Online Ballooning Portal

Ethan Harstad - SBA
What is the portal?

An all inclusive online ballooning toolkit:

● Planning
● Prediction
● Tracking
● Analysis
● Sharing
Why are we doing this?

- 2012 AHAC identified a desire to easily share data
- Beginners frequently launch without a prediction due to perceived difficulty
- Shared data can fill gaps and provide examples
- “Big data” enables statistical modelling
Objectives

● Simple interface to detailed prediction engine
● Plug and play tracking system
● Seamless telemetry storage
● Easy data sharing
● Straightforward data presentation
● Open source and community driven
Prior work

Prediction
● Near Space Ventures
● HabHub - UKHAS
● ASTRA - University of Southampton

Tracking
● aprs.fi, openaprs.net, etc…
● Spacenear - UKHAS
HabHub Predictor
ASTRA Predictor
Spacenear Tracker
No good solution so far

- No telemetry storage
- No data analysis
- No seamless sharing
- No start to finish solution
Proposed solution

Create a flight

- Parameter entry
- Rough predictions
- Tracking/telemetry definition
- Schedule flight
- Paperwork generated
- Announcement issued
- Flight page posted on website
Proposed solution

Tracking

- Confirm launch parameters
- Telemetry stations upload data
- Track and predictions updated live
- Paperwork generated
- Graph live telemetry
- Update status on website
Proposed solution

Analysis

- Export data
- Plot data
- Generate reports
- Analyze prediction accuracy
- All data attached to flight page
Proposed solution

Sharing data

- Browse prior flights
- Search for flights using mission parameters
- Search for data using attributes and tags
Current work

HABtk

- Bulk predictions
- Tracking/logging
- Telemetry upload
- Real-time predictions
Current work

Stratocast

- Guided predictions
- Simplified quick predictions
- Reverse predictions
- Balloon burst calculator
- Simplified interface
- Mobile/tablet compatible
Stratocast

Prediction Results

<table>
<thead>
<tr>
<th>Overview</th>
<th>Elapsed Time</th>
<th>Total Distance</th>
<th>Bearing</th>
<th>Ascent Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2:14:20</td>
<td>55.371 km</td>
<td>107.56°</td>
<td>5.499 m/s</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Launch</th>
<th>Time</th>
<th>Ascent Time</th>
<th>Location</th>
<th>Altitude</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5/26/2014</td>
<td>1:30:30</td>
<td>47.908, -97.059</td>
<td>253 m</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Burst</th>
<th>Time</th>
<th>Location</th>
<th>Altitude</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5/26/2014</td>
<td>47.612, -96.859</td>
<td>36.106 km</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Landing</th>
<th>Time</th>
<th>Descent Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5/26/2014</td>
<td>0:43:50</td>
<td>47.755, -96.363</td>
</tr>
</tbody>
</table>
Current work

Platform planning
- Requirements definition
- Standards development
- Database development
- Website integration
Current work

Standards development
• Interoperability
• Data description
• Telemetry/telecommand description
Current work

Predictor development

- Atmospheric data interpolator
- Float predictor
- Zero-pressure predictor
- Wind extraction and assimilation
Future work

- Statistical modelling
- Automatic performance evaluation
- Distributed tracking network
- Universal SDR transceiver
Modelling & evaluation

Modelling is difficult:
- Drag crisis
- Thermal effects
- Different manufacturers

Machine learning can help identify statistical models and continuously evaluate model performance.
Distributed tracking
Get involved

- Feature requests
- Planning
- Programming
- User experience design
- Testing
- Flight data

E-mail: eharstad@aerodynelabs.com