

# EECS 481 Software Engineering

## Project 2 Description

### Anti-Lock Braking System

Automotive designers have included an embedded system called ABS (Anti-lock Braking System). Without ABS brakes, a car's wheels can lock up or start skidding if the brake pedal is held down too forcefully, especially in rain or snow. This results in loss of control of the vehicle. A typical result is a car going in a straight line in the direction of travel prior to the use of brakes. Pumping the brakes manually may relieve this situation.

In a vehicle with ABS, sensors at each wheel determine when an individual wheel has or is about to lock up. The ABS then lessens the pressure to that wheel by pumping the brakes automatically. And unlike manual brake pumping, the remaining wheels may still have maximum brake pressure applied to stop the car.

Check out the following web sites:

<http://www.autoshop-online.com/auto101/abs.html>

<http://www.autoshop-online.com/auto101/braketext.html>

<http://www.autoshop-online.com/chtml/brk.abs.html>

#### **Constraints**

- The wheelspeed sensor gives input to the controller. Rapid deceleration causes the ABS to cycle. The system must check for skidding hundreds of times a second. If one wheel is decelerating faster than the others, then lockup is predicted and avoided.
- The system must control a value that interfaces with the wheel cylinders. It results in 'pumping' of the brakes, as much as 10 times per second.
- When the vehicle is initially started, the ABS goes through a test sequence. Another test sequence is needed every time the brakes are applied. If an error is found, the system turns itself off, and sends an error light to the dash.
- The vehicle has normal braking when ABS is turned off.