

Differential Steering (Conversion System)

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Introduction

The Double Differential Steering that is used in Tracked Vehicles, can now be used in Private Automobiles.

1. The driver could now switch between two steering systems when needs a special function.
2. By clicking a switch, it will turn the steering wheel response into acting on all the wheels of the vehicle.
3. The main aim of switching to another steering system is to use the new advantage that it gives, of allowing the vehicle to rotate about its vertical axis.

Proposed project

A conversion system that lets the driver to switch between the two steering systems, is basically related to 3 factors:

- The four wheel drive Hydraulic Motors.
 - The Steering input power.
 - The Drive input power cut.
- When the Hydraulic Motors is synchronized, it allows weather to drive the front axle with the rear axle or only the rear drive axle.
 - When Steering input gets power from the Steering Hydraulic Motor, it result the wheels to rotate in different speeds.
 - When drive input is power cut, all the drive power is based at the Steering Hydraulic Motor, and causes the Wheels to rotate in opposite direction, thus making a Neutral Turn.

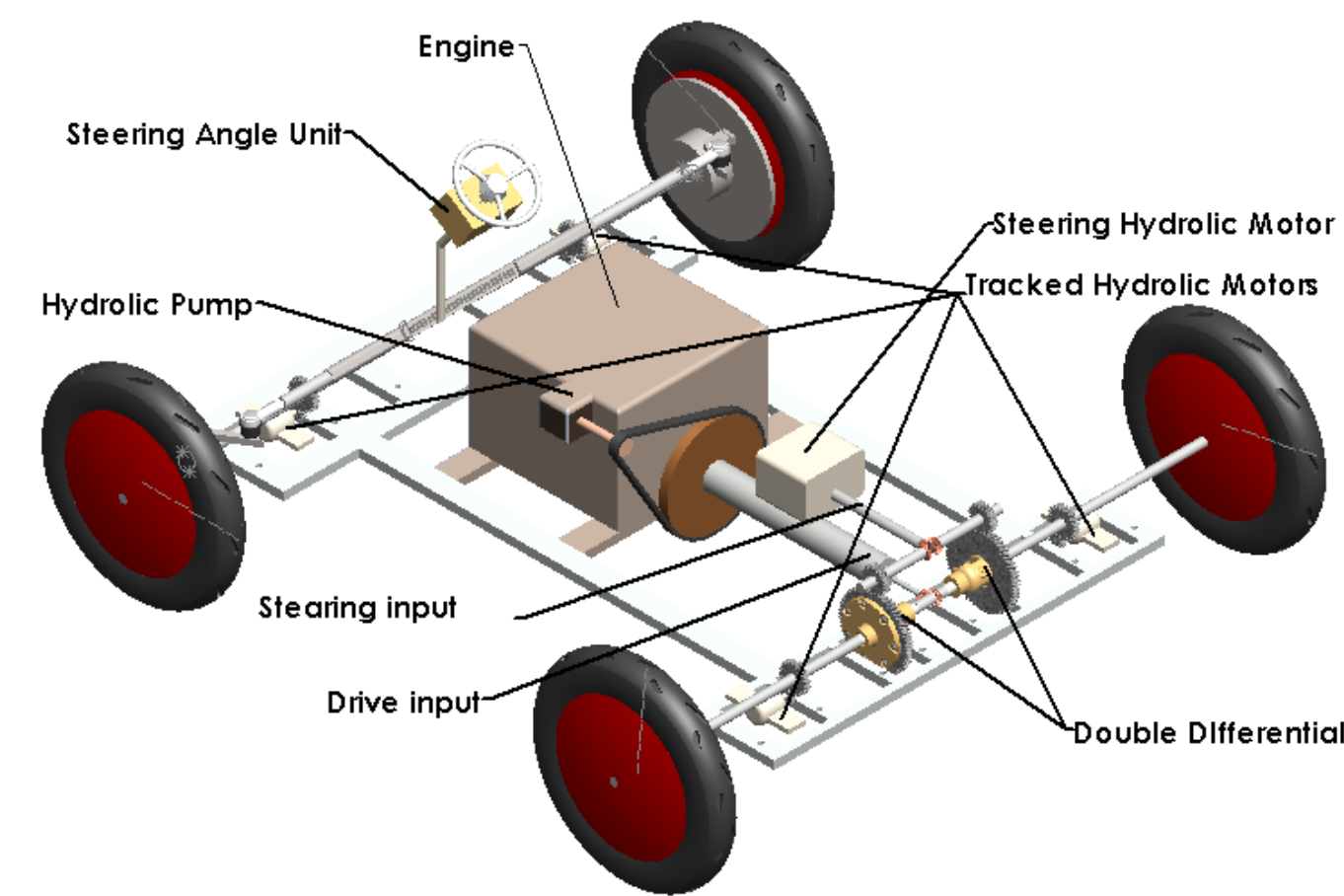


Figure 1: Illustration design of the Double Differential Steering

System Design and Implementation:

To make the system flexible responding for the driver action, a Control System consist of Sensor, Control Unit, and Actuators is required to do the job.

By receiving the Steering Angle signal and the Shifting Selector state, passing through the process in the Control unit, gives the Actuators to do the job depending on the System state.

Figures 3 show the block diagrams for the control function.

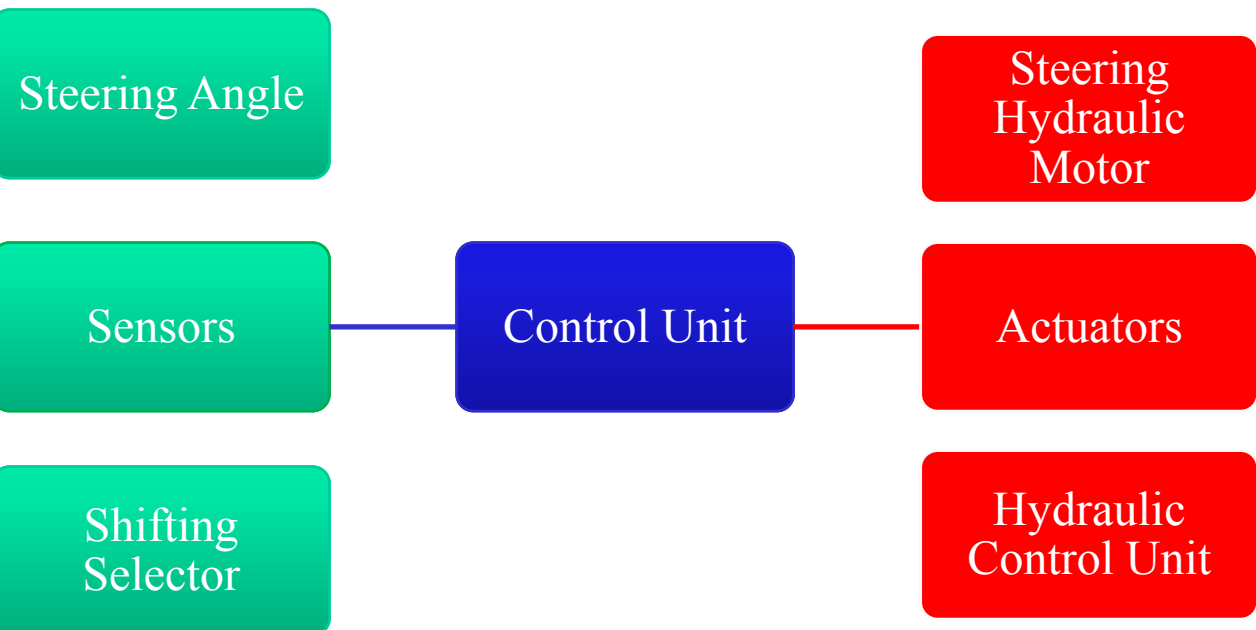


Figure 3: System Control

The general flowchart diagram that describes the Control Options is shown in Figure 4.

Project Objectives:

1. Demonstrate an idea of a new advanced steering system.
2. A steering system that lets the car to steer sharply around its vertical axis.
3. To give the driver the best flexibility and Time saving when needs to rotate the car in the opposite direction.
4. Making it possible to switch between the conventional system in normal driving, and the advanced system to rotating the car direction.
5. Design a simple model that shows the Neutral Turn and Skid Turn.
6. Illustrating a real design that can be applied in Automobiles manufacturing.

Results:

1. When switching to the advanced system, no unwanted problems occurs to the vehicle functionality.
1. When switching to the advanced system, the steering wheel response will act directly at the vehicle wheels to move in different speeds, depending at the steering wheel angle.
2. Sharp turning allows the vehicle to rotate in a small area, means it also allows to help in narrow parking.

Project Block Diagram:

Figure 2 is the general block diagram for a project, as illustrated below, the Conversion System comprises of the Ackerman Steering for normal and fast driving in Wide Roads, while the Differential Steering is used for Narrow Roads and parking .
By allowing the car to make a Neutral turn and Skid Turn.

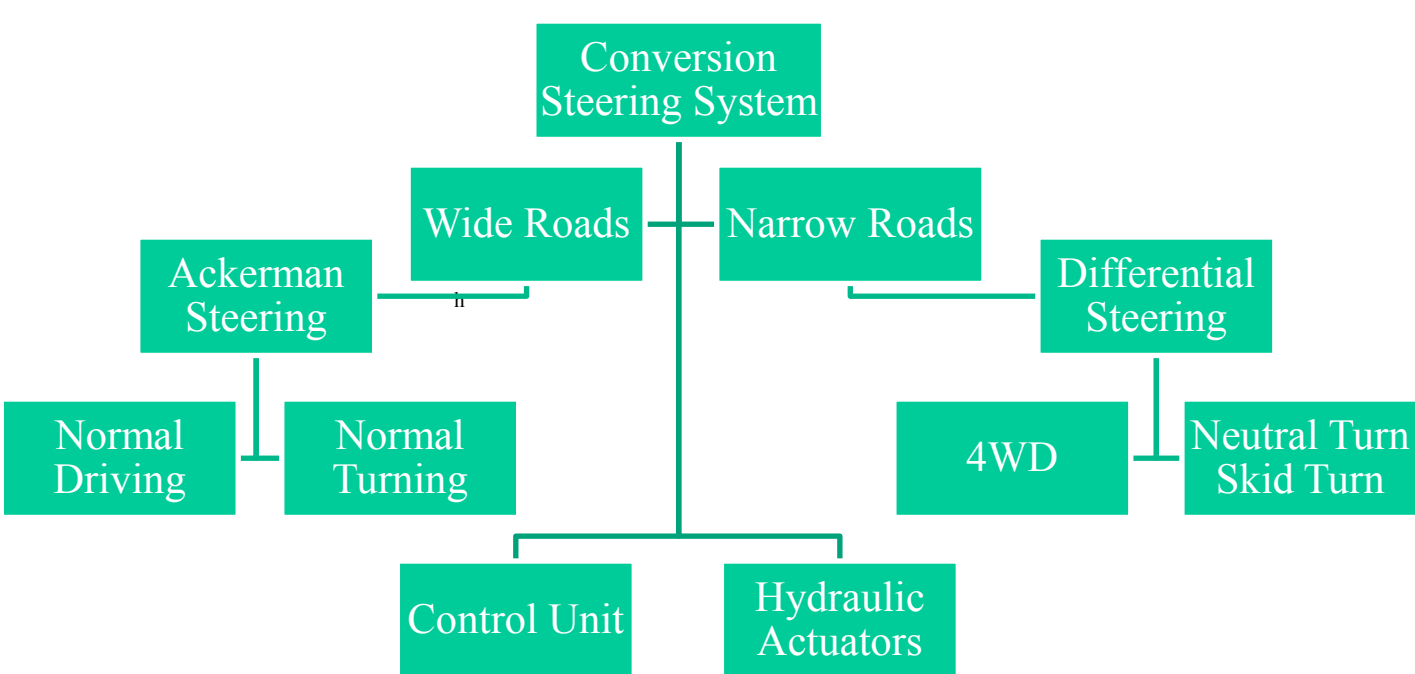


Figure 2 : Conversion System Block diagram.

The Conversion system controlling function depends on the Control unit that receives information from the Steering Angle and the System state.

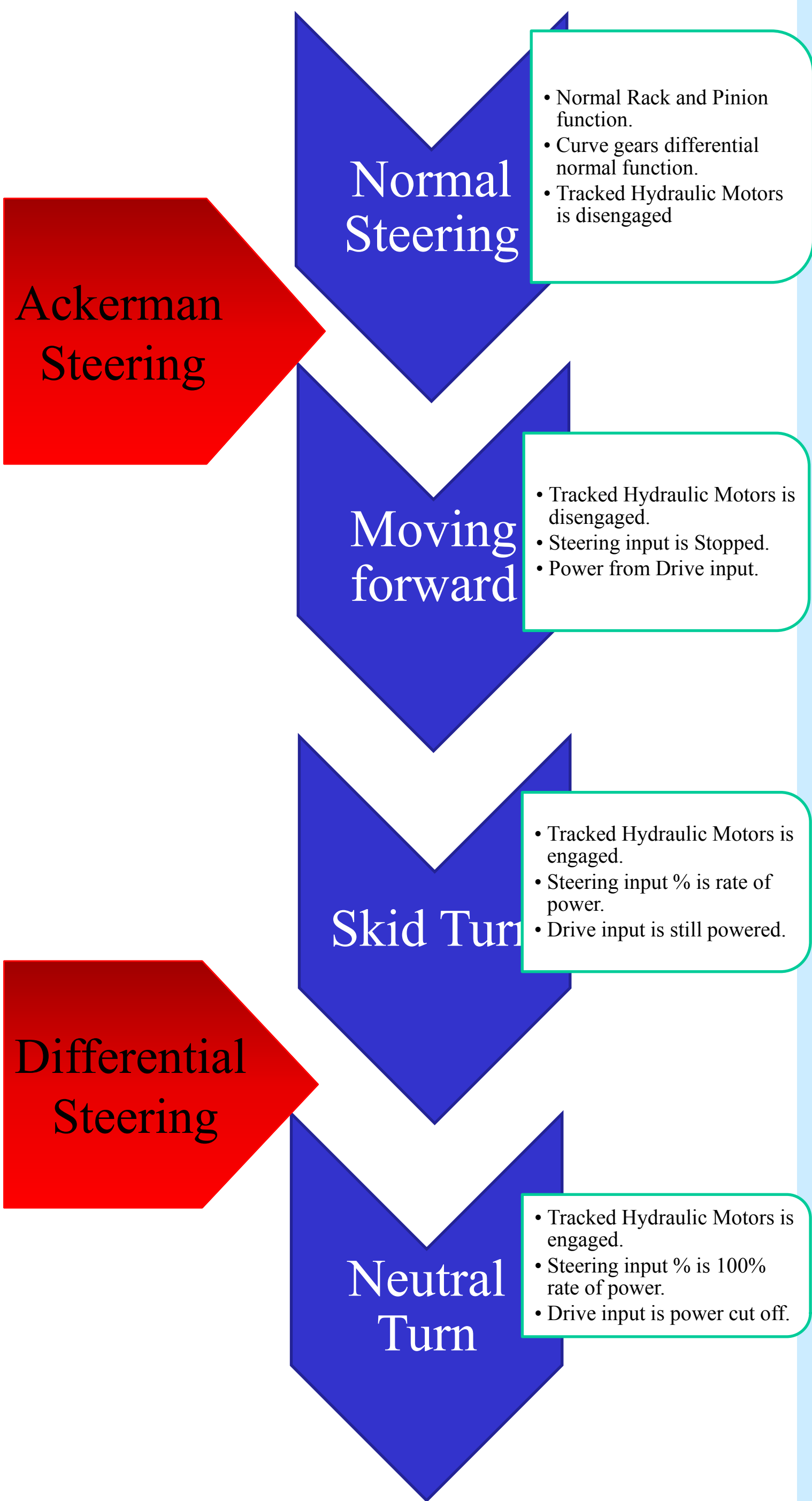


Figure 4: System Control Options