



Problem Definition:

Create alternative controls and assisted driving systems that allows users, who are unable to use conventional controls, to fully operate a vehicle.

Clarify objectives:

- Develop the motion controls for operating the vehicle.
- Develop voice controls to increase user control over the vehicle.
- Implement ultrasonic sensors to detect objects that are in the vehicle's path to avoid collisions.
- Develop a speed regulation system to assist the driver.
- Develop preset maneuvers that the vehicle can perform autonomously and allow the user to invoke by command.

Establish Metrics:

- Able to read the user motion: tilting left /right or up/down. Which correlates to driving the car to turn left/right & forward or backward.
- Identify specific voice commands and execute corresponding tasks. ex on/off..
- Ultrasonic sensors will measure distance between itself and the closest object in its path. Once the vehicle becomes close to the obstacle it will stop to avoid collision.
- The vehicle should be able to sense how fast it is travelling and adjust output to the motors to maintain a constant speed.
- The vehicle will have preset maneuvers such as pivoting and travelling a specific distance. The user will be able to invoke these maneuvers and the vehicle will drive itself according to the users command.

Identify Constraints:

- User dexterity and ability to use motion controls will constrain the number of input controls. The tires on the vehicle cannot turn, they can only move forward/backwards.
- Voice commands must be easy to articulate. Avoid homonyms and slang words. Limited amount of voice commands will be recognized by the vehicle.
- Ultrasonic sensors will not be able to detect small objects or objects that are far away. It will not detect objects that are not in its travel path. It won't be able to detect holes or ledges.
- The vehicle will only have one or two speeds that are predefined.
- Cannot program long maneuvers. Can only program a limited number of maneuvers.

Additional Ideas:

- Program the car to automatically pivot, back up or steer to avoid obstacles.