Custom Valkyrie RTx

Description:

Reads thumb/joy-stick signals and several switches, transforms them into useful values, and then transmits the formatted data over serial to an XBee for uploading to the remote drone.

Inputs: (minimum)

4x analog signals ranging from 0.0V - 3.3V (joysticks)
2x digital signals ranging from 0.0V - 3.3V (arm, sensitivity)

Outputs:

1x Serial Packet destined for XBee (uART)

Constraints:

1. Using FreeRTOS
2. Must be able to output new updates at a min. 50Hz
3. ADC conversion rates
4. XBee max update rate (?)

Lyrie RTX Flow ~~Diagram~~ Design Ver 1.0

- Design Pattern (???)
  - Cyclical in nature
  - Real-Time (hard)
  - Tightly conformed I/O

- General Steps ("Psuedo" Psuedo code)
  1. Read current state of joystick outputs ←
  2. Map those values to some range ← } grouped
  3. Read current state of switch outputs ←
  4. Parse the results from (1-3) to handle special states
     - ARM-ed actions → - data stream output
     - NON-ARM-ed actions
       - Set throttle min/max range
       - "others"
       - stick combos for special configs.
  5. Packetize the resulting data into commands
  6. Send the Packets (currently don't handle RX)

Notes:

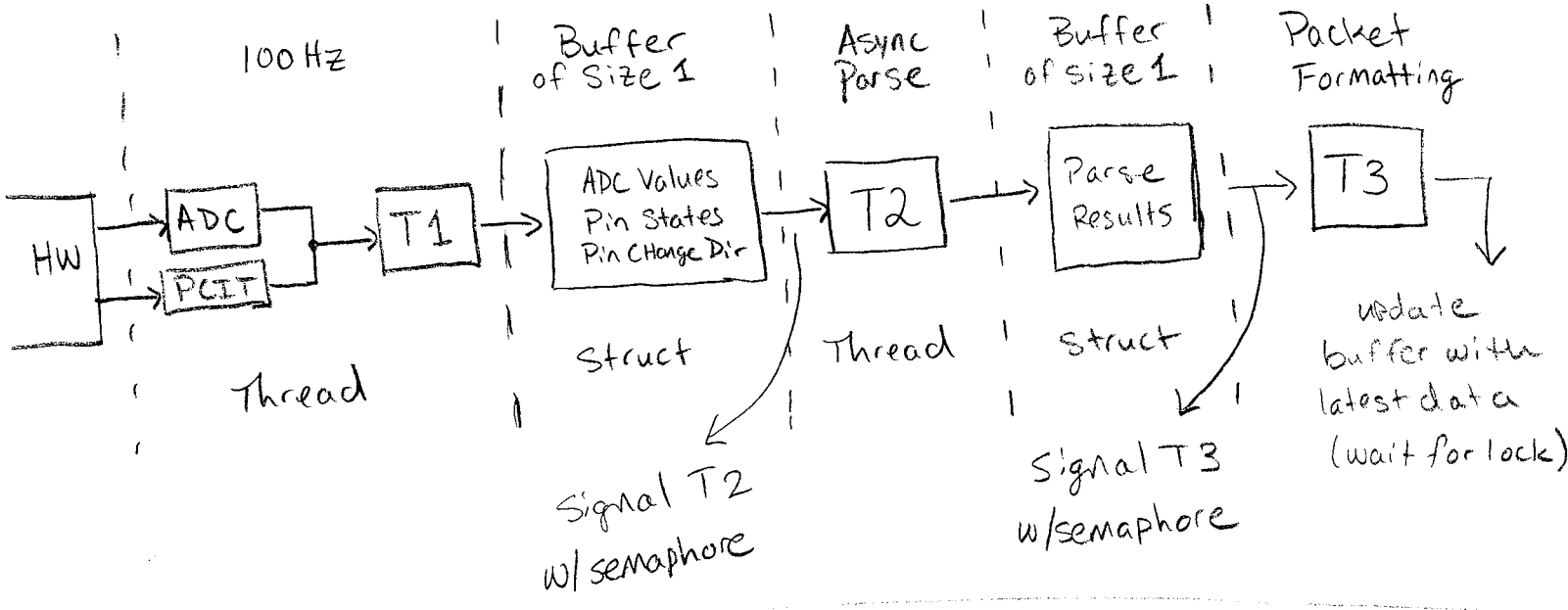
- This seems to resolve itself into 4 main classes of operations:
  1. Get raw input states
  2. Interpret raw data
  3. Condense interpretations into useful commands (packets)
  4. Send out data
- This limits me to one way COMMS ATM, but for the first revision I think this is ok.

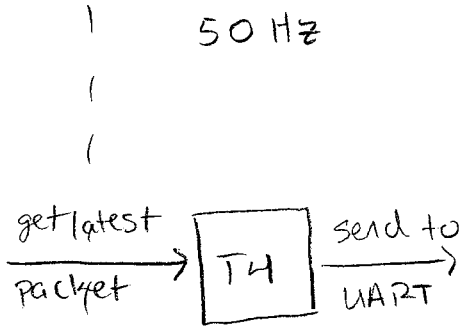
System Uses FreeRTOS:

- Task Based
- Priority encoded
- Capable of frequency scheduling

Task 1: I/O Sampling @ 100Hz
Task 2: Data Tx @ 50 Hz
→ Highest Priority
Always runs regardless of T3/4

Task 3: Interpret task 1 data. Asynchronous execution. Wait on (1)
Task 4: Pack task 3 data. Asynchronous execution. Wait on (3)





Notes:

- will need to protect the buffer between T3 + T4 to make sure stuff isn't overwritten.
- make copies of buffers wherever possible
- Do I even need classes for this? Probably to account for further improvements down the road.