

# Neato XV11 Lidar Development Using PIC32MX Microcontroller

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# CRC

- A Cyclical Redundancy Check is a method to verify that the received data is valid.
- The CRC used here is two bytes added on the end of the data message. The two bytes are compared with the received first bytes in green below.

<start> <index> <speed\_L> <speed\_H> [Data 0]  
[Data 1] [Data 2] [Data 3] <checksum\_L>  
<checksum\_H>

# Parsed Output from Software After CRC

RealTerm: Serial Capture Program 2.0.0.70

```
Index 0 Speed 12479 232 903 232 971 233 934 234 889
Index 1 Speed 12479 259 773 255 635 252 751 251 814
Index 2 Speed 12486 214 641 214 688 214 695 215 701
Index 3 Speed 12426 238 288 247 291 254 398 32770 0
Index 4 Speed 12426 377 527 377 380 32821 0 306 208
Index 5 Speed 12425 202 989 201 1087 200 1073 199 1130
Index 6 Speed 12412 243 975 243 999 245 915 32770 0
Index 7 Speed 12412 380 442 378 408 378 377 382 345
Index 8 Speed 12383 425 506 429 410 478 159 455 206
Index 9 Speed 12415 375 558 373 620 372 581 370 573
Index 10 Speed 12415 349 460 353 281 354 388 352 363
Index 11 Speed 12402 16726 111 16825 64 438 177 436 196
Index 12 Speed 12409 661 186 661 223 32771 0 32805 0
Index 13 Speed 12409 687 42 645 54 664 104 680 100
Index 14 Speed 12439 32821 0 32821 0 32821 0 32821 0
Index 15 Speed 12451 32821 0 32821 0 32821 0 32821 0
Index 16 Speed 12451 32821 0 32821 0 32821 0 32770 0
Index 17 Speed 12442 32770 0 638 533 639 514 640 501
Index 18 Speed 12463 674 226 683 104 32821 0 682 142
Index 19 Speed 12463 32821 0 32821 0 32821 0 32821 0
Index 20 Speed 12484 504 92 16871 24 32821 0 32821 0
Index 21 Speed 12504 1741 11 32821 0 32821 0 32821 0
Index 22 Speed 12504 281 515 273 432 265 513 256 468
Index 0 Speed 12490 236 921 239 939 241 1028 241 982
Index 1 Speed 12499 253 437 16610 58 222 340 218 518
Index 2 Speed 12499 219 644 221 617 222 595 223 485
Index 3 Speed 12478 333 245 389 511 392 639 386 377
Index 4 Speed 12463 219 599 215 694 211 819 209 901
Index 6 Speed 12463 235 784 240 827 242 968 242 1020
Index 7 Speed 12450 367 486 380 529 396 472 386 267
Index 8 Speed 12414 409 604 413 519 418 532 422 553
Index 9 Speed 12414 1808 66 1941 10 1916 14 32821 0
Index 10 Speed 12432 1317 24 1292 21 1263 25 1278 23
Index 11 Speed 12446 362 352 367 202 16778 58 16810 53
Index 12 Speed 12446 749 134 741 208 725 247 693 93
Index 13 Speed 12441 615 570 611 610 606 420 32821 0
Index 14 Speed 12424 765 57 32821 0 32821 0 32821 0
Index 15 Speed 12424 32821 0 32821 0 32821 0 32821 0
Index 16 Speed 12434 32821 0 32821 0 32821 0 32821 0
Index 17 Speed 12452 32821 0 470 99 466 173 467 144
Index 18 Speed 12452 659 342 662 360 666 304 669 307
Index 19 Speed 12463 745 241 750 156 32821 0 32821 0
Index 20 Speed 12498 528 66 507 110 490 90 499 93
Index 21 Speed 12498 1478 24 1535 24 1597 18 1669 21
Index 22 Speed 12500 313 220 302 228 293 334 286 486
Index 0 Speed 12488 234 825 234 866 234 900 235 854
Index 1 Speed 12488 251 826 251 881 251 904 252 922
Index 2 Speed 12488 251 826 251 881 251 904 252 922
```

Display | Port | Capture | Pins | Send | Echo Port | I2C | I2C-2 | I2CMisc | Misc | **Clear** **Freeze** ?

Display As: ☒ Ascii ☐ Ansi ☐ Hex(space) ☐ Hex + Ascii ☐ uint8 ☐ int8 ☐ Hex ☐ int16 ☐ uint16 ☐ Ascii ☐ Binary ☐ Nibble ☐ Float4 ☐ Hex CSV

☐ Half Duplex ☐ newLine mode ☐ Invert ☐ ZBits ☒ Big Endian

Data Frames: Bytes: 2 ☐ Single  Rows: 47 Cols: 80 ☒ Scrollback 200

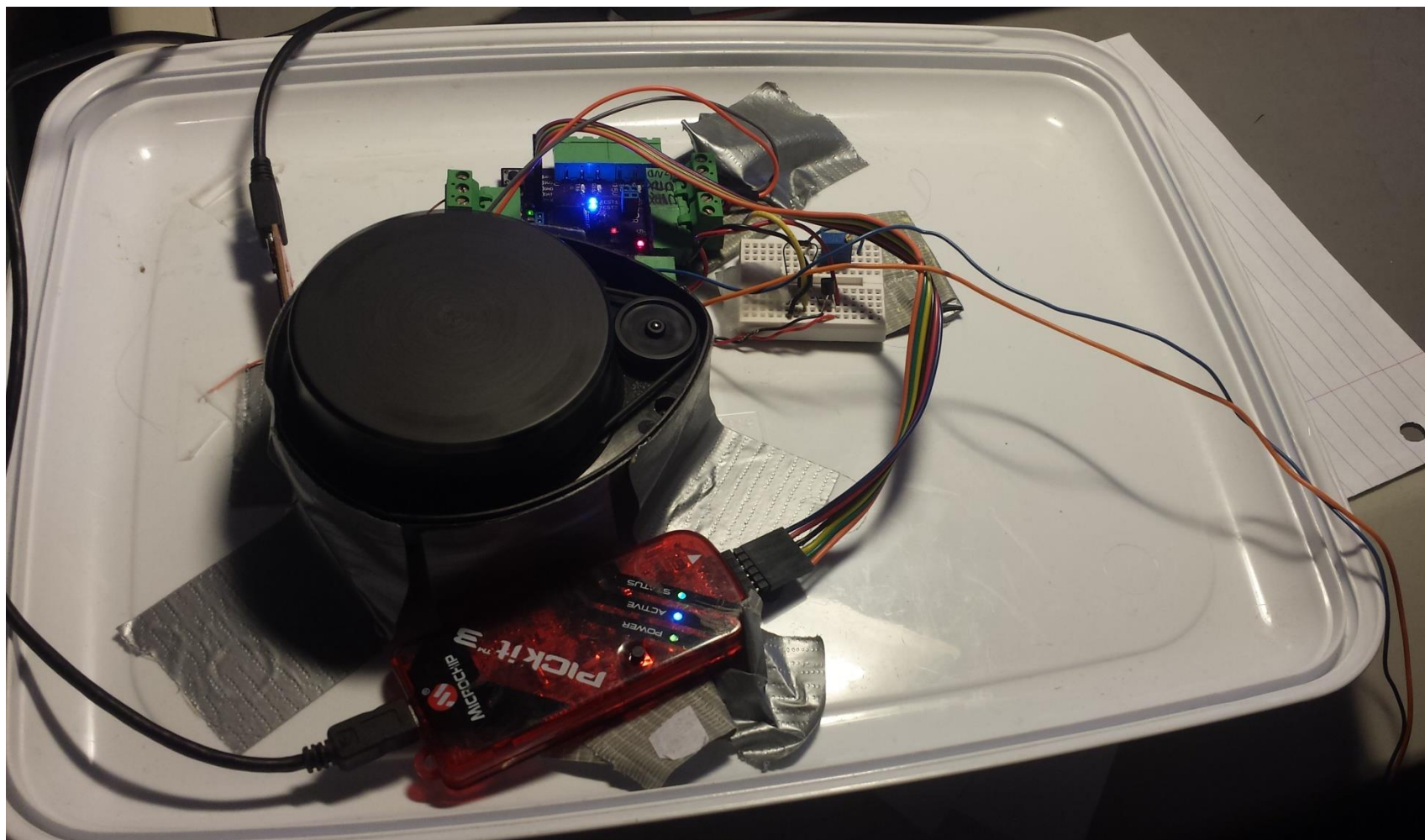
Binary Sync Chars: ABCD

Sync is: ☒ None ☐ ASCII ☐ Number ☐ Leading Sync matches 0

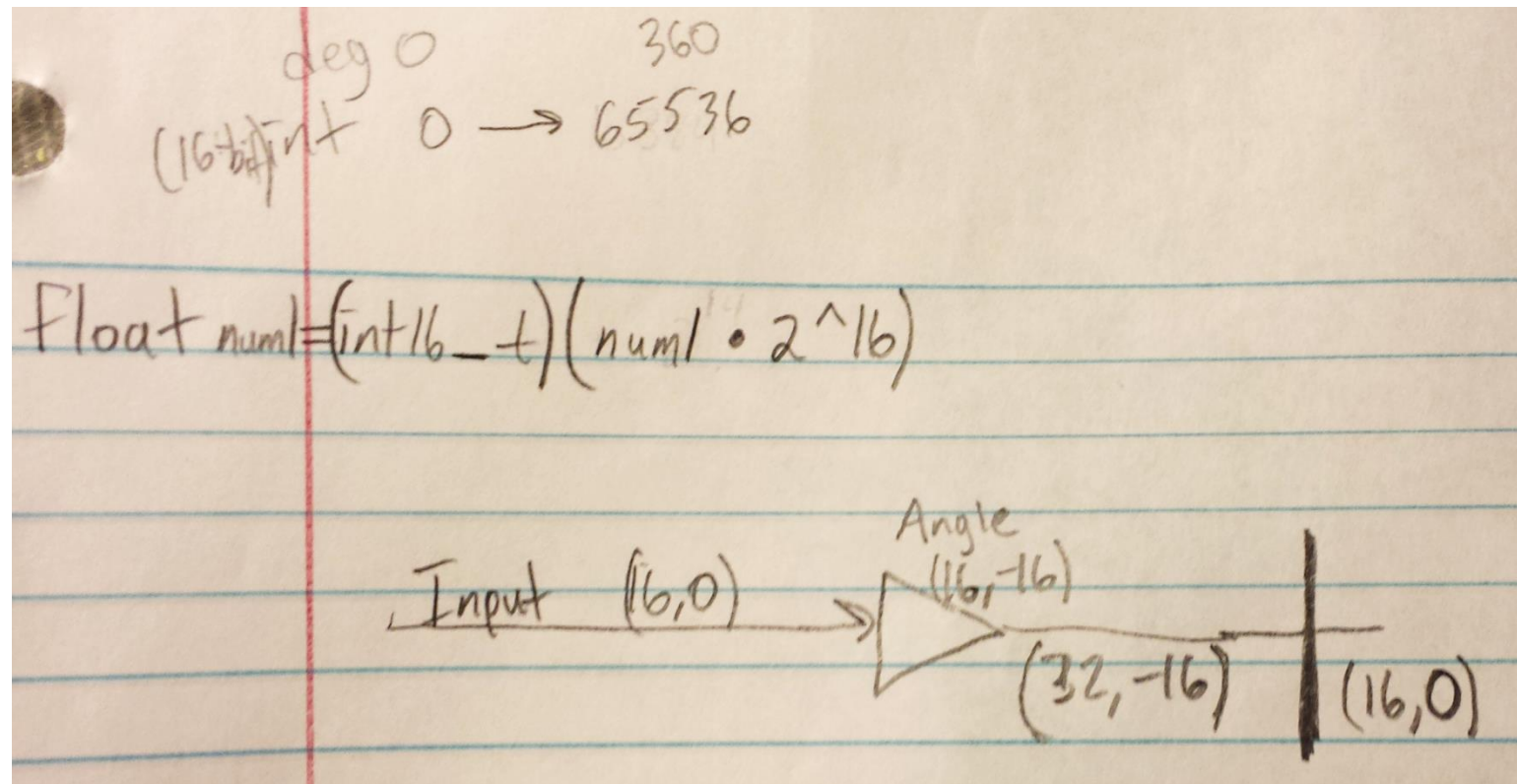
Status: ☐ Disconnect ☐ RXD (2) ☐ TXD (3) ☐ CTS (8) ☐ DCD (1) ☐ DSR (6) ☐ Ring (9) ☐ BREAK ☐ Error

Ctrl+ Tab to step through tab sheets Char Count:2847249 CPS:0 Port: Closed

# How to Hookup the Lidar Hardware



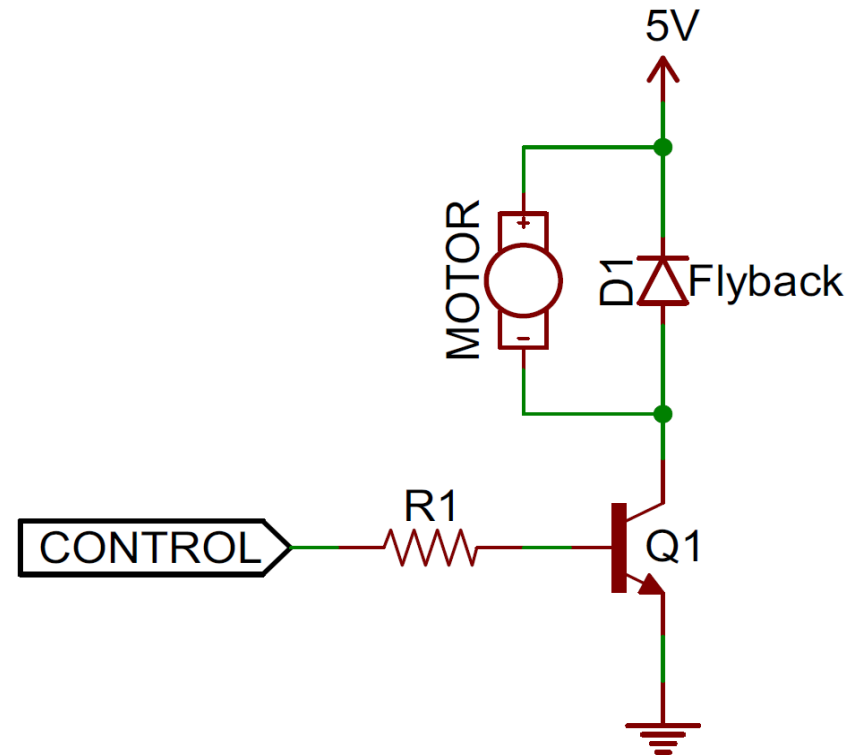
# Fixed Point Math for Lookup Table



# Controlling the DC Motor

- Transistor base is connected to microcontroller
  - Microcontroller sends PWM to transistor base
  - Diode prevents coils in motor from inducing a large voltage spike.

$$V = L \frac{di}{dt}$$



# Site Info and Repository

<https://xv11hacking.wikispaces.com/LIDAR+Sens>

[https://github.com/keithiscool/XV11LidarDevelopment  
PIC32](https://github.com/keithiscool/XV11LidarDevelopmentPIC32)