International Journal of Research in Engineering and Science (IJRES)
ISSN (Online): 2320-9364, ISSN (Print): 2320-9356
www.ijres.org Volume 9 Issue 1 ǁ 2021 ǁ PP. 57-63

New Smart Active Steering With Line Keeping Control Mechanism

Ashish Kumar, Ashish Mishra, Haider Quasim
Rahul Bhandari, Mr. Manoj Kumar Shukla
Glagotias University, Greater Noida, Uttar Pradesh, India

ABSTRACT
•The sensor will vibrate the steering if it senses that the driver is sleeping or he is unconscious. In case the driver do not regain the conscious, in short time even after the vibration the smart sensor will turn the steering in the direction of the road lane.
•The pressure sensor will also be fitted in the steering from preventing accidents. There are many traffic reports which say that the unfortunate incidents occur due to drive fatigue and heart attack. At this type of situation, the pressure sensor will detect pressure of hand on the steering and eventually turn the steering according to the road direction.
• The smart active steering helps to drive the automobile more easily as the normal automobile takes about 2.5 circles of steering to turn the car where as smart active steering car would take only take 1.5 circle turn of steering to turn the car completely which will help to turn the car even at the time of sudden braking.
KEYWORD: *Steering system, Pressure Sensor, Automobile, Line control mechanism*

Date of Submission: 12-01-2021 Date of acceptance: 27-01-2021

I. INTRODUCTION

Active Steering is a comfort while parking and more agility on winding roads – by pressing special push control mechanism fixes steering and the active steering is adjusted thus. Active Steering system affects the steering angle to one's driving speed and provides help in all driving situations. When the speed isn't high, like when someone parks or is in the city steering turns more direct. Turning the steering wheel, a little is enough to move the car and park more easily.

When the speed is high, the necessary angle increases and the steering turns indirect. So that one can control the wheels exactly with more turns of the steering wheel, and driving becomes stable. Consequently, there is noticeable stability at road and a confident steering sensation at high speeds.

Line keeping control mechanism

This steering system can be used for huge and heavy trucks and buses. These vehicles can be steered if driver is not paying attention and vehicle loses control.

The application of this intelligent steering mechanism does the generation of steering input on its own. The technology is changeable, self-sufficient and eco-friendly.

PROBLEM SOLVING AND WORKING

We have these two different concepts to construct our final year project.
There are very few companies, who are working over this concept of active steering and auto Line keeping control mechanism.

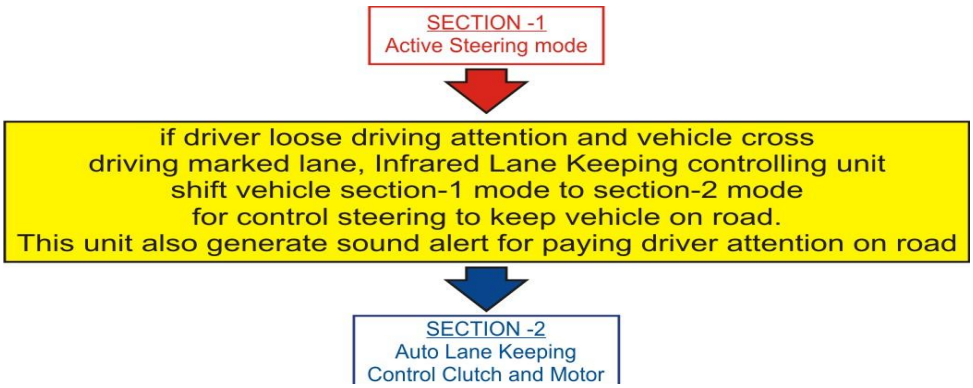
- ***How e.m. clutch works***

E.m. clutch is divided in to six different parts

1. *Iron core*
2. *Coil*
3. *Body cover*
4. *Iron disk-1*
5. *Iron disk-2*
6. *Plastic pipe*

- ***Working***

When we pass steel rode through this clutch, this rode is fixed in plastic pipe special cut. When this rode is rotated with motor only rode rotate, power supply is given to clutch, it attracts to gear disk and motor rotation is transferred to gear.



Components used

1. 3 set of different size of gear (Hs)
2. 1:4 gear box (Teflon)
3. Plastic steering
4. Dc gear motor
5. Rack and pinion
6. Bevel gear mechanism
7. Bearing
8. Electromagnetic clutch
9. Iron rode (8 mm, 12mm)
10. Plastic wheel
11. Iron body frame

Electronic components

1. Ic Lm 567
2. Inferred sensor (2 pair)
3. Regulator
4. Resistance
5. Relay
6. Capacitor
7. Transistor
8. Diode
9. Transformer

Components detail

1. Electromagnetic clutch

Electromagnetic clutches work electrically, but transfer torque mechanically. This is why they are referred to as electro-mechanical clutches. Single-face clutches make up almost 90% of all electromagnetic clutch sales.

Construction

This magnetic attraction, pulls the rotating coil in contact with the rotor face. The frictional contact, is held by the strength of the magnetic field making the rotational motion to begin. The torque is derived from the magnetic attraction of the coil and the friction between the steel of the armature and the steel of the clutch rotor. To increase life in applications, friction material is used between the poles on the surface of the rotor. This friction material made with the steel on the rotor for if the friction material was not flush proper magnetic traction couldn't occur between the faces. Clutches used in most mobile applications avoid use of friction material. Their cycle necessities tend to be less than industrial clutches and their cost is more high. Plus, many mobile clutches are exposed to outside elements thus by not having friction material it removes the possibility of swelling which is reduced torque that could happen when friction material have moisture.

2. GEARS

A gear or cogwheel is a rotating machine part consisting cut teeth, or cogs, which connect with another toothed part to start torque in many cases with teeth on the one gear of simile shape, and many times also with that shape on the other gear. Two or more gears working in tandem are called a transmission and can make a mechanical advantage through a gear ratio and may be referred a simple machine.

Geared devices can change the torque, speed and direction of a power source. The most common condition is to connect with another gear although gear can also connect with a non-rotating toothed part, called a rack thus producing translation rather than rotation.

The gears in a transmission are comparable to the wheels in a crossed belt pulley system. A plus point of gears is that the teeth of a gear avoids slippage.

When two gears contact and one gear is bigger than the other even when size of teeth is not different a mechanical advantage is produced, with the rotational speeds and the torques of the two gears varying in an inverse relationship.

In transmissions with many different gear ratios like bicycles, motorcycles, and cars the term first gear indicates a gear ratio and not a real physical gear. The term elucidate similar devices, even when the gear ratio is continuous rather than distinct or when the device does not really contain gears as in a continuously different channeling.

3. Rack and pinion gears

Rack and pinion is a kind of linear actuator that constitutes a pair of gears which turn rotational motion into linear motion. A circular gear called the pinion involves teeth on a linear gear bar knows as rack rotational motion on to the pinion causes the rack to move, thus translating the rotational motion of the pinion into the linear motion of the rack.

For instance, in a rack railway the rotation of a pinion put on a locomotive or a railcar involves a rack between the rails and pulls a train along a steep slope.

4. Bevel Gears

The surface of bevel gears is a cone. They are used when the direction of a shaft's rotation requires Using gears of differing numbers of teeth can differ the speed of rotation. They are mostly put on shafts that are 90 degrees apart but could be made to work at other angles also.

These gears permit minor adjustment during assembly and allow for some displacement due to deflection under operating loads without concentrating the load on the end of the tooth. For reliable performance, Gears must be pinned to shaft with a dowel or taper pin. Bevel gear sets consist of two gears of different pitch diameter that yield ratios greater than 1:1.

5. DC gear motors

First electromagnetic rotary motors was invented by Michael Faraday in 1821 including free-hanging wire dipping into a pool of mercury. A permanent magnet was put in the middle of the pool of mercury. When a current was made to pass through the wire, the wire rotated around the magnet showing the current giving rise to a circular magnetic field round the wire. This is the simplest form of a class of electric motors called homopolar motors. Later known as the Barlow's Wheel.

Earlier electric motor design used a reciprocating plunger inside a switched solenoid. It can be seen as an electromagnetic version of a two stroke internal combustion engine.

6. Bearings

The bearing makes possible the making of the machines we use daily. Without bearings, we would be constantly taking out parts that wore out from friction.

Gear box

- **Sun and planetary gearbox**

The sun and planet gear) was a way of converting reciprocating motion to rotary motion and was applied in the first rotative beam engines.

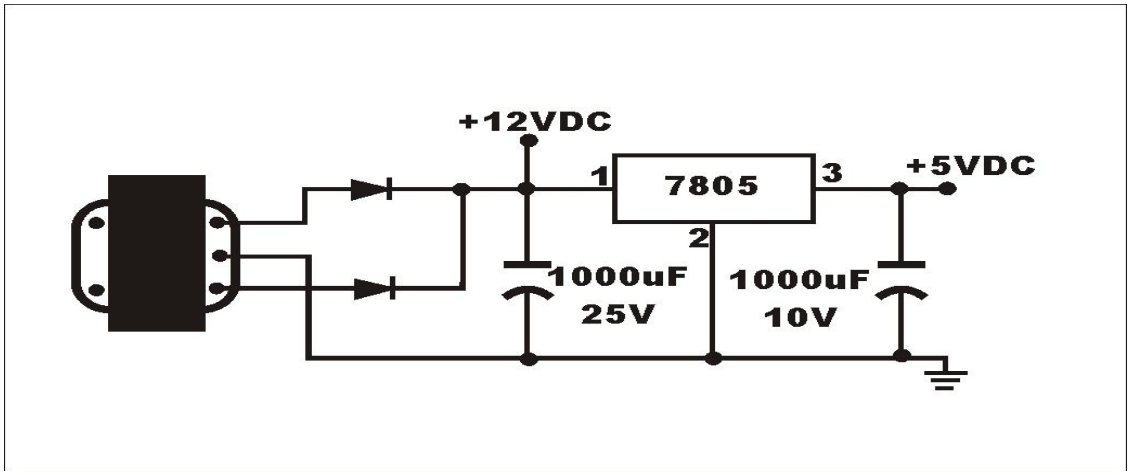
- **Used gear box**

A Transmission or gearbox uses gear ratios to provides speed and torque conversions from a rotating power source to another device. The most common use is in motor vehicles, where the transmission uses the output of the internal combustion engine to the drive wheels. Such engines need to operate at a comparatively high rotational speed which is incorrect for starting, stopping, or slower travel. The transmission decreases the speed

of higher engine to the slower wheel speed and speeds torque in the method. Transmissions are also used on pedal bicycles, fixed machines, and anywhere else rotational speed and torque needs to be adapted.

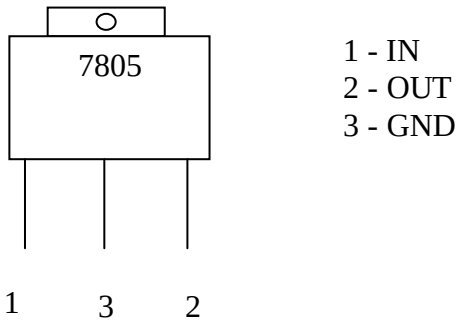
7. POWER SUPPLY

Many digital circuits operate on 5-volt DC supply which is taken by the following circuit. The power supply circuit has a step down transformer, bridge rectifier and 7805 voltage regulator IC.



8. REGULATOR:

7805 IC is used as regulator in 5V power supply.



IN 7805 pin no.1 is input pin through which non-regulated signal is used. Pin no.3 is grounded and regulated output is taken from pin no.2.

9. RELAYS

Many time's it is needed to abandon one circuit electrically from another, while only allowing the first circuit to control the second one.

A simple method of providing electrical isolation between two circuits is to place a relay between them. A relay has of a coil that may be energized by the low-voltage circuit and one or more sets of switch contacts, which may be connected to the high-voltage circuit.

10. CAPACITORS

It is an electronic component whose function is to accumulate charges and then give it up.
They are of two types
(1) **Fixed type** like ceramic, polyester, electrolytic capacitors these names indicate the material they are made of which is aluminum foil.
(2) **Variable type** like gang condenser in radio or trimmer. In fixed type capacitors, it has two leads and its value is all over its body and variable type has three leads.

11. DIODE

The simplest semiconductor device is made up of a sandwich of P-type semi conducting material, with contacts given to join the p-and n-type layers to an external circuit. This is a junction Diode. If the positive

terminal of the battery is joined to the cathode and anode a large current will flow. This is known as forward current or forward biased.

A little current will flow is connection is reversed reason being under this condition, the p-type material will accept the electrons from the negative terminal of the battery and the N-type material will give up its free electrons to the battery, which will result in the phase of electrical equilibrium since the N-type material has no more electrons. Thus there will be a small current to flow and the diode known as Reverse biased.

12. RESISTANCE

Resistance is the opposite of a material to the current. It is measured in Ohms (□). All conductors show a certain amount of resistance, since no conductor is 100% efficient. To control the electron flow we use resistors. Resistors are divided into two groups like fixed & adjustable resistors. In fixed resistors, the value is fixed & cannot be varied. In variable resistors, the resistance value can be varied by an adjuster knob. It can be divided into

(a) Carbon composition

(b) Wire wound

(c) Special type.

The most common type of resistors used in our projects is carbon type. The resistance value is normally indicated by color bands. Each resistance has four colors, one of the band on either side will be gold or silver, this is called fourth band and indicates the tolerance, others three band will give the value of resistance.

13. TRANSISTOR

As name suggests it is a solid state Semiconductor device. Sometimes it acts as an insulator and other conditions it's a conductor. This process is called Semi-conducting and allows a variable control over electron flow. So, the transistor is semi-conductor device used in electronics for amplitude. Transistor has three portions one is the collector, one is the base and other is the emitter. Electrons are released through one terminal and collected on another terminal while the third terminal acts as a control element. Each transistor has a number marked on its body. Every number has its own specific characteristics.

There are two types of transistor (i) NPN & (ii) PNP

NPN Transistors:

When a positive voltage is applied to the base the transistor begins to start by allowing current to flow through the collector to emitter circuit. The small current going through the base circuit causes a much greater current to pass through the emitter or collector circuit. The process is called current gain and is calculated in beta.

PNP Transistor:

It also does precisely same thing as above except that it has negative voltage on its collector and a positive voltage on its emitter.

14. Transformer

A transformer is an electrical device that transfers energy from one circuit to other by magnetic coupling with no parts that move. A transformer comprises two or more than two paired windings or a single tapped winding and in most cases a magnetic core to concentrate magnetic flux. A changing current in one winding creates a time changing magnetic flux in the core which introduces a voltage in the other windings. Michael Faraday built the first transformer, although he used it only to show the principle of electromagnetic induction and did not further see the use to which it would be put at the end.

Overview

An analogy

The transformer is simple two-wheel 'gearbox' for electrical voltage and current. The initial winding is analogous to the input shaft and the secondary winding to the output shaft. Current is equal to shaft speed, voltage to shaft torque. In a gearbox, mechanical power is invariable and is equal to electrical power which is also constant.

If a changeable voltage v_P is applied to the primary winding of N_P turns, current will flow in it producing a magnetomotive force (MMF). Like electromotive force (EMF) drives current around an electric

circuit, so MMF drive magnetic flux through a magnetic circuit. The primary MMF produces a varying magnetic flux Φ_P in the core, and, with an open circuit secondary winding, induces a back electromotive force (EMF) in opposition to v_P. According to Faraday's law of induction, the voltage introduced across the primary winding is equal to the rate of change of flux:

$$v_P = N_P \frac{d\Phi_P}{dt} \quad \textit{and} \quad v_S = N_S \frac{d\Phi_S}{dt}$$

where
v_P and v_S are the voltages across the primary secondary winding,
N_P and N_S are the numbers of turns
$d\Phi_P / dt$ and $d\Phi_S / dt$ are the derivatives of the flux with respect to time of the primary and secondary windings.
Saying that the primary and secondary windings are perfectly coupled is equal to saying that $\Phi_P = \Phi_S$.
Summing up for the voltages shows that:

$$\frac{v_P}{v_S} = \frac{N_P}{N_S}$$

where
v_p and v_s are voltages across primary and secondary
N_p and N_s are the numbers of turns in the primary and secondary.
Thus the ratio of the primary and secondary voltages is equal to the ratio of the number of turns in windings, or other way round, voltage per turn is the same for both windings. The ratio of the currents in the primary and secondary circuits is inversely proportional to the turns ratio. This turns to most usual use of the transformer that is to convert electrical energy at one voltage to energy at a different voltage by use of windings with different numbers of turns. In a practical transformer, the higher-voltage winding will have more turns of smaller conductor cross-section than the lower-voltage windings.

- **Analysis of the ideal transformer**

This treats the windings as a couple of mutually coupled coils with both primary and secondary windings passing currents and every coil linked with the same magnetic flux. In an ideal transformer the core needs no MMF. The primary and secondary MMFs, balance each other and thus there is no overall resultant MMF acting on the core.. The flux in the core is unambiguously showed by the applied primary voltage in according to Faraday's law of induction, or rather by an integration of the aforesaid law. No current will flow in the winding since no MMF is needed by the core.
Further on, the balance of the primary and secondary MMFs i.e. $N_P i_P = N_S i_S$, gives the ratio of the secondary and primary currents as

$$\frac{i_P}{i_S} = \frac{N_S}{N_P}$$

The ratio between the primary and secondary currents is the inverse of the ratio between the corresponding voltages.

- **DC voltages and currents**

A DC voltage applied to a winding of an ideal transformer will cause a DC voltage to be introduced in the other winding because any voltage applied will create a changing flux. However, using a transformer with DC voltages will need the magnetic flux in the core to increase without bound. Many transformers are designed to be near saturation without any DC current elements, so if it has a DC current it will make the transformer saturate more easily. Full-wave rectifiers don't have this problem , since the current they have has no DC component.

- **The universal EMF equation**

If the flux in the core is sinusoidal, the relationship for either winding between its number of turns, voltage, magnetic flux density and core cross-sectional area is given by the universal emf equation (from Faraday's law):

$$E = \frac{2\pi f N a B}{\sqrt{2}} = 4.44 f N a B$$

where
E is the sinusoidal rms or root mean square voltage of the winding,
f is the frequency in hertz,
N is the number of turns of wire on the winding,
a is the cross-sectional area of the core in square meters
B is the peak magnetic flux density in teslas

- **Classifications**

Transformers are adjusted to uncountable engineering applications and are classified in distinguished in different ways as follows
By power level (from fraction of a volt-ampere(VA) to over a thousand MVA)
By application (power supply, impedance matching, circuit isolation)
By frequency range (power, audio, radio frequency(RF))
By voltage class (a few volts to about 750 kilovolts)
By cooling type (air cooled, oil filled, fan cooled, water cooled, etc.)
By purpose (distribution, rectifier, arc furnace, amplifier output, etc.)
By ratio of the number of turns in the coils
Step-up
The secondary has more turns than the primary.
Step-down
The secondary has fewer turns than the primary.
Isolating
With intention to transform from one voltage to the same voltage. The two coils have precisely equal numbers of turns, although many a times there is a small difference in the number of turns, in order to compensate for losses otherwise the output voltage will be a little less than the input.
Variable
The primary and secondary have an adjustable number of turnings which can be choose without reconnecting the transformer.

REFERENCES

[1]. www.google.com
[2]. www.iprojectideas.blogspot.com
[3]. www.en.wikipedia.org
[4]. The Smart Steering Wheel Cover Design:
[5]. A Case Study of Industrial-Academic Collaboration in Human-Computer Interaction
[6]. Eleonora Ibragimova1,2(&), Arnold Vermeeren2, Peter Vink2, Nick Mueller1, and Leanda Verboom1
[7]. MOBGEN, Amsterdam, The Netherlands
[8]. {eleonora.ibragimova,nick,leanda.verboom}@mobgen.com
[9]. Industrial Design Engineering,
[10]. Delft University of Technology, Delft, The Netherlands {a.p.o.s.vermeeren,p.vink}@tudelft.nl