# Ultimate Dual Drive Control

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### Abstract

Through this project, we are attempting to introduce an innovative concept of steering mechanism which has got a wide range of possibilities, than that we ever thought of in the history of automobiles. We all know that in some countries like India we follow right-hand driving style whereas there are places in other parts of the world where they are accustomed to left-hand driving. This makes it difficult for a person to use the same car in countries that follow different modes of driving styles. This is where the importance of our project relies upon. We introduce a concept of which the driver is able to unlock his steering from its position, whether it be left or right, and lock it on the other side if he wishes to. By this adaption technique, the same car may be used in different countries. In the fast pace world of today where time is a matter of concern, most of the high officials are using their automobile for discussing business deals or something of that sort. Our project also aims in providing making this task an easy one for them. In a car with minimum cabin space, these discussions are a hideous task. We provide a solution for this. Our concept allows the driver to unlock the steering from its position and lock it on a free space while the automobile is parked. This makes it possible to turn the seats in the front cabin in the opposite direction, allowing everyone to sit face to face. This makes it easy for them to use their mode of travel also as a space for discussions or conferences. This feature of dual drivability also has a lot other applications in off road driving and in many service sectors which will be discussed in the upcoming chapters

**Keywords** — *Cliff Driving, Dual Drive Control, Heavy Utility Truck, Mower, Steering, Steering Rod, UDDC, Universal Coupling* 

# I. INTRODUCTION

Ultimate Dual Drive Control is an entirely innovative mechanism which enables the driver to switch his vehicle's steering either left or right according to his choice. This option has a wide range of applications particularly in off road driving and cliff driving. As we are already aware about, different countries use different drive systems. Therefore the proposed feature also enables the vehicle to be driven in different countries, even if they follow different drive systems, without having to go through tedious alteration processes.

The proposed design also has a wide range of applications in trucks that are used for sweeping the pavements and mowing embankments and sides of roads. In heavy trucks that are used to remove ice from the roads in countries like Germany with extreme weather conditions, our design will prove extreme relevance. Mowing embankments and the sides of roads, mulching fallow land or trimming ditch bottoms; regardless of how differing the requirements may be, our design will help the operators to have the best possible overview of the driving and working areas at all times.

Even in military vehicles our design may find extremely helpful and relevant in the war field, as well as at critical situations, where the driver needs to be switched spontaneously.

# II. REQUIREMENT STUDY AND ANALYSIS

#### A. Project Plan

The plan is to create a mechanism by which it enables a driver to drive his vehicle from either left or right side, according to his comfort and road conditions. First of all we have to study how the existing mechanism works in steering. We also has to have a clear idea about the adaptions or changes that went through in this field. The next challenge is to find a very apt mechanism that enables to bring about a change in the present system. Further create a perfect and practicable design. Further we have to consult experts in this field who can assist us. Then we should decide the vehicle on which we are going to work on. After that collecting the required tools and spare parts is the next hurdle. Then we have to find a workshop where we can work comfortably. Then our aim is to give our full effort and make our project a success.

# B. Problems in Existing System

Although the technology of steering has went a long way from the primitive model there was never an attempt made to enable a system by which the driver can steer his vehicle from left or right, according to his choice. This makes it difficult for a person to use his car in two countries which follows different drive system. Going through a lot of alteration to make this happen is indeed expensive and uncomfortable. It also brings a lot of challenges in cliff driving and off road driving.

# C. Proposed System

The proposed system allows a driver to shift his steering wheel either left or right, according to his choice and comfort. This system also has a feature to remove the steering and place in the center position of the dash which gives a provision to turn the front seats facing the back ones. This will come useful while using the car to have a conference or chat session in long drives, after parking the vehicle.

# D. General Description

Since our main area of concentration is on the steering system we may not be considering about other features like provision for AC or music players, which are most common in the present vehicles. Although our design is mainly concentrating off road vehicles we are going to do the project in an ordinary car.

# E. Specific Requirements

Since we are planning to do our project in an existing car we require a car as well as a workshop where we can work on the project comfortably. We may also need the help of a technician in this field who may be able to assist us if required.

# III. SCOPE OF THE PROPOSED SYSTEM

# A. Vehicles can be used in different countries with varied drive patterns

The conventional procedure that is adopted in order to use a vehicle which follows a particular drive system, in a country which follows another one, is to take it to an alteration expert and seeking his help. Altering a vehicle likewise is a pretty hideous task and indeed an expensive one. It may even effect the performance of the steering and there many cases in which this system failed with time. Our design is a permanent solution to this issue as no aftermarket modifications or costs are involved.

# B. Increases Market Value

The automobile industry always welcomed new features. People are always keen on new vehicles which may give them a better driving experience as well as effective and efficient comfort and performance. The system that we are proposing will indeed arose the interest of off road drivers and people who use their vehicle to travel through different countries which follows different drive system. Thus this system can bring about a wave in the market.

# C. Helps Taking another Country's License

It's often a difficult task for a person to get a license in a foreign country even though he is expert in driving. This is because that country may be following a different drive system which is a new deal to him. Our design solves this issue as a driver can practice both the systems, right from his country itself.

# D. Assists Parallel Parking

With a great hike in the amount of vehicles, parking is a major issue that we face each day. Parallel parking is an effective way to park in a civilized manner. While parallel parking in the left hand side of the road a left sided steering is more comfortable for a driver.



Fig 3.2 Left Side parallel parking

While the same is done on right side of the road a right handed steering may come handy. Our proposed design gives the luxury of both these systems and solves the above crisis.



Fig 3.1 Interior of an altered vehicle



Fig 3.3 Right Side parallel parking

# E. Assists Off Road and Cliff Driving

Adventure junkies may find this design very useful. While cliff driving, if the cliff is on the right

side it's better to use a right handed steering as it may give a better idea for the driver about the road.



Fig 3.4 Cliff on the right side of the road

Likewise a left handed steering is preferable if the cliff is on the left side.



Fig 3.5 Cliff on the left side of the road

# F. Conducting Conferences

In a busy world like ours, we may often have to use our vehicle as a space for business discussions and other such activities. By parking the vehicle in a comfortable location and shifting the steering from its two working slots to the free zone that is provided in the center, makes it easier for the passengers to rotate the front seats facing the back one. This makes it easier to use the vehicle as a room for official meetings and even for a chatting space for a family while in long drives.



Fig 3.6 Conference mode in vehicle

### G. Ultimate Control for Driving Instructors

Ultimate Dual Drive Control helps to maintain high standards of driving education. It helps to provide the best possible driving training, and to ensure you have the necessary knowledge and skills to stay safe on the road. UDDC helps to improve the quality of teaching, help the students to learn driving skills efficiently, improves the security in training greatly. If a student deviate the steering wheel in the training with dangerous situation, coaches can move the co-pilot's steering wheel to adjust direction in time to avoid the danger of occurrence; addition, when the students do not slam the throttle with panic, the coaches also can turn off the engine switch of the right steering wheel, promptly cut off key switches to avoid danger, to protect the safety of trainees and vehicles.



Fig 3.7 Instructor trying to control the steering

# H. Ultimate Control in Heavy Utility Trucks and Similar Machines

The Ultimate Dual Drive Control allows for smooth transitions from left- to right-hand drive operations in heavy utility trucks and similar machines.



Fig 3.8 A loaded truck passing through rough terrain

The dual drive option is optimal for use in refuse collection, road striping and street sweeping wherein a driver has to have a clear visibility of the side where the work has to be done. It is ideal for refuse and municipal applications requiring dual driving controls.



Fig 3.9 A road sweeper in action

It's also recommended for applications in a conventional truck, requiring a dual drive feature in order to maximize their productivity and make their jobs easier. These truck have to handle complicated terrains frequently and UDDC may favor the driver in these situations.



Fig 3.10 A Conventional Truck in Muddy Terrain

The applicability of UDDC implemented machines is further enhanced, allowing for maximum productivity, efficiency and ease of operation. Mowing embankments and the sides of roads, mulching fallow land or trimming ditch bottoms; regardless of how differing the requirements may be, UDDC implemented mowers will be the best multipurpose mower available. With the UDDC transferable steering system the steering column can be moved from the left to the right quite easily. This gives the best possible overview of the driving and working areas at all times. Or we can opt for two front-loaded mowing attachments which can be operated either in one-man or two-man operation.

The requirements when it comes to innovative municipal technology for gardening and landscaping are demanding. The challenging tasks can be solved efficiently and economically by a UDDC implemented machine.

#### J. UDDC in Summer and Winter Maintenance Machines



Fig 3.12 An ice cleaner in action

For diverse applications in summer and winter maintenance, in municipal logistics UDDC enabled machines is the best option. It provides everything we need for clearing and gritting operations.

# K. For Military Grade Applications

Ultimate Dual Drive Control can be implemented even in military grade vehicles. This feature gives the ultimate control over the machine in rigid and risky terrains as well as in war zones. In emergency situations where the driver needs to be switched UDDC comes in favour without the need for a delay.



Fig 3.11 A mower in action



Fig 3.13 A military grade vehicle in rough terrain



Fig 3.14 A military truck in war zone

# IV. DESIGN

A. Proposed Design For Dual Steering Control The proposed design is as follows.



Fig 4.1 Ultimate Dual Drive Control Design

## V. MAJOR COMPONENTS

There are two major components that makes this design a practical one. They includes

- 1. Universal Coupling
- 2. Additional Gear Train Assembly

#### A. Universal Coupling

Universal coupling is a main part of this mechanism. In many cases we required to connect shafts, whose axis are inclined at an angle to each other. In such cases universal joints are used.



Fig 5.1 Disassembled View



Fig 5.2 Assembled View

### B. Additional Gear Train Assembly

Gear trains are used inside the gear box. Gears are used in mechanical devices to transmit power. They are used to change the direction of motion. Idler gear are used. One gear turning another will always reverse the direction of motion.

To overcome this, we can insert an idler gear between the drive gear and the driven gear. The idler reverses the direction of motion coming from the drive gear. This allows the driven gear to be turned in the same direction as the drive gear.

The speed and angle of turn can also be maintained by using gears with same modules and design specifications.



Fig 5.3 Driving and Driven Gear



Fig 5.4 Gear Train with Idler Gear

# VI. STEPS FOR IMPLEMENTATION

1. Explore about the scope of the project.

Since this is an innovative project we needed to ensure that this project was relevant and had some future scopes. We thoroughly went through various issues that the conventional system of single steering raises in various applications. We made sure that these issues could be resolved through our project.

2. Go through the possible mechanisms by which the project can be implemented.

After a detailed study of how the present steering system works in different automobiles we tried to develop a design by which we could implement our concept. Various designs came up in our mind.

3. Finalize the most efficient design.

Scrutinizing the advantages and disadvantages of these possible designs helped us to draft a perfect design. The mechanism we adapted mainly includes identical spur gears and universal gears. This is the most efficient and less complicated mechanism by which our concept could be implemented.

4. Draft a drawing of the desired design.

Once we finalized our design we needed to draft a drawing for the same so as to refer when required. We drafted this drawing using Adobe Photoshop.

5. Select a suitable vehicle.

We required to choose a vehicle with compact and simple design so as to implement our concept. Maruti 800(1995 model) has been selected for implementing our proposed mechanism.

6. Seeking the assistance of an expert.

For clarifying about the requirements and for assistance to implement mechanism with minimum effort, we sought advice from a veteran mechanic who specialized in modifying automobiles.

Purchasing the required spare parts.

We tried to procure the required parts from several various places. We also had to manufacture some parts that were specific in our design.

8. Assembling the parts according to the design.

We had to disassemble the dashboard and associated units. Then we replaced the original system with our new system.

9. Testing functionality and modifying if required.

After re-assembling we tested for any malfunction. We rectified some tightening issues that we came across and made sure that the car with UDDC was running and can be controlled from both the sides effectively and efficiently.

# VII. PHASES OF CONSTRUCTION

The initial phase of a Maruti 800 is as in Fig 7.1.



Fig 7.1 A Maruti 800 original cabin view

After disassembly the final phase of the Maruti 800 is as in Fig 8.2.



Fig 7.2 Maruti 800 cabin after disassembling all components

# VIII. PARTS AFTER DISASSEMBLY

The following are the major parts of a Maruti 800 dashboard that we came across and had to deal with in this project.

1. Steering Rod



Fig 8.1 Steering rod

2. Steering Lock



Fig 8.2 Steering lock

3. Universal coupling



Fig 8.3 Universal coupling

# IX. ASSEMBLY OF ADDITIONAL PEDAL CONTROL

Establishing an automotive design by which an automobile can be steered from both side would also require a system by which the pedals can also be applied from both the sides. This is implemented in UDDC very effectively. It has been ensured that the pedals on both sides would ensure the same impact with the same effort.



Fig 9.1 Pedal control system in UDDC

X. CONSTRUCTION OF ADDITIONAL GEAR TRAIN



Fig 10.1 Additional gear train

An additional gear train as in the figure is an important component of the UDDC. The driven and driving gear of this gear train is of the same module. This ensures that they rotates with the same angle and speed and thus enables the smooth control of the steering irrespective of whether it is in right or left position.

# XI. FINAL STAGES

The project after assembly of all the additional systems and control is shown below. A provision to enclose the pedal controls on the side where the steering is not attached is given. This "pedal encloser" can be switched easily and comfortably along a trailer, to the side where pedals are not required. This ensures safety and unintentional application of the pedals by the person who is not behind the steering wheels.



Fig 11.1 Steering and pedals on right side



Fig 11.2 Steering and pedals on left side

Sl	Particular	Cost
No.		
1	A second hand Maruti 800	25000
2	6 additional universal	13800
	coupling	
3	3 gears of gear train	2500
4	Gas welding expense	1500
5	Irons and sheet metal	1000
6	A set of clutch brake and	1000
	accelerator	
7	Lubrication	100
8	Painting	100
9	Fuel expense	200
10	Other expenses	500
11	I shaft	2000
Total		47700

#### XII. COST ESTIMATION

**Table 12.1 Cost Estimation** 

# XIII. CONCLUSION AND FUTURE SCOPES

Successfully incorporating a mechanism which enables to switch a right handed steering to a left handed one or vice versa is our major concern. This feature has tremendous scope in the future of off road driving, cliff driving as well as normal driving.

Ultimate Dual Drive Control addresses a lot of issues. If a car has to be used in a country or region which follows a different drive system than the one it is designed for, UDDC is the perfect feature. Thus the same car can be used in countries that follows different drive patterns. Market values of such vehicles also increases.

It even helps driving instructor to control the car to the maximum while instructing less experienced drivers. It also help to practice drive patterns in the same vehicle. It assists the drivers in having ultimate control over the car as well as maximum visibility while parallel parking. It is a great advantage and attractive feature for adventure junkies as well as off road drivers who wish to take their vehicles through cliffs, hill sides and similar terrains where visibility over both sides of the vehicle may be necessary.

UDDC gives more cabin space when the steering is in detached mode. Thus the car may be utilized for even business conference, with the front side seats turned facing back seats.

This is also a feature that is applicable in trucks and several other similar machines like mowers. The requirements when it comes to innovative municipal technology for gardening and landscaping are demanding. For diverse applications in summer and winter maintenance, in municipal logistics and also in other tasks "Ultimate Dual Drive Control" comes handy. Mowing embankments and the sides of roads, mulching fallow land or trimming ditch bottoms, regardless of how differing the requirements may be, "Ultimate Dual Dive Control" is a handy feature. This gives you the best possible overview of the driving and working areas at all times. Or you can opt for two front-loaded mowing attachments which can be operated either in one-man or two-man operation. Even for clearing and gritting operations in countries where ice falling occurs, machines with UDDC makes the task easier.

Even in military grade vehicles this feature gives the ultimate control over the machine in rigid and risky terrains as well as in war zones.

We hope that this project serves as an inspiration for the automotive industry, especially in the field of off road driving, heavy utility trucks and machines like mowers, military vehicles etc., to find solutions for the future together.

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