

# Radio Collar Tracker - RTK GPS Integration

Project Updates  
Corbin, Ryan, and Sam

# Radio Collar Tracker Overview

- Airborne tracker identifies radio collars on wildlife
- Collected information helps track animal movement patterns
- Largely beneficial to biologists and ecologists
  - More efficient than tracking on foot



Image from: [http://e4e.ucsd.edu/wordpress/?page\\_id=96](http://e4e.ucsd.edu/wordpress/?page_id=96)

# RTK GPS Integration Overview

- The current system uses standard GPS
  - Accuracy between 10m - 30m
- RTK GPS will dramatically improve location accuracy for biologists and ecologists
  - Centimeter grade precision
- Utilizes a base station and a roaming unit

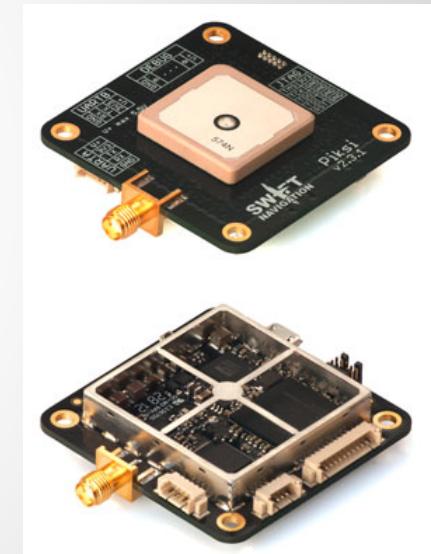


Image from:  
<http://www.swiftnav.com/piksi.html>

# Disneyland



# Disneyland



# Disneyland



# Project Specification

| Milestones   | Due Date  |
|--|-----------|
| Get up to speed with the Piksi RTK GPS hardware.   | 4/21/2015 |
| Get the RTK GPS working in the field with laptops. | 5/5/2015  |
| Integrate hardware/software with the quadcopter.   | 5/19/2015 |
| Evaluate performance between GPS and RTK GPS.      | 5/26/2015 |
| Document results.                                  | 6/2/2015  |

- Notice the slack between the last due date and the end of class
  - To account for unexpected integration issues

# Work Completed

- ✓ Get up to speed with the Piksi RTK GPS hardware
  - Reading documentation, watching YouTube videos, gaining access to existing code

# Work Completed

- ✓ Get up to speed with the Piksi RTK GPS hardware
- ☐ Get the RTK GPS working in the field with two laptops
  - Due on Tuesday, 5/5/2015
  - Attempted using two Raspberry Pis running Linux
  - Switched to use Mac and PC to achieve initial results

# Work Completed

Single Point Position    RTK Position

**Single Point Position (SPP)**

| Item      | Value                       |
|-----------|-----------------------------|
| GPS Time  | 2015-04-27 23:59:43.700004  |
| GPS Week  | 1842                        |
| GPS ToW   | 172783.700004               |
| Num. sats | 4                           |
| Lat       | 32.8802613423               |
| Lng       | -117.231546737              |
| Alt       | 92.4388400935               |
| Flags     | 0x00                        |
| Mode      | SPP (single point position) |
| Vel. N    | 0.0800                      |
| Vel. E    | 0.0460                      |
| Vel. D    | 0.0280                      |
| PDOP      | 4.0                         |
| GDOP      | 4.3                         |

Latitude Longitude

## Get Latitude Longitude

To make a search, use the name of a place, city, state, or address, or click the location on the map to **get lat long coordinates.**

Place Name

San Diego, CA

Add the country code for better results. Ex:  
London, UK

Latitude                      Longitude

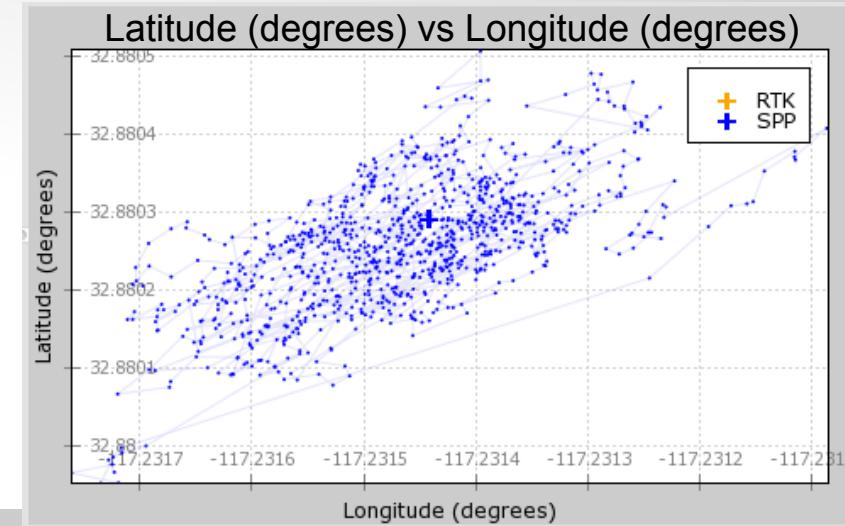
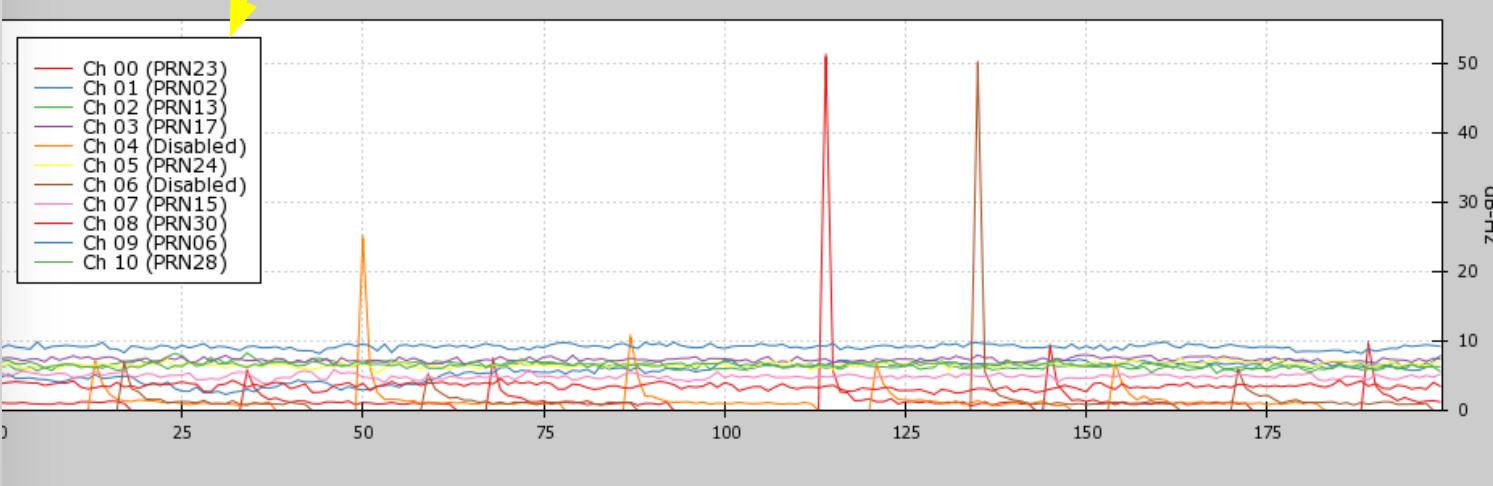
32.715738                      -117.161084

1.1k  
 466

# Work Completed

11 Different Satellites connected

Signal Gain (dB) vs Time(s)  
Tracking C/N0



# Work Completed

- ✓ Get up to speed with the Piksi RTK GPS hardware
- Get the RTK GPS working in the field with laptops
- Integrate hardware/software with the quadcopter.
  - Originally Due on 5/19/2015
  - May need additional week for integration on Beaglebone Black

# Next Steps

1. Install Linux on two laptops
2. Integrate Piksi software and test Piksi hardware with both laptops
3. Write post-processing code to match current system
4. Begin replacing GPS with the RTK GPS on the Beaglebone microprocessor

# Conclusion

- Initial hiccups
- Milestones developed with these possibilities in mind
  - We have enough time and resources to be successful
- RTK GPS integration will provide an instant, measurable improvement to the radio collar tracker
- Biologists and ecologists will be given more accurate information
  - Enhance their research
  - Improve the safety of collared animals