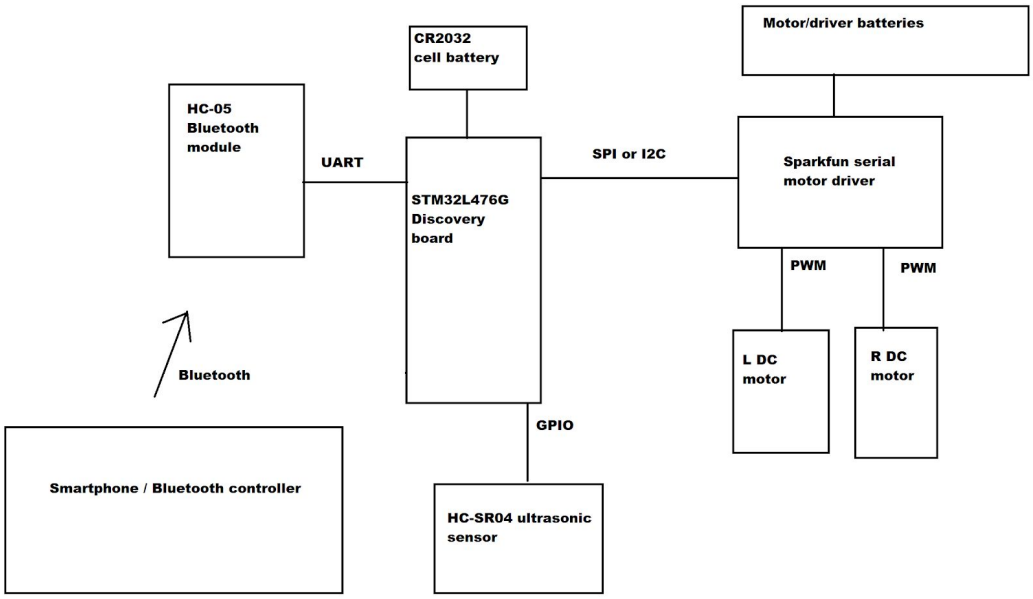
Siyuan Wang
Robert Tremewan
ECE 153B
TA Sang Min Oh

Final project proposal

We propose a small wirelessly-controlled continuous track vehicle, i.e. an RC tank. We'll mount the STM32L476G-Discovery board on top. Connected to it are a motor driver which controls the two motors. The motor driver will be communicated with via SPI or I2C. We'll connect the HC-05 Bluetooth module to allow the user to control the tank with a Bluetooth controller or a phone. The HC-05 Bluetooth module communicated with the board through UART. When the user hits forward both motors will spin forward. Similarly backwards. When the user decides to turn left the left motor will be held still while the right motor spins forward. Similarly to turn right. The board will be powered by a cell battery connected to the bottom while the motors and motor driver will be powered by a set of batteries of appropriate specifications. As a stretch goal we propose placing a set of four HC-SR04 ultrasonic sensors that will prevent the tank from crashing into obstacles. If an ultrasonic sensor detects an object getting too close it will override the user control and spin the engines briefly in the opposite direction to prevent the car from crashing. We also discussed the possibility of holding a battle-bot competition with another group also making an RC car. At the very least we can tape a screwdriver to the tank. More sophisticated weaponry might be added if time allows. Our priority list in order of descending priority is (1) motor control, (2) wireless control, (3) ultrasonic collision avoidance, (4) weaponry.

Our project update website can be accessed at
https://ucsbece153b2020springfinalprojectdrive.car.blog



Peripherals

1. HC-05 Bluetooth module
2. Bluetooth controller or smartphone
3. 2 DC Motors, brushed or brushless depending on requirements. Controlled by PWM signals from the serial motor controller.
4. Sparkfun serial motor controller
5. 4 HC-SR04 ultrasonic sensors, sending data to the board via GPIO.

Software Design

We will use SPI or I2C to control the motor controller from the STM32L476G. Each motor will have two or three ports, depending on whether we decide to use brushed or brushless motors. The motor controller will send the appropriate PWM signals to the motor as directed by the motor controller. User inputs will result in interrupt signals being sent from the Bluetooth module to the discovery board, and from the discovery board to the motor controllers. The ultrasonic sensors will communicate with the board via GPIO and will generate interrupts that override user controls appropriately if they detect the tank is getting too close to an obstacle.

Goals

1. The tank will move forward, backward and turn in any arbitrary direction as directed by the user.
2. The tank will avoid collisions with detected obstacles appropriately.

Group Responsibilities

We will both split work equally based on good faith work hours. We will both share responsibility equally for planning, physical design and construction, software design and implementation, testing, status updates, and troubleshooting.