Anti-Stupid Car

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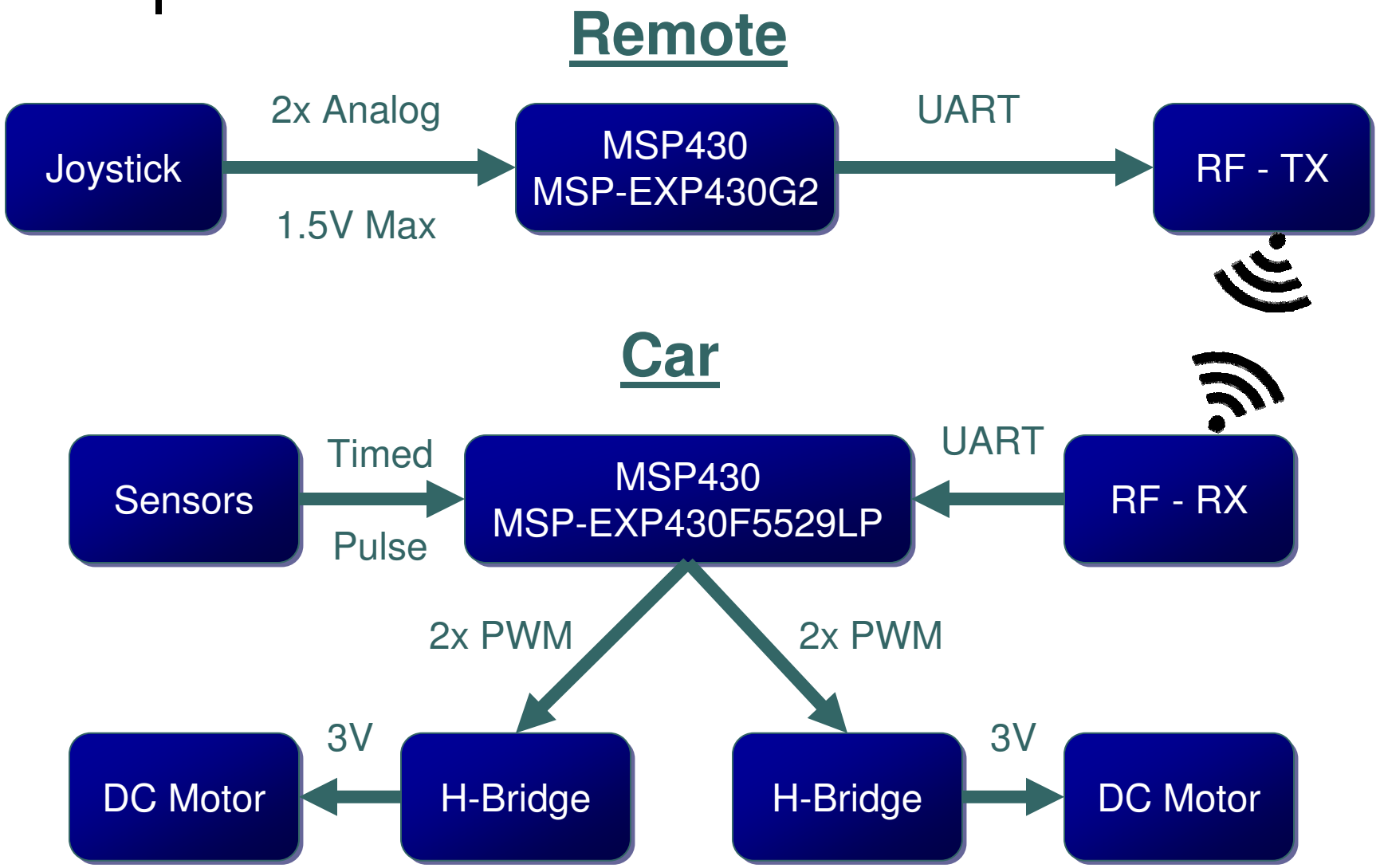
Overall Status

- All components have been tested individually
- Beginning Overall integration of sub components
  - Starting with combining code and verifying sub components
  - Moving onto testing hardware together

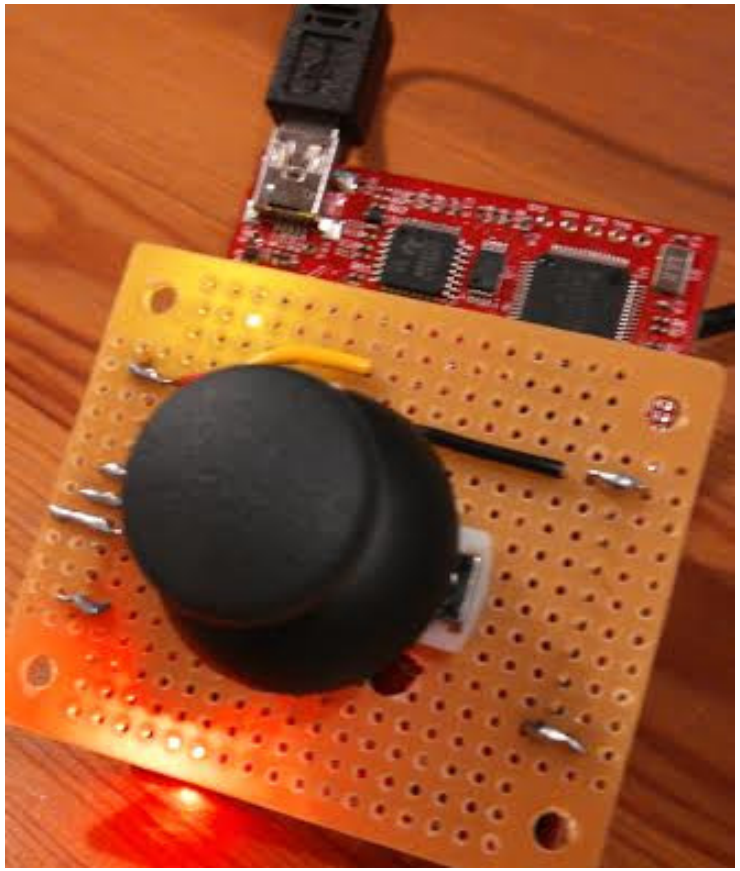
Block Diagrams



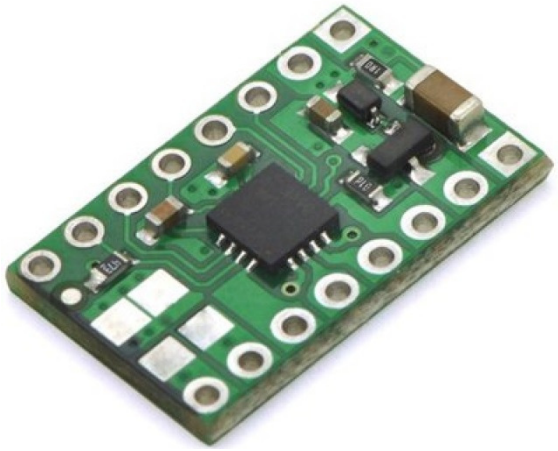
Component Breakdown

Analog Joystick (Done – Ready for integration)

- Voltage dividers limit the voltage to 0V and 1.5V
  - Note this is not a proportional divide
  - Center is ~2/3 of the way through so still have to manipulate the data to get it in a nice range between 0 and 20 (using bit shifts to reduce overhead)
- The inputs are connected to A4 and A5
  - These are read using the ADC consecutive read function to read them back to back
  - The processor is put in Low Power Mode 0 during the ADC conversion and is woken up by the interrupt generated by its completion
  - A look up table uses the end results to determine the motor speed commands



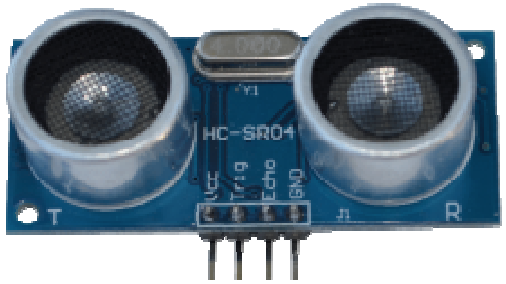
Motor/Body (Tested)



- 2 Wheel Drive chassis ordered
  - Actually has 4 drive motors
  - Tried running with just 2, but since the wheels are mounted directly to the gear box there was too much resistance
    - Used the backup motor controller and just daisy chained them together to control the other 2 motors
- Using 2 Dual Motor Controller
  - 2 pins control per channel
    - Alternate which pin the PWM is on to control direction
    - Breaks if both channel are pulled high
    - coasts if both channels are pulled low
- Using timer A0 to generate PWM
  - This is because it has 4 pins associated with Capture/Compare Registers
  - Running in count up mode
  - Each pin is configured as a Reset/Set based on the CCR value

PROXIMITY SENSOR (ACQUIRED/WORKING)

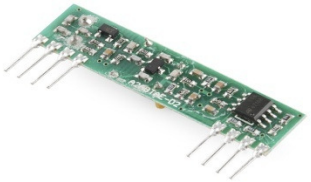
- **4 HC-SR Ultrasonic Distance Sensor**
  - Distance measurement range 2cm to 450cm
  - It can use 3.3V levels on Trig signal but provides 5V on the Echo pin. To get the signal to 3.3V, we will use a simple voltage divider.
  - Will toggle red/green LEDs upon sensing the obstacles.
  - Amount of time Echo pin stays high corresponds to distance ultrasonic sound has travelled
  - Planning to use interrupts to time the ping delay



- **2 SHARP IR SENSOR (PLAN-B)**
  - Distance measurement range 10 cm to 80 cm
  - 3 pin JST connector
  - It uses beam of infrared to reflect off an object to measure its distance in form of analog voltage which can be easily read using the ADC

RF Transmitter and Receiver (Tested)

- 1 WRL-10532 RF Link Receiver
  - 500 ft. range
  - 4800bps data rate at 434 MHz
  - Interface is through a single Data Out pin to the MSP430



- 1 WRL-10534 RF Link Transmitter
  - 500 ft. range
  - 4800bps data rate at 434 MHz
  - Interface is through a Single Data In pin to the MSP430

- Hardware interface
  - Each component will be driven with a timer on it's respective MSP430
  - Each component requires a 5V connection, ground connection, and data pin
- Software
  - UART Implementation with leading byte and checksum.

Project Status Slide

- Task Division
  - Brandon = RF Link
  - Jon = Analog Joystick
  - Divid = Sensors
  - ??? = Motors
- Overall Progress
  - All parts working, some software integration completed, need to integrate all hardware components
- Possible Problems
  - Interrupt sharing
    - The car side potentially will need a lot of interrupts between the sensors and the PWM
      - Chose the larger Launchpad for the car side
      - Will have to work together to insure no conflicts
  - Possible sensor integration issues
    - Ordered 2 types of sensors that had different interfaces so we would have a fall back plan if problems came up
    - Since one is sound and one is IR we can see which detects better as well