And over there we have the labyrinth guards. One always lies, one always tells the truth, and one stabs people who ask tricky questions.
Main Autonomous Boat Uses

• Transportation
• Fishing and Recreation
• Department of Defense Application
• Security
• Search and Rescue

How can we do it?
Compass
Tachometer
Speedometer
MC9S12C (Microcontroller)
Notebook Computer
Tachometer

VCC

To ADC on microcontroller
Compass

- Direction sent as a 16-bit word. 0 - 3599 represents 0E - 359.9E
- Pins 2 and 3 to communicate to the micro-controller through an I2C interface.

Start bit Compass uses address 0xCO

Write The register number that you want to read from

Repeated Start bit

Write address with bit0 set - 0xC1

Read one or more registers

Stop bit
Speedometer
(Actually, it’s a pressure sensor)

Real Picture:

Part # MPXH6250AC6U

+5V applied to Vs
Vout gives pressure reading between 0V and 5V
Higher pressure = Higher output voltage
Microcontroller

• External Ports Used
  – 2 Pressure Sensors 1 ADC pin each
    • A simple analog voltage will be read
  – 1 Tachometer 1 ADC pin
    • A simple analog voltage will be read
  – Compass Port T
    • A digital signal on multiple pins will be sampled
  – Serial Communication Rx and Tx pins
    • Will send and receive digital pulses serially
Microcontroller to Laptop Interface

• Serial Interface
  – Half-duplex SCI (asynchronous)
  – RS232 Protocol
    • 1 Start Bit + 8 Data Bits + 1 Parity Bit + 1 Stop Bit = 11 Bits
    • 1 Sensor ID Byte + 2 Byte Raw Sensor Data = 3 Bytes

<table>
<thead>
<tr>
<th>ASCII Character</th>
<th>Hex-Value</th>
<th>Binary-Value</th>
<th>Sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘V’</td>
<td>0x56</td>
<td>0101 0110</td>
<td>“Velocity” from the anemometer</td>
</tr>
<tr>
<td>‘T’</td>
<td>0x54</td>
<td>0101 0100</td>
<td>“Tachometer” from the motor’s tachometer</td>
</tr>
<tr>
<td>‘C’</td>
<td>0x43</td>
<td>0100 0011</td>
<td>“Compass” from the digital compass</td>
</tr>
<tr>
<td>‘W’</td>
<td>0x57</td>
<td>0101 0111</td>
<td>“Wind speed” from the wind sensor</td>
</tr>
<tr>
<td>‘D’</td>
<td>0x44</td>
<td>0100 0100</td>
<td>“Direction” from the wind sensor</td>
</tr>
</tbody>
</table>
GPS/Sonar - Humminbird 383c

NMEA Protocol Sentence Structure
$type, data1, data2, ..., dataN*checksum

Relevant NMEA Protocol Sentences
- Latitude $GPGLL dddmm.mm
- Longitude $GPGLL dddmm.mm
- Velocity $GPVTG kph
- Heading $GPVTG degrees
- Depth $GPDPT meters
Pronto4 Kit

- Transmission Control
- Steering Control
- Throttle Control
- Non-obtrusive
- Manual Override
Pronto4 - Boat Integration
Anomaly

By Kennedy Rose

Look, Cox, I'm sorry. But we're going to have to let you go. A picture of Pac-Man just won't do for a sales report.

That's a pie chart.

You're a pie chart.

ECE Department