

# Cruise Control System in Automobile

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**ABSTRACT:** In modern era technology is growing fast day by day. In order to sustain the competition, automobile companies have to adopt advance technologies such as electronic control system. Future of automobile industries will be driven by these systems. This has led to improved fuel economy, reduced pollution, improved driving safety and reduced manufacturing costs. Cruise control system keeps vehicle's speed constant on long runs and therefore may help prevent driver fatigue. Cruise control systems are comprised of electronic and mechanical subsystems. Cruise control system employs a radar device to determine the rate of approach between your car and surrounding vehicles. Adaptive cruise control is an advancement of conventional cruise control in that it maintains the vehicle's pre-set speed. This new system can automatically adjust speed in order to maintain a proper distance between vehicles in the same lane.

**KEYWORDS:** safety and reduction in manufacturing cost.

## I. INTRODUCTION

### 1.1 Theory of Cruise Control System.

Cruise control systems are comprised of electronic and mechanical subsystems. Conventionally things that control the speed of the car are the gas pedal and the brakes and the brain that normally controls the speed of the car is the brain of the driver.

**1.2 Cruise Control: General Hardware Information** the block diagram of the hardware for such a system shows the main elements of a typical cruise control system. (Refer fig1)



Fig1. Controls for cruise control.

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## There are several inputs

- Hitting the on button tells the car that you might be hitting another button soon. The off button turns the cruise control off.
- The set/accel button tells the car to maintain the speed you are currently driving.
- Brake: On when the brake is pressed; the cruise-control system temporarily reverts to manual control if the brake is pressed.
- Resume: Resume the last maintained speed; only applicable if the cruise control system is on.
- Holding down the coast button will cause the car to decelerate There is one output from the system:
- Throttle: Digital value for the engineer throttle setting.

## 1.3 Cruise Control: Principle of operation

The vehicle's speed sensor which is mounted on the output shaft of the transmission sends electrical pulses to the computer. When the vehicle's speed increases the frequency of the pulses increases. For any given speed of the vehicle there is a corresponding pulse frequency. It is this pulse frequency which the cruise control tries to maintain as a constant. The brain of the control box of the cruise control has three functions. First, it stores the speed of the vehicle when you press the "set" button while travelling at the desired speed. It keeps this value in its memory until you turn the ignition off. Second, it receives the pulses from the transmission sensor and compares the frequency of those pulses to the frequency value stored in its memory - the set point. Third, it sends pulses to a vacuum controlled diaphragm connected to the accelerator linkage. The pulses it sends regulates the amount of vacuum the diaphragm receives. The more pulses, the more vacuum and the more vacuum the more force on the accelerator linkage. The system continues to add vacuum force until the set point speed is reached. At that point the system modulates the amount of vacuum the diaphragm receives in an effort to maintain the number of pulses coming from the speed sensor as close to the stored value as possible.

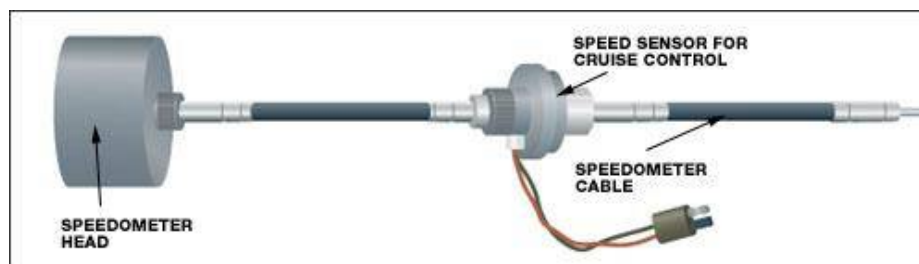


Fig 2 Speed sensor.

## 1.4 Controlling Cruise Control System

The brain of a cruise control system is a small computer that is normally found under the hood or behind the dashboard. The cruise control system controls the speed of car by adjusting the throttle position. But cruise control actuates the throttle valve by a cable connected to an actuator, instead of by pressing a pedal. The throttle valve controls the power and speed of the engine by limiting how much air the engine takes in.

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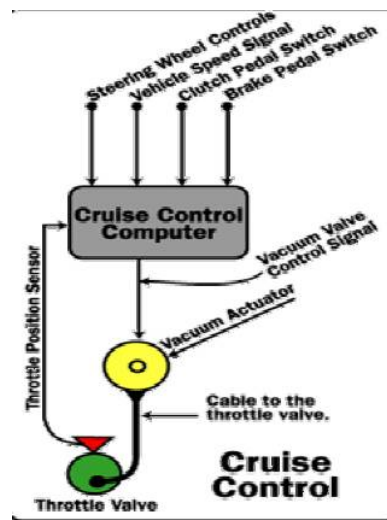


Fig 3 -inputs and outputs of a typical cruise control system.

## 1.5 Adaptive Cruise Control System

This new technology, called adaptive cruise control, uses forward looking radar, to detect the speed & distance of the vehicle ahead of it. Adaptive cruise control is similar to conventional cruise control in that it maintains the vehicle's pre-set speed. However, unlike conventional cruise control, this new system can automatically adjust speed in order to maintain a proper distance between vehicles in the same lane. This is achieved through a radar headway sensor, digital signal processor and longitudinal controller. ACC system measures the distance and relative speed of vehicles ahead using a sophisticated long-range radar sensor mounted behind the front bumper of the vehicle, cruising normally when the path ahead is clear and appropriately adjusting to traffic when necessary. The "cruise control with intelligence" is highly reliable, making more individual measurements on each horizontal radar scan than other systems. It can help the driver detect objects more than 100 meters ahead of the vehicle.

## 1.6 Case Study of Bmw's Adaptive Cruise Control System

Adaptive Cruise Control (ACC) uses a three-beam radar sensor to monitor the road ahead of the car and to adjust the speed of the vehicle by slowing the engine or by gently applying the brakes. Unlike conventional cruise control systems, BMW's ACC system is actually able to adjust the car's speed to suit the surrounding traffic conditions. Suddenly a car blocks your path. What happens next? The system uses a three-beam radar sensor. This electronic eye monitors the road ahead of the car - up to 120 meters. When a car appears in the lane ahead - as in the below picture - the system calculates its location, movement and relative speed, using the reflected radar waves. The system is able to recognize whether a particular vehicle is occupying the lane ahead. As soon as the car ahead changes lanes again, your vehicle picks up speed again.

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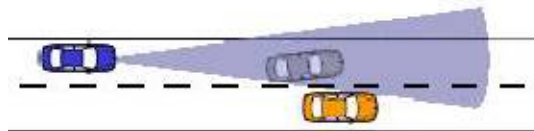


Fig-4 Suddenly a car blocks your path.

## Features of Adaptive Cruise Control System:

- Maintains consistent performance in poor visibility conditions.
- Maintains continuous performance during road turns and elevation changes.
- Alerts drivers by way of automatic braking.

## Benefits:

- Minimizes speed differentials between vehicles.
- Reduces throttle and brake management.
- Integrates easily with other vehicle systems between vehicles without driver interventions.

## II.CONCLUSION

An electronic system frequently fitted to modern vehicles is a cruise control system, usually throttle controlling which keeps a vehicle's speed constant on long runs and therefore may help prevent driver fatigue. Cruise control systems are adapting to this new reality, cars will be equipped with adaptive cruise control, which will allow your car to follow the car in front of it while continually adjusting speed to maintain a safe distance. Adaptive cruise control adjusts your car's speed to the changing flow of the surrounding traffic.

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