Adaptive RC Sailer Project Design Notes - Phase Two

Demonstration Model Interface (Pulse Position Modulation With Binary Inputs)

Please refer to the *Phase One Adaptive RC Sailer Interface Design Notes* for a review of the design approach and methodologies.

The phase two demonstration model uses an Arduino UNO microcontroller to control a FlySky i6X RC transmitter via its organic Pulse Position Modulation (PPM) Trainer Port. The control signal inputs are the same as the Phase One control signal inputs; for example, On & Off impulses from Sip & Puff adaptive switches. No modifications are required for either the RC radio system or the sailboat systems.

Special thanks to Gabriel Staples www.electricrcaircraftguy.com
for his eRCaGuy_PPM_Writer library Utility

Sail Control = Channel 3 : Rudder Control = Channel 1
In order to facilitate smooth operation and account for skipper input lag, system delays were implemented for both the sails and rudder.

Nominal Channel Width = 1500 msec +/- 300 msec
getPPMPolarity
PPM_WRITER_NORMAL has a HIGH base-line signal, with channelSpace pulses that are LOW

Sails = Channel 3
- Number of Click from Sails Full In to Sails Full Out = 12
- Sails_Step = 500 msec / 12 = 50 msec
  - Sails_In = -50 msec
  - Sails_Out = +50 msec
- Present Position = pulsewidth_Sails
- New Position = Present Position +/- Sails_Step
- Restrain Position 1200 to 1800 msec
- PPMWriter Code : PPMWriter.setChannelVal(CH3, pulsewidth_Sails * 2);

Rudders = Channel 1
- Number of Click from Rudder Full Left to Rudder Full Right = 16
- Rudder_Step = 600 msec / 16 = 37.5 = 36 msec
  - Rudder_Left = -36 msec
  - Rudder_Right = +36 msec
- Present Position = pulsewidth_Rudder
- New Position = Present Position +/- Rudder_Step
- Restrain Position 1200 to 1800 msec
- PPMWriter Code : PPMWriter.setChannelVal(CH4, pulsewidth_Rudder * 2);

getPPMPolarity
-PPM_WRITER_NORMAL has a HIGH base-line signal, with channelSpace pulses that are LOW

CAUTION: The Arduino output on pin D9 is nominally 5 VDC. The FlySky i6X is basically a 3.3 VDC system. As such, a resistive voltage divider network was incorporated where R1 = 560 Ω and R2 = 1200 Ω.

Vout = R2/(R1 + R2) * Vin = 1200/(560 + 1200) * 5 = 3.4 VDC

FlySky i6X Training Mode Switchology (Software Setup)
Training Mode = ON
Student Mode = OFF
Switch "D" = Engaged (Down Position)