Shore Station

Date: 3/5/2012
Revision: 5
Engineer: Gregory Busillo

Wire Specs
W1: USB wire
W2-3: CAT6 cables
U1 Laptop:
J1: USB
A1 Station:
J1,2: CAT6 Jacks
J3: RPSMA Connector
J4: USB cable out
J5: AC Main Jack
A2,3 Sensor:
J1: CAT6 Jack

Diagram:
- Laptop U1
  - J1
  - W1
- Station A1
  - J3, J5
- Sensor A2
  - J1
  - W2
- Tripod U9
- Sensor A3
  - J1
  - Triod U3
W1-3: Ardupilot / RC connections (digital?) (incl. power)
W4: RC Receiver power (future)
W5: GPS/Ardupilot line
W6: Ardupilot 5v regulated power line (temporary)
W7: Motor control line
W8: Payload control line
W9: Audio control line
W10: Visual control line
W11: Audio power line (18v)
W12: Visual power line (18v)
W13: Payload power line
W14: Motor power line
W15: Power to wall jack line

J1,2,3: RC Receiver interface (future)
J4: RC Receiver Power (future)
J5,6,7: Ardupilot RC interface (future)
J8: Ardupilot power jack (temporary)
J9: Ardupilot servo outputs
J10: Ardupilot I2C output
J11: Ardupilot top
J12: Ardupilot to audio control line
J13: Ardupilot to visual control line
J14: Ardupilot GPS Connection
J15: GPS board connection
J17: IMU RX/TX pins
J18: Magnetometer board
J19: Xbee shield connection
J21: Power to RC (future)
J22: Power to Ardupilot (temporary)
J23: Power to wall jack
J24: Power to visual beacon
J25: Power to audio beacon
J26: Motor power jack
J27: Power to payload
J28: Wall adapter
J29: Motor power
J30: Motor control line
J31: Payload power jack
J32: Payload control line
J33: Audio beacon control line
J34: Audio power jack
J35: Visual control line
J36: Visual power jack

Date: 3/5/2012
Revision: 6
Engineer: Sam Courtney
RF Interface

- getData ( ) : packet
- sendData ( packet )
- detectType ( packet ) : string
- convertData ( packet, string ) : dictionary

Controller

- getFromRF ( ) : dictionary
- sendToRF ( dictionary )
- updateGUI ( )
- logging ( __.csv, t, x, y, θ, data ) : int
- processing ( )
- errorHandler ( exception ) : string
- systemLogger ( sysLog.csv , t ) : int
- guiEventHandler ( event )
- setUp ( string, double )

GUI

- controlMode ( buttonEvent ) : event
- mode ( buttonEvent ) : event
- saveData ( buttonEvent )
- displayData ( dataType ) : int
A1: Station

Date: 3/5/2012
Revision: 4
Engineer: David Salter

<table>
<thead>
<tr>
<th>Ports:</th>
<th>U13 2-Port USB Hub:</th>
<th>U10 CAT6 Interface PCB:</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1,2: CAT6 Jacks</td>
<td>J1-2: USB Inputs</td>
<td>P0-4: 5 pin angle connector</td>
</tr>
<tr>
<td>J3: RPSMA Connector</td>
<td>U12 Xbee USB Adapter:</td>
<td>J1-2: CAT6 Jacks</td>
</tr>
<tr>
<td>J4: USB cable out</td>
<td>J1: USBmini jack</td>
<td>Digikey: 380-1167-ND</td>
</tr>
<tr>
<td>J5: AC Main jack</td>
<td>J2: 2 Mounted Pin Headers</td>
<td></td>
</tr>
<tr>
<td>Wire Specs:</td>
<td>U11 Xbee-Pro ZB:</td>
<td></td>
</tr>
<tr>
<td>W1: USB_A to USBmini Wire</td>
<td>P1: 2 Row Pins</td>
<td></td>
</tr>
<tr>
<td>W2: USB_A to I2C Cable</td>
<td>U15 Maintenance Power Switch:</td>
<td></td>
</tr>
<tr>
<td>Digikey: 768-1105-ND</td>
<td>J1: AC Main Input</td>
<td>J1: AC Main Input</td>
</tr>
<tr>
<td>W4: Ground line</td>
<td>J3: Gnd output</td>
<td>J3: Gnd output</td>
</tr>
<tr>
<td></td>
<td>J4: Battery &gt;18V input</td>
<td>J4: Battery &gt;18V input</td>
</tr>
<tr>
<td></td>
<td>J5: Battery Gnd input</td>
<td>J5: Battery Gnd input</td>
</tr>
</tbody>
</table>

2-Port USB Hub U13

Xbee USB Adapter U12

Xbee-Pro ZB U11

Battery 18V, __A U14

Maintenance Power Switch U15

P&D Interface Board U10

Packaging U15

Ports:
- J1,2: CAT6 Jacks
- J3: RPSMA Connector
- J4: USB cable out
- J5: AC Main jack

Wire Specs:
- W1: USB_A to USBmini Wire
- W2: USB_A to I2C Cable
  
  Digikey: 768-1105-ND
- W3: 18V Line
- W4: Ground line

Ports:
- J1-2: USB Inputs
- J1: USBmini jack
- J2: 2 Mounted Pin Headers

U11 Xbee-Pro ZB:
- P1: 2 Row Pins

U15 Maintenance Power Switch:
- J1: AC Main Input
- J2: >18V
- J3: Gnd output
- J4: Battery >18V input
- J5: Battery Gnd input

U13 2-Port USB Hub:
- J1-2: USB Inputs

U10 CAT6 Interface PCB:
- P0-4: 5 pin angle connector

Battery 18V, __A U14

Maintenance Power Switch U15
A2,3: Sensor

Date: 3/5/2012
Revision: 2
Engineer: David Salter

<table>
<thead>
<tr>
<th>Ports:</th>
<th>Plugs:</th>
<th>U15 AZ/EL Positioner:</th>
<th>A10 IR Angle Shore:</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1: CAT6 Jack</td>
<td>P1: CONN 2.1mm Female Plug</td>
<td>SDA, SCL: I2C Bus</td>
<td>J1,2: Digital Control Signals</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dikey: CP3-1000-ND</td>
<td>PB0, PD5-7: 5V CMOS Digital I/O</td>
</tr>
<tr>
<td>Wire Specs:</td>
<td>W1,2: I2C Bus</td>
<td>U15: Conn 2.1mm Power Jack</td>
<td>J3: Regulated 5V</td>
</tr>
<tr>
<td>W4: Gnd</td>
<td>W5-8: 5V CMOS Digital I/O Lines</td>
<td>J6: Conn 2.1mm Power Jack</td>
<td>A11 Power Distribution:</td>
</tr>
<tr>
<td>W12: Regulated 1.8V Line</td>
<td>W12: Regulated 1.8V Line</td>
<td>J4: Gnd</td>
<td></td>
</tr>
</tbody>
</table>

A9 UltrasonicRangeShore:
- J1: Transmit Input - 5V CMOS
- J2: Receive Output - 5V CMOS
- J3: Regulated 18V
- J4: Gnd

Power Distribution:
- J1: >18V Unregulated Input
- J2: Gnd
- J3: 12V Unregulated output
- J4: 18V Regulated output
Sensor 1 Receiver

Sensor 2 Transmitter

Receiver Circuit

Driver Circuit

W1: Basic Wire to Header
W2: Basic Wire to Header
W3: Basic Wire to Header
W4: Basic Wire to Header (18v)
W5: Basic Wire to Header
W6: Basic Wire to Header (5v)
W7-8: Basic Wire to Header

W1

W2

GND

W3

W4

Power from Station

Enable driver from micro controller

W5

Peak Detected Out to micro controller

5v Power from AZ/EL
Sensor 1 Receiver

Sensor 2 Transmitter

Receiver Circuit

Driver Circuit

Arduino

18v Line

Switch input from micro controller

Peak Detected Out to micro controller

12v Regulator

W1: Basic Wire to Header
W2: Basic Wire to Header
W3: Basic Wire to Header
W4: Basic Wire to Header (18v)
W5: Basic Wire to Header
W6: Basic Wire to Header (~9V)
W7-8: Basic Wire to Header
W9: Basic Wire to Header (5v)
IR Angle Shore

Date: 3/5/2012
Revision: 1
Engineer: Andrew Ho

Light From Beacon → High Pass Light Filter & Optics → Quad Photodiode Array → Analog High Pass Filters & Transimpedence Amplifier → Summer & Divider Circuit → A to D and Control Loop On Arduino → AZ/EL Positioner

Azimuth Angle and Elevation Angle to X/Y position to laptop
IR Angle Boat

Date: 3/5/2012
Revision: 1
Engineer: Andrew Ho

Boat Power
Approx. (1.8V @ 1A) *4

Switching Circuit
100Hz +

Infrared LED Array

Flashing Light To Shore Station