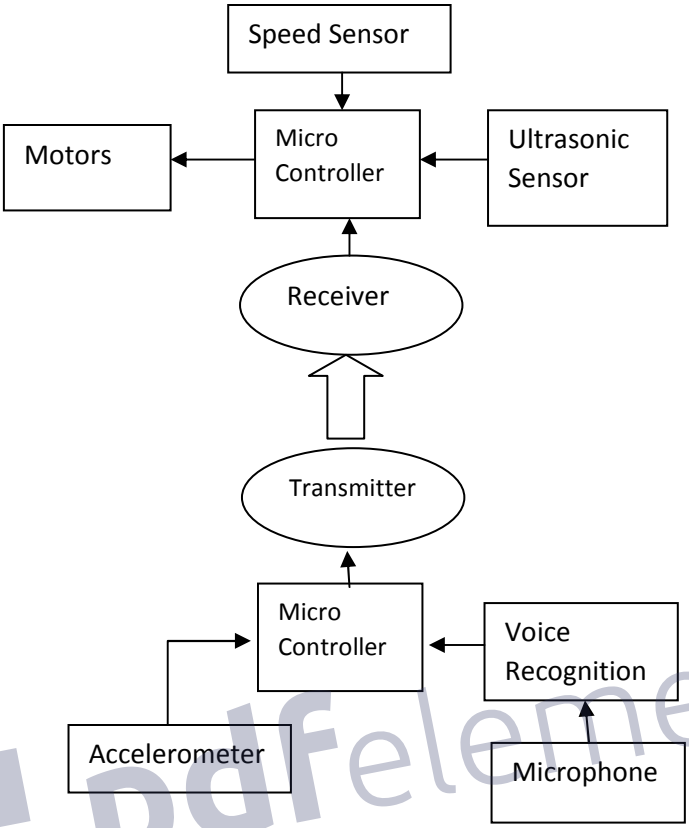

1. Develop the motion controls for operating the vehicle.
    - The user will be able to rotate an accelerometer in different directions to control drive the vehicle.
    - The microcontroller on the user controller will read data from the accelerometer using SPI communication.
    - The microcontroller must determine the orientation of the accelerometer in terms of the following 9 gestures.

Gestures

Forward/left	Forward	Forward/right
Left	Flat	right
Backwards/left	Backwards	Backwards/right

    - Successful implementation of this system can be demonstrated by using an accelerometer as an input to a microcontroller that will output the correct gesture via leds.
    - Ali will be responsible for the motion control portion of this project.

2. Develop voice controls to increase user control over the vehicle.
    - The user will be able to speak into a microphone that is connected to the user's controller.
    - The microphone is an input for the voice recognition component. The voice recognition component will be programmed to trigger a response to the microcontroller in the user's controller if a particular command is recognized.
    - Example commands may be "on", "off", "fast", "slow", or something that defines a preset maneuver.
    - Successful implementation of this system can be demonstrated by using a microphone as an input to a microcontroller that will output the correct word via leds.
    - Mohammed will be responsible for the voice control portion of this project.

3. Implement ultrasonic sensors to detect objects that are in the vehicle's path to avoid collisions.
    - The microcontroller on the vehicle will sample distances from the vehicle and the closet object in its path using ultrasonic sensors.
    - The microcontroller on the vehicle will use this input to determine the location of obstacles in its path. The vehicle will automatically adjust its motion to avoid colliding with obstacles.
    - The vehicle should drive up to an obstacle and stop at an appropriate distance away from it to avoid the collision.
    - Successful implementation of this system can be demonstrated by programming the vehicle to drive autonomously toward an obstacle. The vehicle will sample the distance it is away from the obstacle and it will stop to avoid the collision.
    - Matthew will be responsible for the collision avoidance portion of this project.

4. Develop a speed regulation system to assist the driver.
    - The microcontroller on the vehicle will read input from the vehicle to determine its speed. This input may come from a sensor that counts the revolutions of one of the tires on the vehicle.
    - The microcontroller will adjust the voltage applied to the motors to control the speed of the vehicle.
    - The user should be able to select the relative speed that the vehicle travels however, the vehicle should accelerate smoothly between different speeds and drive at a constant speed.
    - Successful implementation of this system can be demonstrated by programming the vehicle to drive autonomously, regulating its own speed while it transitions from slow to fast to stopped.
    - Matthew will be responsible for the speed regulation portion of this project.

5. Develop preset maneuvers that the vehicle can perform autonomously and allow the user to invoke by command.
    - The vehicle will be programmed to perform specific maneuvers.
    - These maneuvers may have practical purpose such as pivoting approximately 90 degrees or driving forward and attempting to steer around an obstacle if one is encountered.
    - While these maneuvers are performed, the vehicle will not respond to any input from the user except for an emergency stop command. Therefore minimal user input is required for testing.
    - The preset maneuver can be demonstrated by allowing the vehicle to execute its maneuvers in a controlled environment. If the vehicle is able to execute its maneuvers as expected, then the system is successful.
    - Matthew will be responsible for the preset maneuvers portion of this project.

Notes:

1. We have not discussed how many maneuvers the vehicle needs to be able to perform or how a successful execution of a particular maneuver will be measured.
2. We also need to develop a wireless communication system between the user controller and the vehicle.
3. We should try to build the circuitry on the vehicle and on the user controller to be durable and ergonomic.
4. The interface between each subsystem must be completed after testing is successful.