

MSP430 Tank

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The Tank

What?

- RF controlled vehicle
- Dual motor tread drive system
- Remotely fired Nerf-like weapon
- Rotating turret mount

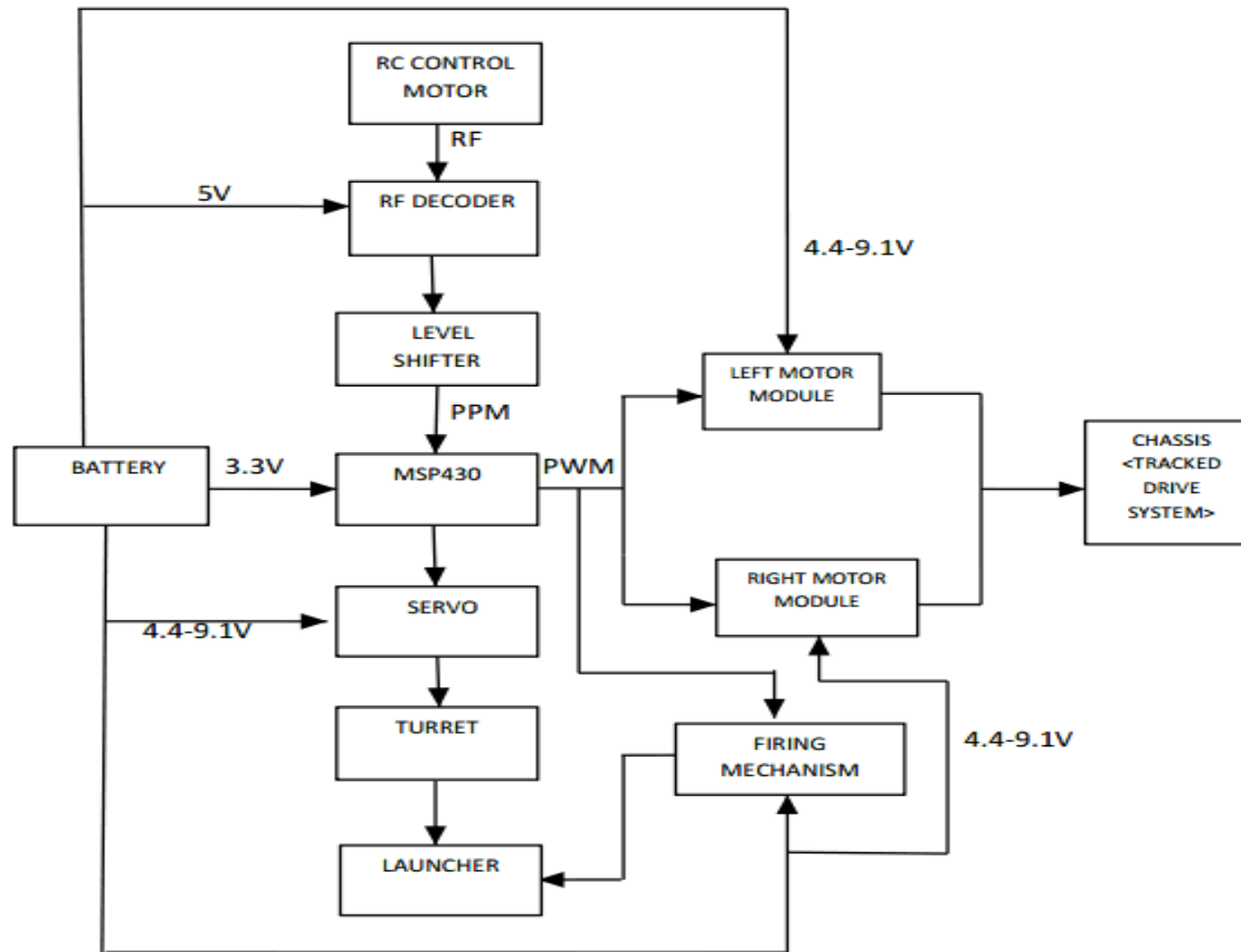


Why?

- Standard RC cars are not enough
- Firepower is fun!



MSP430 Block Diagram

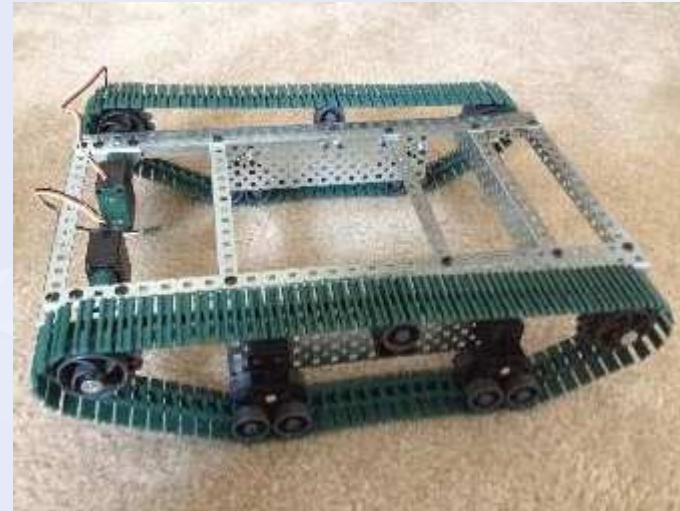


Components

- Six main components to interface with MSP430
 - Tank Chassis
 - RF controller
 - Dual motor drive system
 - Turret motor/servo
 - Firing mechanism

Tank Chassis

- Status: Assembled
- Hardware interface
 - Vex metal frame
 - Support frame
 - Drive train - tank treads
- Software Interface
 - No MSP430 interface
 - Ground Plane
- Challenges
 - Turret and gun mounts may require modification



RF Controller

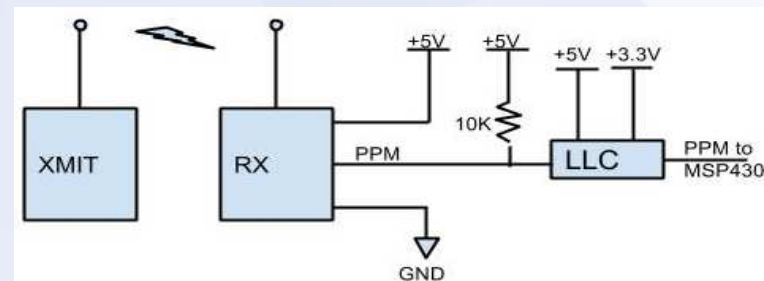
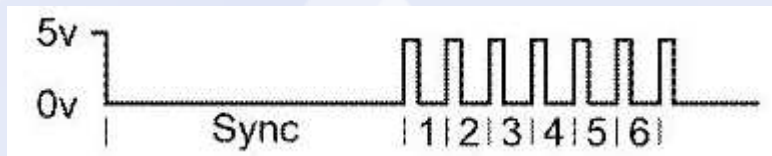
- Vex RF Receiver / Decoder

- **Status: Acquired**
- **Hardware interface**
 - 4 Pin RJ-10 to breakout cable to breadboard
 - 5V, GND, PPM Signal, NC
 - Will use MSP430 Pin 4: TA0.1 for PPM input
 - Pull up resistor for PPM output
 - MRF Antenna
 - Logic level Converter to step down 5v output for PP(ordered)
- **Software Interface**
 - PPM Signal will be connected to Timer_A0 capture channel 1
 - Capture channel will measure time between PPM pulses to determine control settings
 - Requires TA0.1 interrupt vector
- **Challenges**
 - Requires 5V to 3.3V conversion for input to MSP430
 - Correct timing interval for signal interpretation, timer rollover



- Vex 6 Channel RF Transmitter

- **Status: Acquired**
- **RF Antenna, independent battery**
- **No direct interface to MSP430**



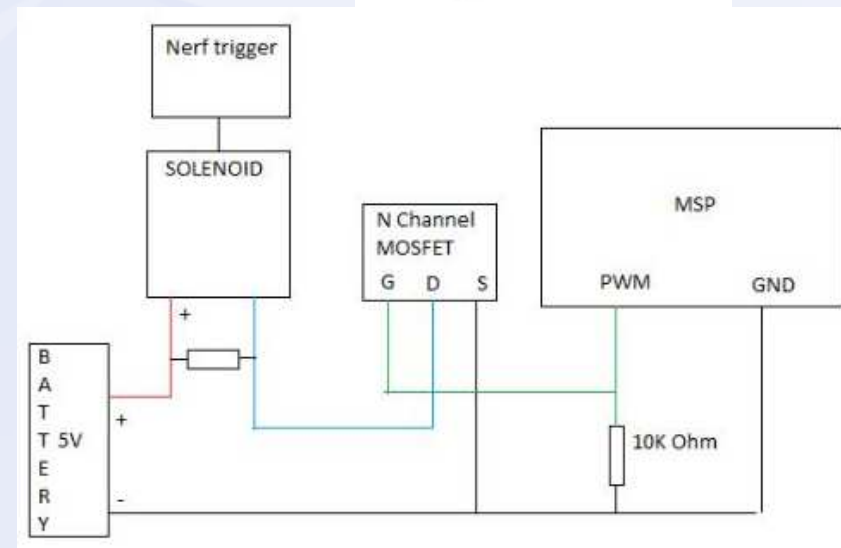
Drive Motors and Turret Motor



- Three Vex Servo Motors (Acquired)
- Hardware Interface
 - **3-Wire Servo Motors**
 - *Power:* Voltage from 4.4-9V
 - *Control:* PWM Signal range 1-2ms.
 - 1.5ms pulse corresponds to neutral/stop
 - *Ground:* Connected to vehicle power system
- Software Interface
 - **Two Drive Motors**
 - Left/Right tread rotation controlled via PWM
 - MSP430 pins deliver PWM.
 - Pin 9 (TA1.1) for left, pin 12 (TA1.2) for right
 - Pulses of 1ms (reverse) and 2ms (forward) correspond to max speed of 100rpm @ 7.5V
 - **One Turret Motor**
 - Range of rotation: 100 degrees.
 - MSP430 pin 8 (TA1.0) for PWM signal
- Challenges – Correct timing intervals for motor movement

Firing Mechanism

- **Components**
 - **Solenoid**
 - **Accompanying circuit**
 - N channel MOSFET
 - 10K ohm resistor
 - Diode rectifier
 - 5v power source
- **Addressing from software**
 - **PWM pin will control the switch**
- **Challenges**
 - **Connecting Solenoid to trigger**
 - **Travel of the solenoid**



Current Status

Overall Progress

- All parts acquired except trigger solenoid and level select, which are ordered
- Solid design, easily compartmentalized tasks ahead
- Assembly has begun
- Code development is underway
- Still need a good test environment

Task Division

- Drive and turret motor:
 - Krishna and Byron
- RF Decoder:
 - Andrew
- Trigger and mount:
 - Dheeraj
- Assembly
 - Andrew and Matt
- Initial Coding
 - Matt