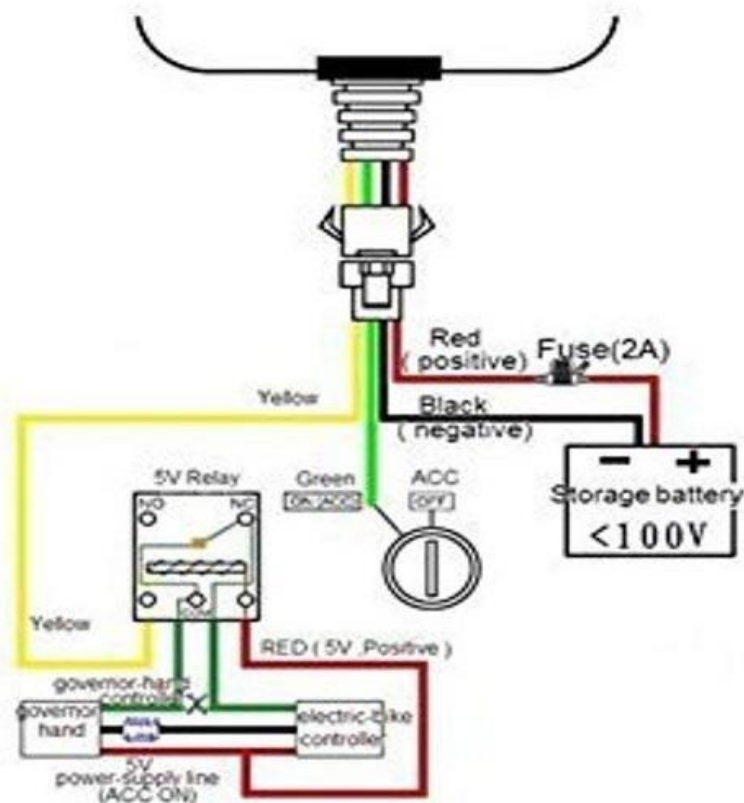


Fig. 2 The schematic representation of circuit diagram GPS module and GSM technology which may be able to notify the user and share location in attempt of car theft.



Fig. 3 The GSM module used to notify the owner incase of car theft.

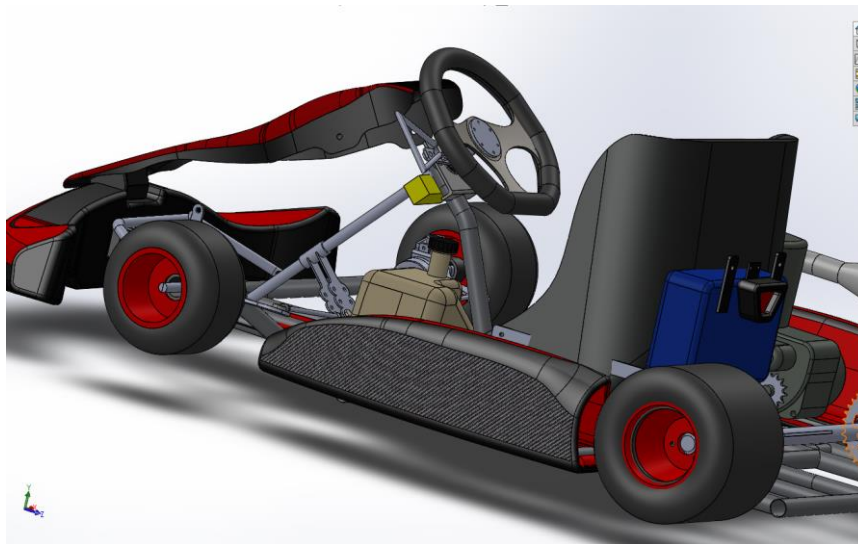


Fig. 4 The architecture and the schematic representation of the anti theft locking mechanism to be implemented on the racing go-kart.

Initially the steering column is welded with a circular plate having holes drilled at equal intervals. An well shielded cage is constructed for the components such as solenoid valves and the GSM module. Within the cage an GPS tracker is also installed in order to track the geo location of the vehicle in case the thief surpasses all the security systems. While putting parked condition the driver needs to press a push button, in case of actual automobile the push button will be replaced by various sensors, which will actuate the solenoid valve and insert the ferromagnetic core in the desired hole drilled in the circular plate, hence locking the steering of the racing go-kart.

To reverse the process when the racing kart needs to be driven, the individual needs to authenticate the system by authorized biometrics feeded in the system of the PCB and arduino program.

If this steering locking mechanism fails somehow and the thief manages to start the vehicle, then the security system will not only activate the GSM module and send a message to the user but also send

the racing karts live location on the user's device.

Addition to this there is a possibility of adding alcohol detectors to prevent the drunk driver from starting the vehicle and hence prevent further catastrophes.

#### IV. CONCLUSIONS

The various components are required to reduce the theft of kart are design. This will give additional safety features to the go kart vehicle. There components design in solid works. This system develop will be a well operating prototype of a anti-theft steering locking system and fingerprint based vehicle starting system.

The complete design and CAD model of the securely shielded cage and the components inside it ie. the solenoid valve, the wiring, and the welded locking hole-punched circular plate to be installed on the steering column of the racing cart is analysed and corrected. The GSM and GPS system which is a secondary security system on the cart in-case, unfortunately the thief manages to break-in the automobile, is installed and tested successfully on the kart in the IKSC4 championship..

The bio-metric input once stored will be verified and authenticate then only it will start. This system will be helpful to control theft of vehicle by providing additional security at minimum cost.

Alcohol sensor has very good sensitivity and fast response to alcohol, suitable for portable alcohol detector. If the driver is under the influence of alcohol, then sensor will notify the system and the automobile will not start. It is left for the future scope.

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