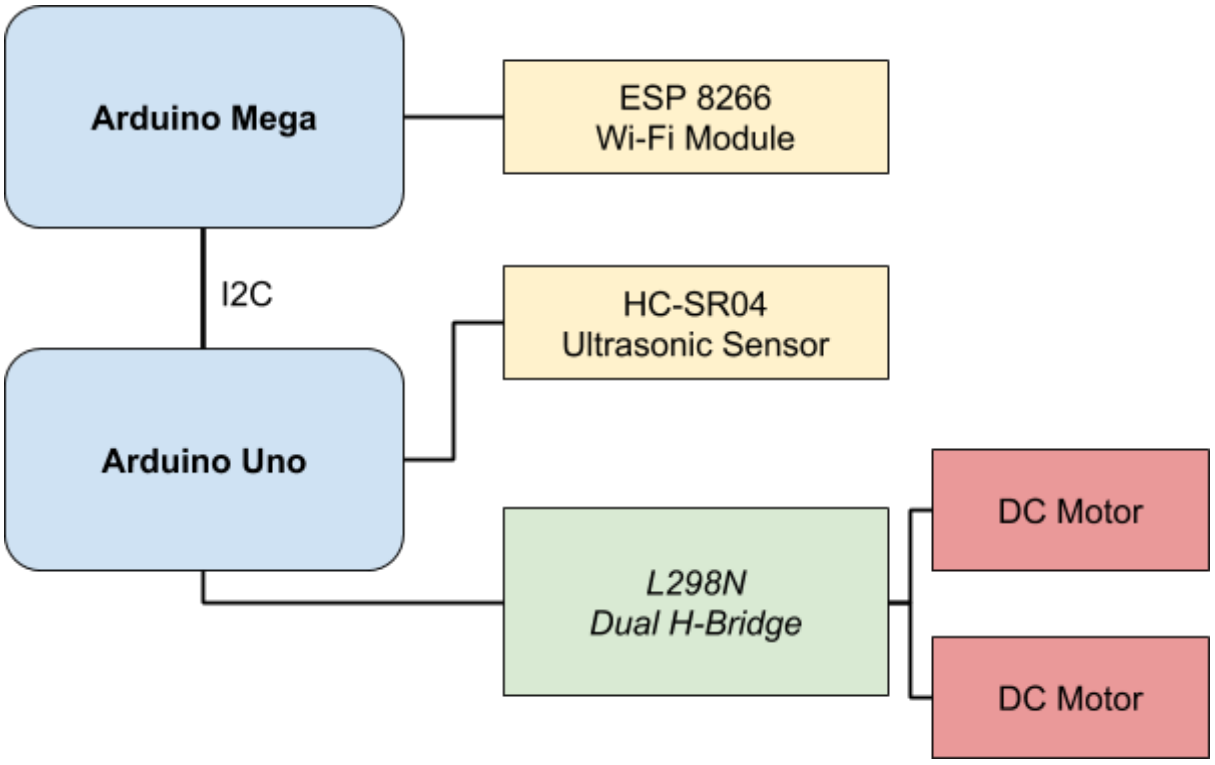
Remote-Controlled Collision-Avoiding Robot

Description

The robot is a simple device equipped with an ultrasonic distance sensor and a wi-fi module. Once turned on, it will generate its own Wi-Fi network. Connecting to that network, for example using a phone, allows one to control the robot. Furthermore, the robot will refuse to move towards obstacles it detects, to prevent collisions.

High-Level Design

The remote-controlled robot is commanded by two Arduino boards. An Arduino Mega board connects to the Wi-Fi modules, receiving and interpreting commands received from the user. An Arduino Uno board controls the motors required for the robot to move and receives information from the ultrasonic distance sensor. The two boards are, meanwhile, connected via I2C.
The previously described arrangement is shown in the diagram below:



Activity Flowchart

- On power-up, the robot will set up its internal state, then turn on the Wi-Fi module and await commands.

- Once a user connects to the robot via wireless, they will be presented with a simple page that has buttons for the following commands:
    - STOP: orders the robot to stop moving
    - FORWARD: orders the robot to move forward
    - BACK: orders the robot to move backwards
    - LEFT: orders the robot to turn counterclockwise
    - RIGHT: orders the robot to turn clockwise
- The robot will continue its last-received command until a new one is received. If commanded to stop, it will wait, if commanded forward or backward, will move in a straight line, and if commanded to turn, it will turn in place (without going forwards or backwards).
- The robot periodically scans the space ahead of itself using its ultrasonic sensor. If it detects obstacles nearby, it will stop, and will not move forward while the obstacle remains. (The robot will still accept orders to move backwards or turn.)