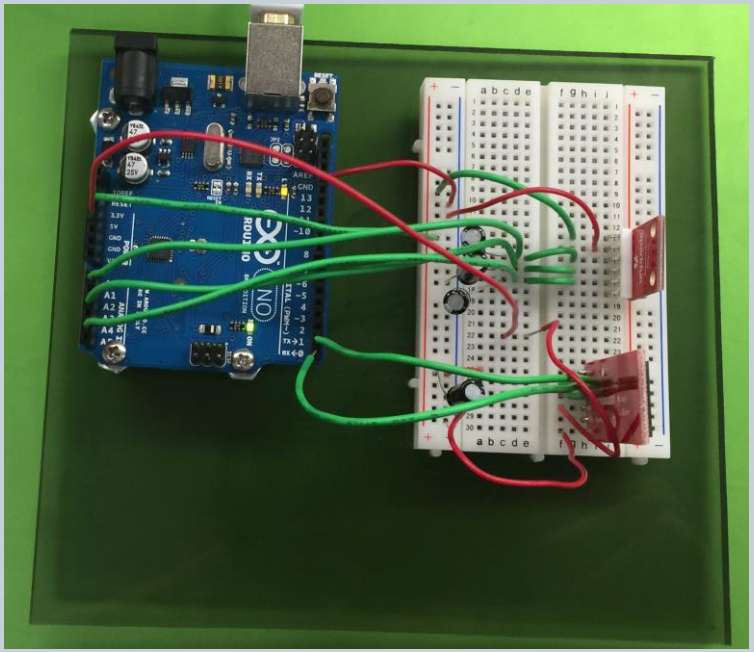
Acceleration RC Car Controller

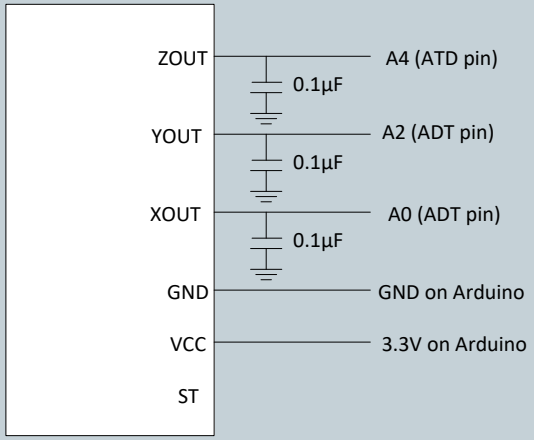
Project Goals

- Create a controller that will translate movement of the remote control to commands for an RC Car
  - Read signals from an Accelerometer
  - Send digital signals through wireless serial communication to HCS12
  - Read signals and send proper control signal
  - Configure hardware to drive the RC Car's control chip

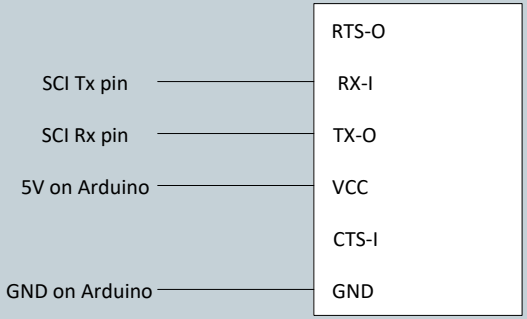
Motion Controller Schematic



- Arduino Sensors Schematics



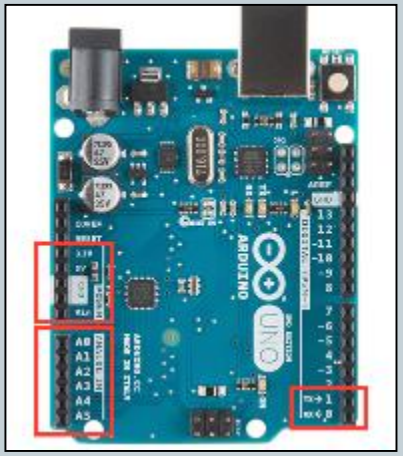
ADXL 335



Bluetooth Module

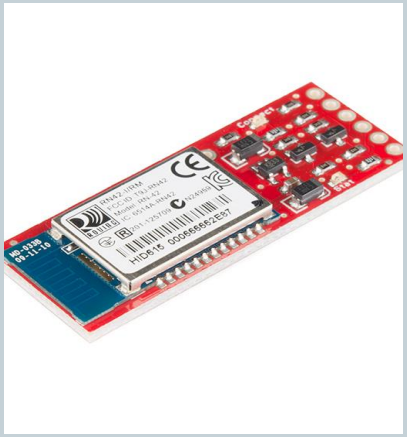
Reading the Accelerometer

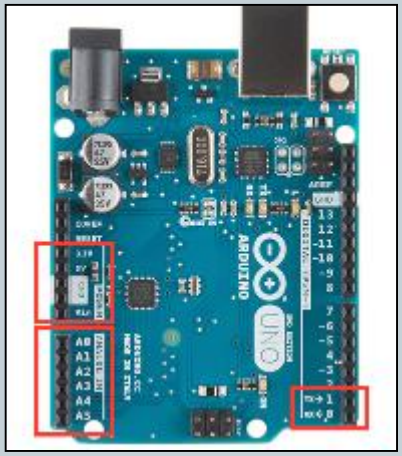
- ADXL335
  - Three axis accelerometer
  - Reads between -3g and 3g
  - Read the x and z axis
  - X->A0
  - Z->A4
- Arduino Uno
  - Smaller size
  - Enough ADC channels to perform Task
    - ADC converts the analogue signal to 10bit digital reading



Sending Data Serially

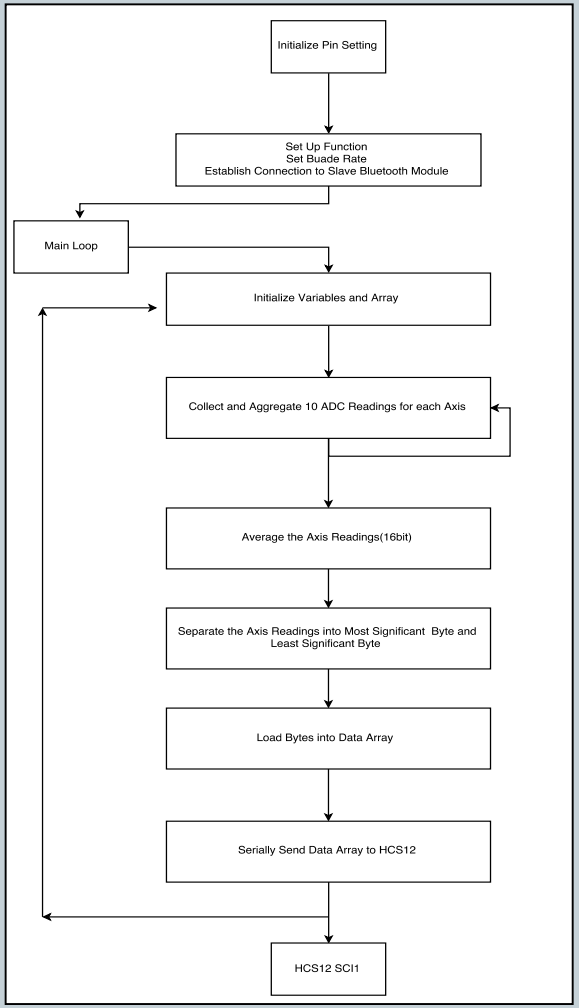
- SparkFun Bluetooth Mate Silver (Master)
  - RX-1 ->Txpin
  - TX-0-> Rxpin
  - Operates at 9600bps
  - Sends data as 8N1
    - 8bit, no parity, 1 stop bit



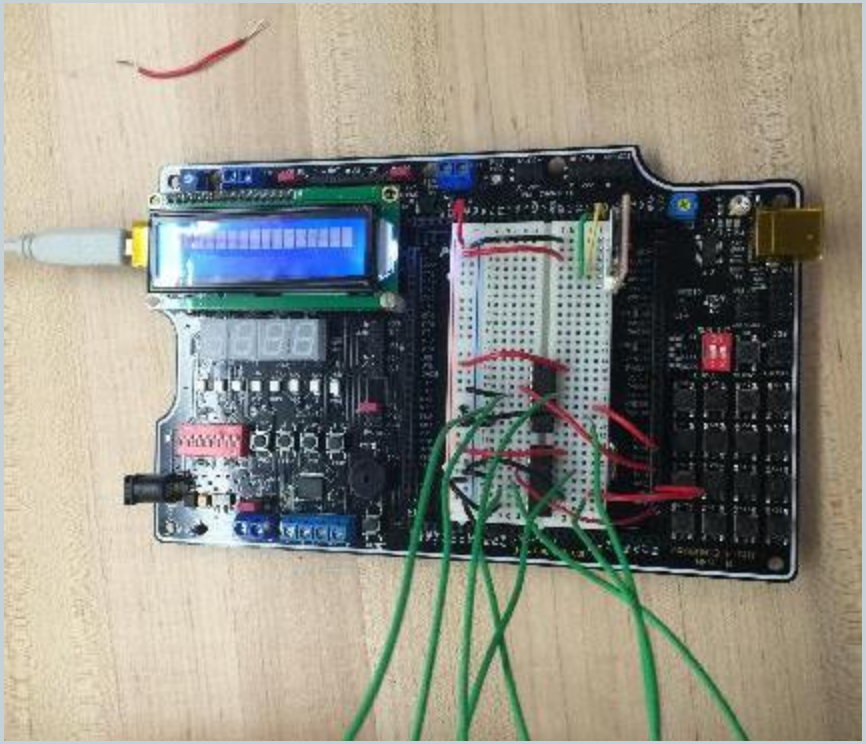


Program Running on the Arduino

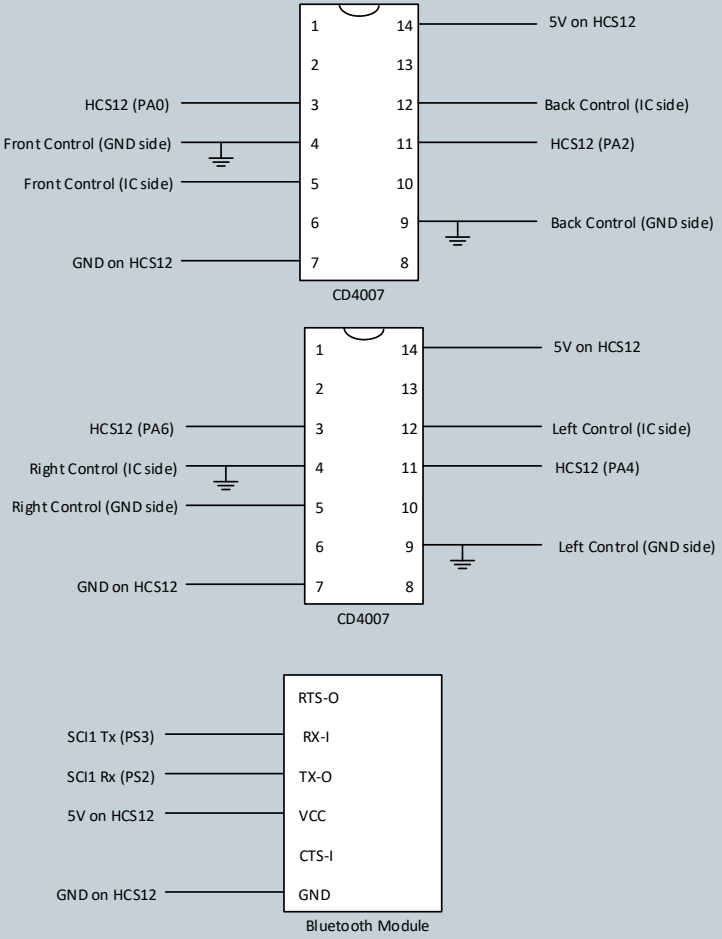
- Initialize the GPIO pins
- Set Up Function
- Read and sum 10 reading for each axis
- Average the readings
- Split the readings into two bytes each
- Send the data to the HCS12, to its SCI1 receive transmit pins



Toy Controller Schematic

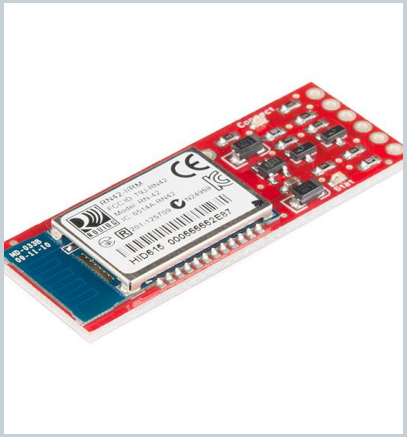


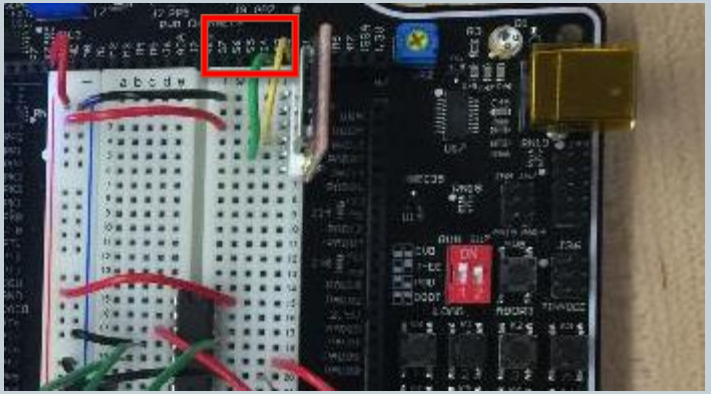
- HCS12 Sensors Schematics



Receiving Data Serially

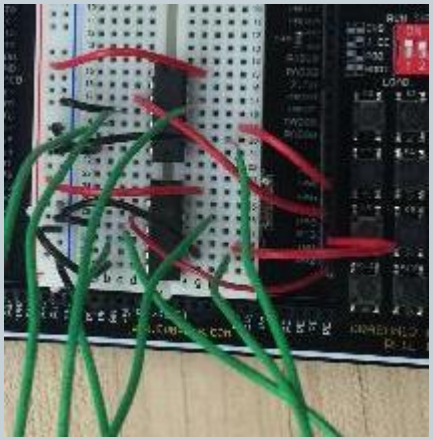
- SparkFun Bluetooth Mate Silver (Slave)
  - RX-1 ->SP3 (Tx for SCI1)
  - TX-0-> SP2 (Rx for SCI1)
  - Operates at 9600bps
  - Receives data as 8N1
    - 8bit, no parity, 1 stop bit





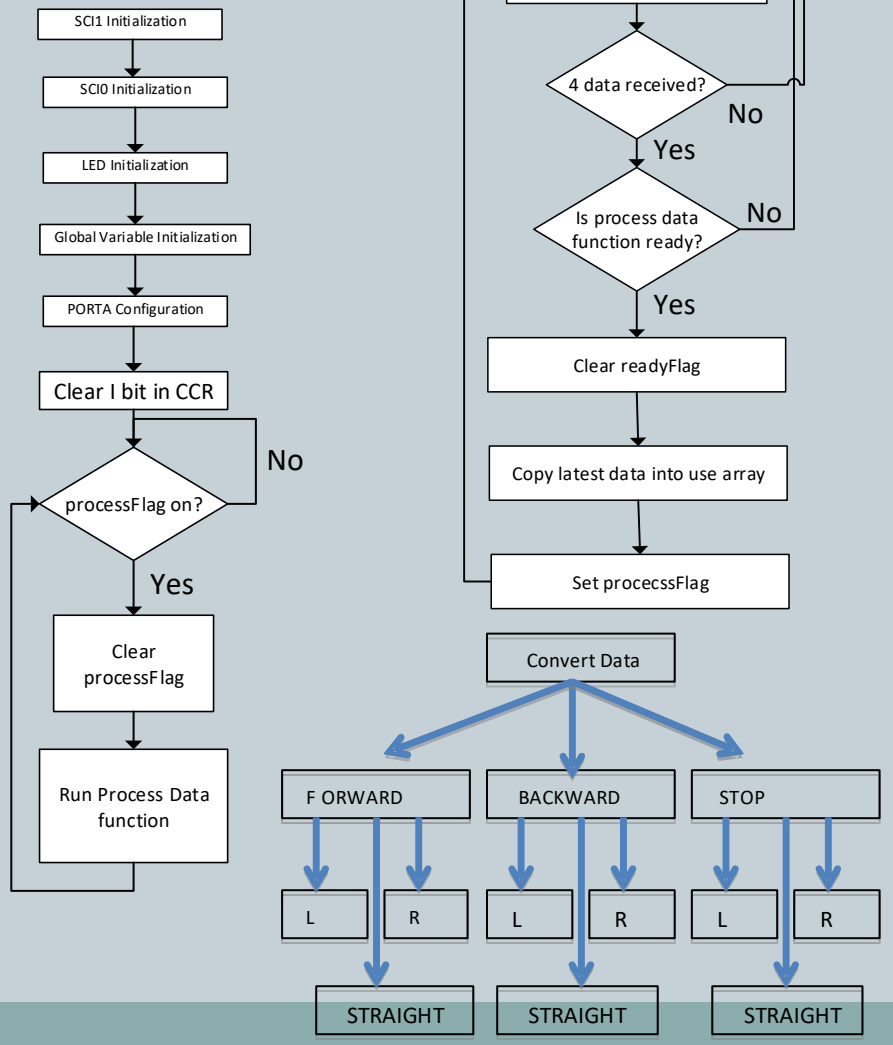
Sending Control Signal

- CD4007
  - Each chip contains two N-MOSFET
  - Open Collector Circuit
  - Driving gate to 5V connects drain and source
- PREICOM 5-Function Remote Controller
  - GND to drive
  - Originally driven by push button



Program Running on the HCS12

- Initialize the both SCI0 and 1
- Initialize LEDs and PORTA
- SCI1 Interrupt receiving data
- Restore the received data
- Evaluate and output control signal
- Sends received data to PC via SCI0 and shows control output on LEDs



Conclusion

- Toy car controller using accelerometer is fully functional.
- Importance of component interface agreement
- Incremental development and testing

Possible Improvements

- Support different types of acceleration reading
- Better packaging