

# beetles

March 19, 2023

## 1 tagged\_beetles.ipynb

### 1.1 Objective

In this experiment we measured line-of-sight detection distance for tagged CRB using the UOG2 RECCO harmonic radar transceiver. Targets were 5 single-tagged and 5 double-tagged dead CRB. Each target was pinned to a piece of wood about 6 inches above the ground at one end of a measured linear transect. Using the most sensitive setting, the distance between the transceiver and the target was increased until no signal could be heard in the headphones. Each beetle was pinned in two orientations: perpendicular and parallel to the transect (see diagram below).

### 1.2 Results

- Double-tagged beetles had a detection range of between 82 and 102 feet. Orientation of the beetle did not affect detection range.
- Single-tagged beetles had a detection range of only 18 to 38 feet when the tag antenna was parallel to the line-of-sight. But this increased to 74 to 93 feet when the tag antenna was perpendicular to the line of sight.
- Detection range for the tagged beetles (82 to 102 feet) was only about half of what we measured for the standard RECCO tag (183 to 225 feet).

```
[6]: import pandas as pd
import plotly.express as px
```

```
[9]: df = pd.read_csv('beetles.csv')
df
```

```
[9]:
```

	beetle	tags	orientation	feet
0	1	1	perpendicular	22
1	1	1	parallel	74
2	2	1	perpendicular	18
3	2	1	parallel	83
4	3	1	perpendicular	26
5	3	1	parallel	79
6	4	1	perpendicular	38
7	4	1	parallel	87
8	5	1	perpendicular	29
9	5	1	parallel	93
10	6	2	perpendicular	82

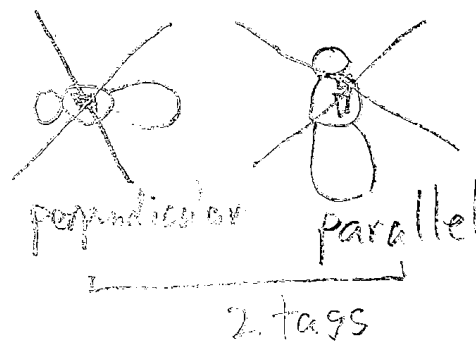
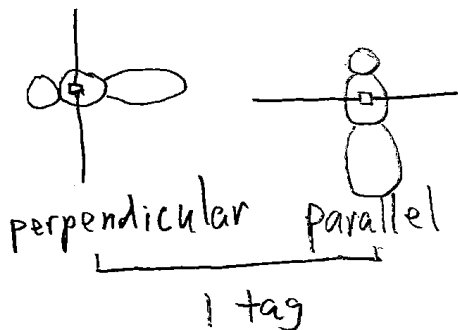
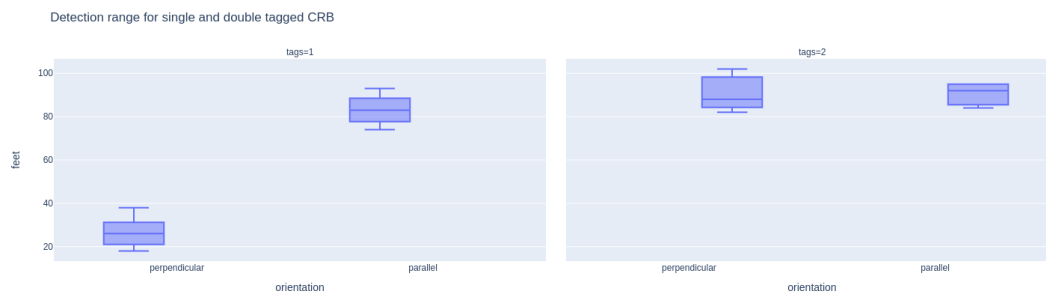
11	6	2	parallel	84
12	7	2	perpendicular	97
13	7	2	parallel	86
14	8	2	perpendicular	88
15	8	2	parallel	95
16	9	2	perpendicular	102
17	9	2	parallel	95
18	10	2	perpendicular	85
19	10	2	parallel	92

```
[7]: g = df.groupby(['tags', 'orientation'])
      g['feet'].describe()
```

```
[7]:
```

		count	mean	std	min	25%	50%	75%	max
tags	orientation								
1	parallel	5.0	83.2	7.293833	74.0	79.0	83.0	87.0	93.0
	perpendicular	5.0	26.6	7.602631	18.0	22.0	26.0	29.0	38.0
2	parallel	5.0	90.4	5.128353	84.0	86.0	92.0	95.0	95.0
	perpendicular	5.0	90.8	8.408329	82.0	85.0	88.0	97.0	102.0

```
[10]: px.box(data_frame=df, x='orientation', y='feet', facet_col='tags',
             title='Detection range for single and double tagged CRB')
```



[ ]: