Homework 4 – Motion Controls
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Requirements

To configure the hardware and software necessary to connect a controller to a host PC. The host PC must support the motion controls to be sent over wireless to a BeagleBone Black. Supported controls include thrust, yaw, pitch and roll. The host PC must display assign specific controls to adjust these measurements and display the current value for all controls.

Hardware Architecture

Controller Layout

Controller connects to Laptop over Bluetooth through MotionJoy Drivers

Parts List

- Sony PlayStation 3 Controller
- Asus Eee PC 1215b
    - Broadcom Azurewave AW-CE123H Wireless/Bluetooth Adapter

Software Implementation

Python along with additional libraries are used as the development language for implementing the controls. The PyGame library allows interaction with an attached joystick and supports the Sony PS3 controller. PyGTK library along with the Glade RAD tool are used to create and manipulate the graphical user interface (GUI) that display the controller values. The SciPy library is used in order to map the controller analog stick axes values from the range -1 to 1 to the range -100 to 100.

The program consists of two threads, the main GTK thread that displays the GUI and a thread that updates GUI labels representing the control values. The controller thread that handles retrieving the values from the controller also stores the labels from the GUI that are to be updated. Whenever these labels are updated a function is called stating that the controller thread is entering the GTK thread and likewise when the controller thread leaves the GTK thread. An exception try-catch clause surrounds the loop block since occasionally the controller needs to be reinitialized to continue retrieving values through PyGame.

The controller thread handles retrieving values through a continuous loop. For the thrust, yaw, pitch, and roll, the thread retrieves the raw value from the controller, maps the value to the correct range, and then sets the label value. There are two states for the controls, armed and disarmed. When disarmed the values are fixed at 0 even if the controller is being used. When armed the control values are updated based on the state of the controller.

The analog sticks do not always give an absolute zero value when centered. Therefore, the value retrieved is first checked against a minimum deviation of .0005 from zero. If the value is found to be within this deviation the control label is updated to zero. The trim values are set to increment by .1 whenever pressed during each controller thread iteration. Trim values have a maximum and minimum threshold of 100 and -100 respectively. This value may be reset to zero by pressing the correct button described in the Controller Layout section on the previous page.

```
'''
Homework 4 - Motion Controls
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Retrieves values from an attached Playstation 3 controller and maps
 to values used to represent Quad-Copter controls. Displays the values
 of the controls through a Graphical User Interface.
'''
import gtk
import pygame, sys, time
from pygame.locals import *
from scipy.interpolate import interp1d
import pygtk
import threading
import gobject
pygtk.require('2.0')

# Reads in values from the attached controller
def readController(ControllerThread):
    pygame.init()
    pygame.joystick.init()
    joystick = pygame.joystick.Joystick(0)
    joystick.init()
    armed = False

    # Refresh values from controller every 100th of a second
    interval = 0.01

    # get count of joysticks=1, axes=27, buttons=19 for DualShock 3
    numJoysticks = pygame.joystick.get_count()
    numAxes = joystick.get_numaxes()
    numButtons = joystick.get_numbuttons()

    # Initialize values and display control specs
    ControllerThread.initValues(numButtons, numJoysticks, numAxes)

    # Function that maps controller values to the range of [-100, 100]
    valueMap = interp1d([-1,1],[-100,100])

    resetThrustTrim = False     # L1 pressed, reset thrust trim to 0
    resetYawTrim = False        # L2 pressed, reset yaw trim to 0
    resetPitchTrim = False      # left analog pressed, reset pitch trim to 0
    resetRollTrim = False       # right analog pressed, reset roll trim to 0

    while ControllerThread.running:
        try:
            # Arm/Disarm when start/select/ZL/ZR are pressed
            if joystick.get_button(6) and joystick.get_button(7) \
            and joystick.get_button(8) and joystick.get_button(9):
                armed = False if armed else True
                time.sleep(1)
            # L1 pressed, reset thrust trim to 0
            if joystick.get_button(4):
                resetThrustTrim = True
            # L2 pressed, reset yaw trim to 0
            if joystick.get_button(5):
                resetYawTrim = True
            # left analog pressed, reset pitch trim to 0
            if joystick.get_button(10):
                resetPitchTrim = True
            # right analog pressed, reset roll trim to 0
            if joystick.get_button(11):
                resetRollTrim = True
```

```
63
64              # Retrieve axes values
65              thrustRaw = -joystick.get_axis(1)
66              yawRaw = joystick.get_axis(0)
67              pitchRaw = -joystick.get_axis(3)
68              rollRaw = joystick.get_axis(2)
69
70              # Retrieve currently displayed trim values
71              gtk.threads_enter()
72              curThrustTrim = float(ControllerThread.thrustTrim.get_text())
73              curYawTrim = float(ControllerThread.yawTrim.get_text())
74              curPitchTrim = float(ControllerThread.pitchTrim.get_text())
75              curRollTrim = float(ControllerThread.rollTrim.get_text())
76              gtk.threads_leave()
77
78              # Determine if trust trim buttons are pressed down
79              thrustTrimUpPressed = joystick.get_button(3)
80              yawTrimUpPressed = joystick.get_button(0)
81              pitchTrimUpPressed = True if (joystick.get_hat(0)[0] == -1) \
82                                   and (joystick.get_hat(0)[1] == 0) else False
83              rollTrimUpPressed = True if (joystick.get_hat(0)[0] == 0) \
84                                  and (joystick.get_hat(0)[1] == 1) else False
85              thrustTrimDownPressed = joystick.get_button(2)
86              yawTrimDownPressed = joystick.get_button(1)
87              pitchTrimDownPressed = True if (joystick.get_hat(0)[0] == 0) \
88                                     and (joystick.get_hat(0)[1] == -1) else False
89              rollTrimDownPressed = True if (joystick.get_hat(0)[0] == 1) \
90                                    and (joystick.get_hat(0)[1] == 0) else False
91
92              # Calculate new axes values
93              # Map from [-1, 1] to [-100, 100]
94              # If within a .0005 deviation from zero then set value to zero
95              # Use calculated value if armed, use zero otherwise
96              thrust = (valueMap(thrustRaw)
97                        if (thrustRaw > .0005 or thrustRaw < -.0005)
98                        else 0) if armed else 0
99              yaw = (valueMap(yawRaw)
100                    if (yawRaw > .0005 or yawRaw < -.0005) else 0) if armed else 0
101             pitch = (valueMap(pitchRaw)
102                      if (pitchRaw > .0005 or pitchRaw < -.0005)
103                      else 0) if armed else 0
104             roll = (valueMap(rollRaw)
105                     if (rollRaw > .0005 or rollRaw < -.0005) else 0) if armed else 0
106
107             # calculate new trim values
108             # Increment by .1 if up button pressed, decrement otherwise
109             # Set to zero if not armed
110             thrustTrim = max(min((curThrustTrim + .1 if thrustTrimUpPressed \
111                           else (curThrustTrim - .1 if thrustTrimDownPressed \
112                                 else curThrustTrim)) if armed else 0, 100), -100)
113             yawTrim = max(min((curYawTrim + .1 if yawTrimUpPressed \
114                       else (curYawTrim - .1 if yawTrimDownPressed \
115                             else curYawTrim)) if armed else 0, 100), -100)
116             pitchTrim = max(min((curPitchTrim + .1 if pitchTrimUpPressed \
117                         else (curPitchTrim - .1 if pitchTrimDownPressed \
118                               else curPitchTrim)) if armed else 0, 100), -100)
119             rollTrim = max(min((curRollTrim + .1 if rollTrimUpPressed \
120                        else (curRollTrim - .1 if rollTrimDownPressed \
121                              else curRollTrim)) if armed else 0, 100), -100)
122
123             # Reset trim button pressed, set to zero
124             if resetThrustTrim:
```

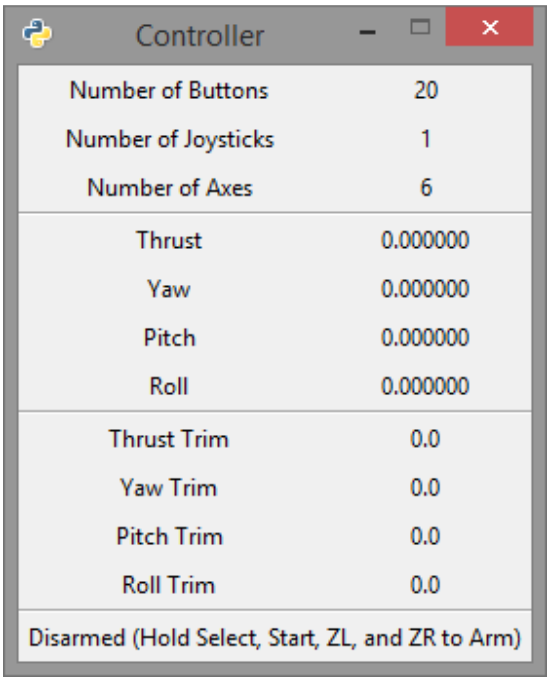
```
125                 thrustTrim = 0
126                 resetThrustTrim = False
127             if resetYawTrim:
128                 yawTrim = 0
129                 resetYawTrim = False
130             if resetPitchTrim:
131                 pitchTrim = 0
132                 resetPitchTrim = False
133             if resetRollTrim:
134                 rollTrim = 0
135                 resetRollTrim = False
136 
137             # Update values to display
138             ControllerThread.updateValues(thrust, yaw, pitch, roll, thrustTrim,
139                 yawTrim, pitchTrim, rollTrim,
140                 "Armed (Hold Select, Start, ZL, and ZR to Disarm)" if armed else
141                 "Disarmed (Hold Select, Start, ZL, and ZR to Arm)")
142 
143             # Handle controller update events
144             for event in pygame.event.get():
145                 if event.type == QUIT:
146                     loopQuit = True
147                 elif event.type == pygame.KEYDOWN:
148                     if event.key == pygame.K_ESCAPE:
149                         loopQuit = True
150 
151             # sleep for .01 seconds
152             time.sleep(interval)
153         # Occasionally the controller must be reinitialized
154         except:
155             if ControllerThread.running:
156                 joystick.init()
157 
158 # Thread dedicated to handling retrieving values from controller and
159 # updating GUI labels with new values
160 class ControllerThread(threading.Thread):
161     # Initialize thread
162     def __init__(self, numButtons, numJoysticks, numAxes, thrust, yaw,
163                  pitch, roll, thrustTrim, yawTrim, pitchTrim, rollTrim, arm):
164         super(ControllerThread, self).__init__()
165         self.numButtons = numButtons
166         self.numJoystick = numJoysticks
167         self.numAxes = numAxes
168         self.thrust = thrust
169         self.yaw = yaw
170         self.pitch = pitch
171         self.roll = roll
172         self.thrustTrim = thrustTrim
173         self.yawTrim = yawTrim
174         self.pitchTrim = pitchTrim
175         self.rollTrim = rollTrim
176         self.arm = arm
177         self.running = True
178 
179     # Initialize to initial values
180     def initValues(self, numButtons, numJoysticks, numAxes):
181         gtk.threads_enter()
182         self.numButtons.set_text("%d" % numButtons)
183         self.numJoystick.set_text("%d" % numJoysticks)
184         self.numAxes.set_text("%d" % numAxes)
185         self.thrustTrim.set_text("0")
186         self.yawTrim.set_text("0")
```

```
187         self.pitchTrim.set_text("0")
188         self.rollTrim.set_text("0")
189         self.arm.set_text("%s"
190                           % "Disarmed (Hold Select, Start, ZL, and ZR to Arm)")
191         gtk.threads_leave()
192         return False
193 
194     # Update values based on controller's state determined from controller
195     # read function
196     def updateValues(self, thrust, yaw, pitch, roll, thrustTrim, yawTrim,
197                      pitchTrim, rollTrim, arm):
198 
199         self.thrust.set_text("%f" % thrust)
200         self.yaw.set_text("%f" % yaw)
201         self.pitch.set_text("%f" % pitch)
202         self.roll.set_text("%f" % roll)
203         self.thrustTrim.set_text("%.1f" % thrustTrim)
204         self.yawTrim.set_text("%.1f" % yawTrim)
205         self.pitchTrim.set_text("%.1f" % pitchTrim)
206         self.rollTrim.set_text("%.1f" % rollTrim)
207         self.arm.set_text("%s" % arm)
208         gtk.threads_leave()
209         return False
210 
211     # Call controller read function when thread is run
212     def run(self):
213         readController(self)
214 
215     def exit(self):
216         self.running = False
217         pygame.quit()
218 
219 def delete_event(*args):
220     gtk.main_quit(*args)
221 
222 # Creates/runs threads and handles the GUI
223 def main():
224     # Use GTK threads
225     gobject.threads_init()
226 
227     # construct GUI from glade file
228     builder = gtk.Builder()
229     builder.add_from_file("interface.glade")
230 
231     # retrieve window from constructed GUI
232     window = builder.get_object("window1")
233     window.connect("delete_event", delete_event)
234     # display window
235     window.show_all()
236 
237     # retrieve labels that will be updated from controller thread
238     numButtons = builder.get_object("numButtons")
239     numJoysticks = builder.get_object("numJoysticks")
240     numAxes = builder.get_object("numAxes")
241     thrust = builder.get_object("thrust")
242     yaw = builder.get_object("yaw")
243     pitch = builder.get_object("pitch")
244     roll = builder.get_object("roll")
245     thrustTrim = builder.get_object("thrustTrim")
246     yawTrim = builder.get_object("yawTrim")
247     pitchTrim = builder.get_object("pitchTrim")
248     rollTrim = builder.get_object("rollTrim")
```

```
249     arm = builder.get_object("arm")
250 
251     # construct controller thread, passing in labels to manipulate
252     t = ControllerThread(numButtons, numJoysticks, numAxes, thrust, yaw, pitch,
253                          roll, thrustTrim, yawTrim, pitchTrim, rollTrim, arm)
254 
255     # start controller thread
256     t.start()
257 
258     # start GUI thread
259     gtk.threads_enter()
260     gtk.main()
261     gtk.threads_leave()
262 
263     t.exit()
264 
265     sys.exit(-1)
266 
267 # call main
268 if __name__ == "__main__":
269     main()
270 
```

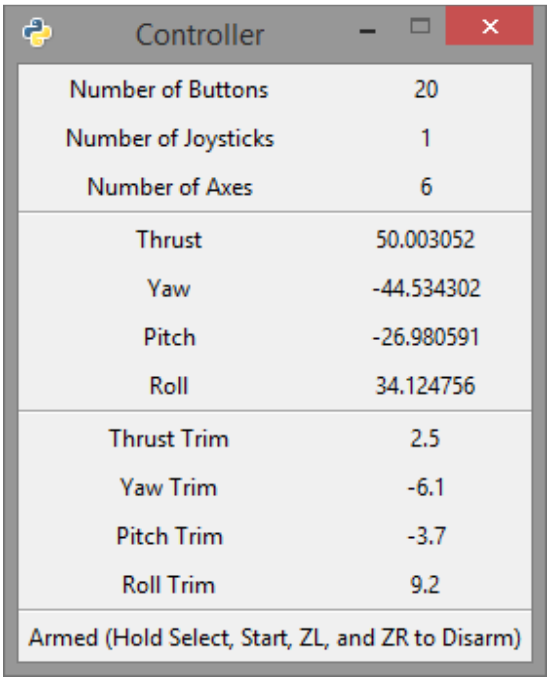
Graphical User Interface Results

Disarmed



This displays the user interface while the controls are in a disarmed state. During this time the controller's state is ignored and values displayed are fixed at zero except for the controller specifications. These specifications include the number of buttons, joysticks, and axes retrieved from PyGame. The PS3 controller is viewed as a single joystick with 6 axes comprised of the two analog sticks and the Z triggers. In total there are 20 buttons, all used by the controller program.

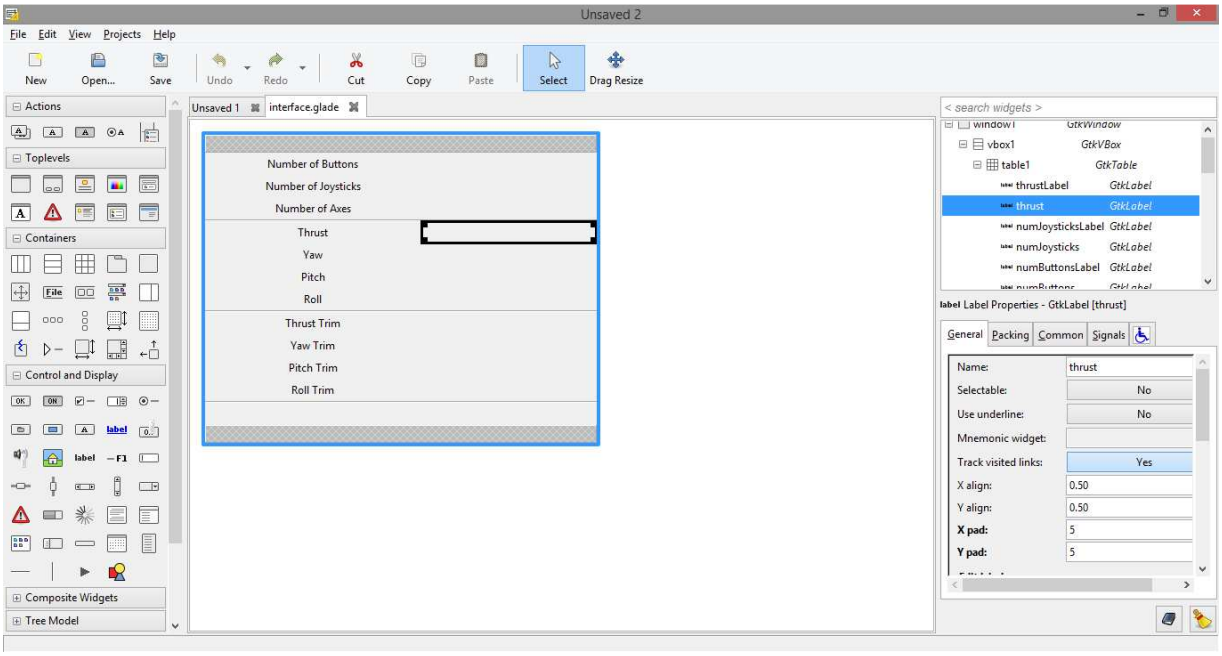
Armed



This displays the user interface while the controls are in a disarmed state. During this time the controller's current values are retrieved, mapped from the range [-1, 1] to [-100, 100], and sent to the appropriate label on the GTK interface thread.

From this point the values would be sent to the BeagleBone Black over wireless.

Glade Interface Designer



The Glade Interface Designer was used to construct the gtkbuilder xml file that represents the static location of the GUI widgets. This allowed for rapid development of the interface and simplified python code that would otherwise require manually boxing the interface elements.

The next page displays the XML generated by Glade.

```
<?xml version="1.0" encoding="UTF-8"?>
<interface>
  <requires lib="gtk+" version="2.24"/>
  <!-- interface-naming-policy project-wide -->
  <object class="GtkWindow" id="window1">
    <property name="can_focus">False</property>
    <property name="title" translatable="yes">Controller</property>
    <property name="resizable">False</property>
    <child>
      <object class="GtkVBox" id="vbox1">
        <property name="visible">True</property>
        <property name="can_focus">False</property>
        <child>
          <placeholder/>
        </child>
        <child>
          <object class="GtkTable" id="table1">
            <property name="visible">True</property>
            <property name="can_focus">False</property>
            <property name="n_rows">13</property>
            <property name="n_columns">2</property>
            <child>
              <object class="GtkLabel" id="thrustLabel">
                <property name="visible">True</property>
                <property name="can_focus">False</property>
                <property name="xpad">5</property>
                <property name="ypad">5</property>
                <property name="label" translatable="yes">Thrust</property>
              </object>
              <packing>
                <property name="top_attach">4</property>
                <property name="bottom_attach">5</property>
              </packing>
            </child>
            <child>
              <object class="GtkLabel" id="thrust">
                <property name="visible">True</property>
                <property name="can_focus">False</property>
                <property name="xpad">5</property>
                <property name="ypad">5</property>
                <property name="width_chars">10</property>
              </object>
              <packing>
                <property name="left_attach">1</property>
                <property name="right_attach">2</property>
                <property name="top_attach">4</property>
                <property name="bottom_attach">5</property>
              </packing>
            </child>
            <child>
              <object class="GtkLabel" id="numJoysticksLabel">
```

```
52                    <property name="visible">True</property>
53                    <property name="can_focus">False</property>
54                    <property name="xpad">5</property>
55                    <property name="ypad">5</property>
56                    <property name="label" translatable="yes">Number of
    Joysticks</property>
57                  </object>
58                  <packing>
59                    <property name="top_attach">1</property>
60                    <property name="bottom_attach">2</property>
61                  </packing>
62                </child>
63                <child>
64                  <object class="GtkLabel" id="numJoysticks">
65                    <property name="visible">True</property>
66                    <property name="can_focus">False</property>
67                    <property name="xpad">5</property>
68                    <property name="ypad">5</property>
69                    <property name="width_chars">10</property>
70                  </object>
71                  <packing>
72                    <property name="left_attach">1</property>
73                    <property name="right_attach">2</property>
74                    <property name="top_attach">1</property>
75                    <property name="bottom_attach">2</property>
76                  </packing>
77                </child>
78                <child>
79                  <object class="GtkLabel" id="numButtonsLabel">
80                    <property name="visible">True</property>
81                    <property name="can_focus">False</property>
82                    <property name="xpad">5</property>
83                    <property name="ypad">5</property>
84                    <property name="label" translatable="yes">Number of
    Buttons</property>
85                  </object>
86                </child>
87                <child>
88                  <object class="GtkLabel" id="numButtons">
89                    <property name="visible">True</property>
90                    <property name="can_focus">False</property>
91                    <property name="xpad">5</property>
92                    <property name="ypad">5</property>
93                    <property name="width_chars">10</property>
94                  </object>
95                  <packing>
96                    <property name="left_attach">1</property>
97                    <property name="right_attach">2</property>
98                  </packing>
99                </child>
100               <child>
```

```
101                 <object class="GtkLabel" id="numAxesLabel">
102                   <property name="visible">True</property>
103                   <property name="can_focus">False</property>
104                   <property name="xpad">5</property>
105                   <property name="ypad">5</property>
106                   <property name="label" translatable="yes">Number of
    Axes</property>
107                 </object>
108                 <packing>
109                   <property name="top_attach">2</property>
110                   <property name="bottom_attach">3</property>
111                 </packing>
112               </child>
113               <child>
114                 <object class="GtkLabel" id="numAxes">
115                   <property name="visible">True</property>
116                   <property name="can_focus">False</property>
117                   <property name="xpad">5</property>
118                   <property name="ypad">5</property>
119                   <property name="width_chars">10</property>
120                 </object>
121                 <packing>
122                   <property name="left_attach">1</property>
123                   <property name="right_attach">2</property>
124                   <property name="top_attach">2</property>
125                   <property name="bottom_attach">3</property>
126                 </packing>
127               </child>
128               <child>
129                 <object class="GtkLabel" id="yawLabel">
130                   <property name="visible">True</property>
131                   <property name="can_focus">False</property>
132                   <property name="xpad">5</property>
133                   <property name="ypad">5</property>
134                   <property name="label" translatable="yes">Yaw</property>
135                 </object>
136                 <packing>
137                   <property name="top_attach">5</property>
138                   <property name="bottom_attach">6</property>
139                   <property name="x_options">GTK_FILL</property>
140                 </packing>
141               </child>
142               <child>
143                 <object class="GtkLabel" id="yaw">
144                   <property name="visible">True</property>
145                   <property name="can_focus">False</property>
146                   <property name="xpad">5</property>
147                   <property name="ypad">5</property>
148                   <property name="width_chars">10</property>
149                 </object>
150                 <packing>
```

```
151                     <property name="left_attach">1</property>
152                     <property name="right_attach">2</property>
153                     <property name="top_attach">5</property>
154                     <property name="bottom_attach">6</property>
155                   </packing>
156                 </child>
157                 <child>
158                   <object class="GtkLabel" id="pitchLabel">
159                     <property name="visible">True</property>
160                     <property name="can_focus">False</property>
161                     <property name="xpad">5</property>
162                     <property name="ypad">5</property>
163                     <property name="label" translatable="yes">Pitch</property>
164                   </object>
165                   <packing>
166                     <property name="top_attach">6</property>
167                     <property name="bottom_attach">7</property>
168                   </packing>
169                 </child>
170                 <child>
171                   <object class="GtkLabel" id="pitch">
172                     <property name="visible">True</property>
173                     <property name="can_focus">False</property>
174                     <property name="xpad">5</property>
175                     <property name="ypad">5</property>
176                     <property name="width_chars">10</property>
177                   </object>
178                   <packing>
179                     <property name="left_attach">1</property>
180                     <property name="right_attach">2</property>
181                     <property name="top_attach">6</property>
182                     <property name="bottom_attach">7</property>
183                   </packing>
184                 </child>
185                 <child>
186                   <object class="GtkLabel" id="roll">
187                     <property name="visible">True</property>
188                     <property name="can_focus">False</property>
189                     <property name="xpad">5</property>
190                     <property name="ypad">5</property>
191                     <property name="width_chars">10</property>
192                   </object>
193                   <packing>
194                     <property name="left_attach">1</property>
195                     <property name="right_attach">2</property>
196                     <property name="top_attach">7</property>
197                     <property name="bottom_attach">8</property>
198                   </packing>
199                 </child>
200                 <child>
201                   <object class="GtkLabel" id="rollLabel">
```

```
202                     <property name="visible">True</property>
203                     <property name="can_focus">False</property>
204                     <property name="xpad">5</property>
205                     <property name="ypad">5</property>
206                     <property name="label" translatable="yes">Roll</property>
207                   </object>
208                   <packing>
209                     <property name="top_attach">7</property>
210                     <property name="bottom_attach">8</property>
211                   </packing>
212                 </child>
213                 <child>
214                   <object class="GtkLabel" id="yawTrimLabel">
215                     <property name="visible">True</property>
216                     <property name="can_focus">False</property>
217                     <property name="xpad">5</property>
218                     <property name="ypad">5</property>
219                     <property name="label" translatable="yes">Yaw
    Trim</property>
220                   </object>
221                   <packing>
222                     <property name="top_attach">10</property>
223                     <property name="bottom_attach">11</property>
224                   </packing>
225                 </child>
226                 <child>
227                   <object class="GtkLabel" id="thrustTrimLabel">
228                     <property name="visible">True</property>
229                     <property name="can_focus">False</property>
230                     <property name="xpad">5</property>
231                     <property name="ypad">5</property>
232                     <property name="label" translatable="yes">Thrust
    Trim</property>
233                   </object>
234                   <packing>
235                     <property name="top_attach">9</property>
236                     <property name="bottom_attach">10</property>
237                   </packing>
238                 </child>
239                 <child>
240                   <object class="GtkLabel" id="pitchTrimLabel">
241                     <property name="visible">True</property>
242                     <property name="can_focus">False</property>
243                     <property name="xpad">5</property>
244                     <property name="ypad">5</property>
245                     <property name="label" translatable="yes">Pitch
    Trim</property>
246                   </object>
247                   <packing>
248                     <property name="top_attach">11</property>
249                     <property name="bottom_attach">12</property>
```

```
250                   </packing>
251                 </child>
252                 <child>
253                   <object class="GtkLabel" id="rollTrimLabel">
254                     <property name="visible">True</property>
255                     <property name="can_focus">False</property>
256                     <property name="xpad">5</property>
257                     <property name="ypad">5</property>
258                     <property name="label" translatable="yes">Roll
    Trim</property>
259                   </object>
260                   <packing>
261                     <property name="top_attach">12</property>
262                     <property name="bottom_attach">13</property>
263                   </packing>
264                 </child>
265                 <child>
266                   <object class="GtkLabel" id="thrustTrim">
267                     <property name="visible">True</property>
268                     <property name="can_focus">False</property>
269                     <property name="xpad">5</property>
270                     <property name="ypad">5</property>
271                     <property name="width_chars">10</property>
272                   </object>
273                   <packing>
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276                     <property name="top_attach">9</property>
277                     <property name="bottom_attach">10</property>
278                   </packing>
279                 </child>
280                 <child>
281                   <object class="GtkLabel" id="yawTrim">
282                     <property name="visible">True</property>
283                     <property name="can_focus">False</property>
284                     <property name="xpad">5</property>
285                     <property name="ypad">5</property>
286                     <property name="width_chars">10</property>
287                   </object>
288                   <packing>
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291                     <property name="top_attach">10</property>
292                     <property name="bottom_attach">11</property>
293                   </packing>
294                 </child>
295                 <child>
296                   <object class="GtkLabel" id="pitchTrim">
297                     <property name="visible">True</property>
298                     <property name="can_focus">False</property>
299                     <property name="xpad">5</property>
```

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300                     <property name="ypad">5</property>
301                     <property name="width_chars">10</property>
302                   </object>
303                   <packing>
304                     <property name="left_attach">1</property>
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307                     <property name="bottom_attach">12</property>
308                   </packing>
309                 </child>
310                 <child>
311                   <object class="GtkLabel" id="rollTrim">
312                     <property name="visible">True</property>
313                     <property name="can_focus">False</property>
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315                     <property name="ypad">5</property>
316                     <property name="width_chars">10</property>
317                   </object>
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319                     <property name="left_attach">1</property>
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321                     <property name="top_attach">12</property>
322                     <property name="bottom_attach">13</property>
323                   </packing>
324                 </child>
325                 <child>
326                   <object class="GtkHSeparator" id="hseparator2">
327                     <property name="visible">True</property>
328                     <property name="can_focus">False</property>
329                   </object>
330                   <packing>
331                     <property name="top_attach">8</property>
332                     <property name="bottom_attach">9</property>
333                   </packing>
334                 </child>
335                 <child>
336                   <object class="GtkHSeparator" id="hseparator3">
337                     <property name="visible">True</property>
338                     <property name="can_focus">False</property>
339                   </object>
340                   <packing>
341                     <property name="left_attach">1</property>
342                     <property name="right_attach">2</property>
343                     <property name="top_attach">8</property>
344                     <property name="bottom_attach">9</property>
345                   </packing>
346                 </child>
347                 <child>
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349                     <property name="visible">True</property>
350                     <property name="can_focus">False</property>
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352                 <packing>
353                   <property name="top_attach">3</property>
354                   <property name="bottom_attach">4</property>
355                 </packing>
356               </child>
357               <child>
358                 <object class="GtkHSeparator" id="hseparator5">
359                   <property name="visible">True</property>
360                   <property name="can_focus">False</property>
361                 </object>
362                 <packing>
363                   <property name="left_attach">1</property>
364                   <property name="right_attach">2</property>
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366                   <property name="bottom_attach">4</property>
367                 </packing>
368               </child>
369             </object>
370             <packing>
371               <property name="expand">True</property>
372               <property name="fill">True</property>
373               <property name="position">1</property>
374             </packing>
375           </child>
376           <child>
377             <object class="GtkHSeparator" id="hseparator1">
378               <property name="visible">True</property>
379               <property name="can_focus">False</property>
380             </object>
381             <packing>
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383               <property name="fill">True</property>
384               <property name="position">2</property>
385             </packing>
386           </child>
387           <child>
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389               <property name="visible">True</property>
390               <property name="can_focus">False</property>
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392               <property name="ypad">5</property>
393               <property name="justify">center</property>
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395             <packing>
396               <property name="expand">True</property>
397               <property name="fill">True</property>
398               <property name="position">3</property>
399             </packing>
400           </child>
401           <child>
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402             <placeholder/>
403           </child>
404         </object>
405       </child>
406     </object>
407   </interface>
408
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