Nonholonomic & Underactuated System

⇒ Every robot system is subjected to variety of motion constraints, but not all of these can be expressed as configuration constraints.

Ex: Car {It cannot move sideways}

→ This velocity constraint does not imply a constraint on configurations.

→ The car can reach any position & orientation in the obstacle-free plane.

⇒ This no-slip constraint is a **nonholonomic constraint**, a constraint on the velocity.

⇒ We call ~~each~~ such system as **underactuated**.

⇒ Underactuated systems have fewer control than degree of freedom.

⇒ Our first task is to determine if the constraints actually limits the reachable states of the robot system.

↳ This is a **Controllability** question.

⇒ The next problem is to construct algorithms that find motion plans that satisfy the motion constraints.

⇒ A last problem is feedback stabilization of the motion plans during execution.