

Sensors for Monitoring Feeding Behavior in Nectar-feeding Bats

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The subjects

Lesser Long-nosed Bat

(*Leptonycteris curasoae yerbabuena*)

- <https://www.desertmuseum.org/pollination/bats.php>



Mexican Long-tongued Bat (*Choeronycteris Mexicana*)

- <http://eol.org/pages/327865/details>



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Photographer: U.S. Fish and Wildlife Service Headquarters

Some Lepto Biology

- Lesser long-nosed bats removed from the U.S. Fish and Wildlife service Endangered Species List
- Feed exclusively on the fruit and nectar of night-blooming columnar cacti and some agave (and hummingbird feeders)
- Range from Southern Arizona to Central America
- Migrate – arrive Arizona April to September *mostly*

Research Questions

- Conservation Strategy and Education
- Seasonal migration patterns
 - When to they arrive at locations and when do they leave
- Diurnal patterns
 - When do they arrive at a location in the evening
 - When do they leave in the morning
 - Roost location extrapolation
 - Feeding patterns through the night
- Species interactions
 - Long-nosed – Long-tongued synchronization
 - Long-nosed – plant proximity

Prior Work (not me)

- Citizen Science
 - Bat and Hummingbird study Marana and Tucson
 - US Fish and Wildlife and AZ Fish and Game
 - Ted Flemming
 - Citizens measure level of nectar in hummingbird feeders

Internet of (Wild) Things

- Instrument Feeders
 - Photo Sensors
 - Data Storage and WiFi Transmission
- Design objective < \$50/unit
- Rechargeable battery backs



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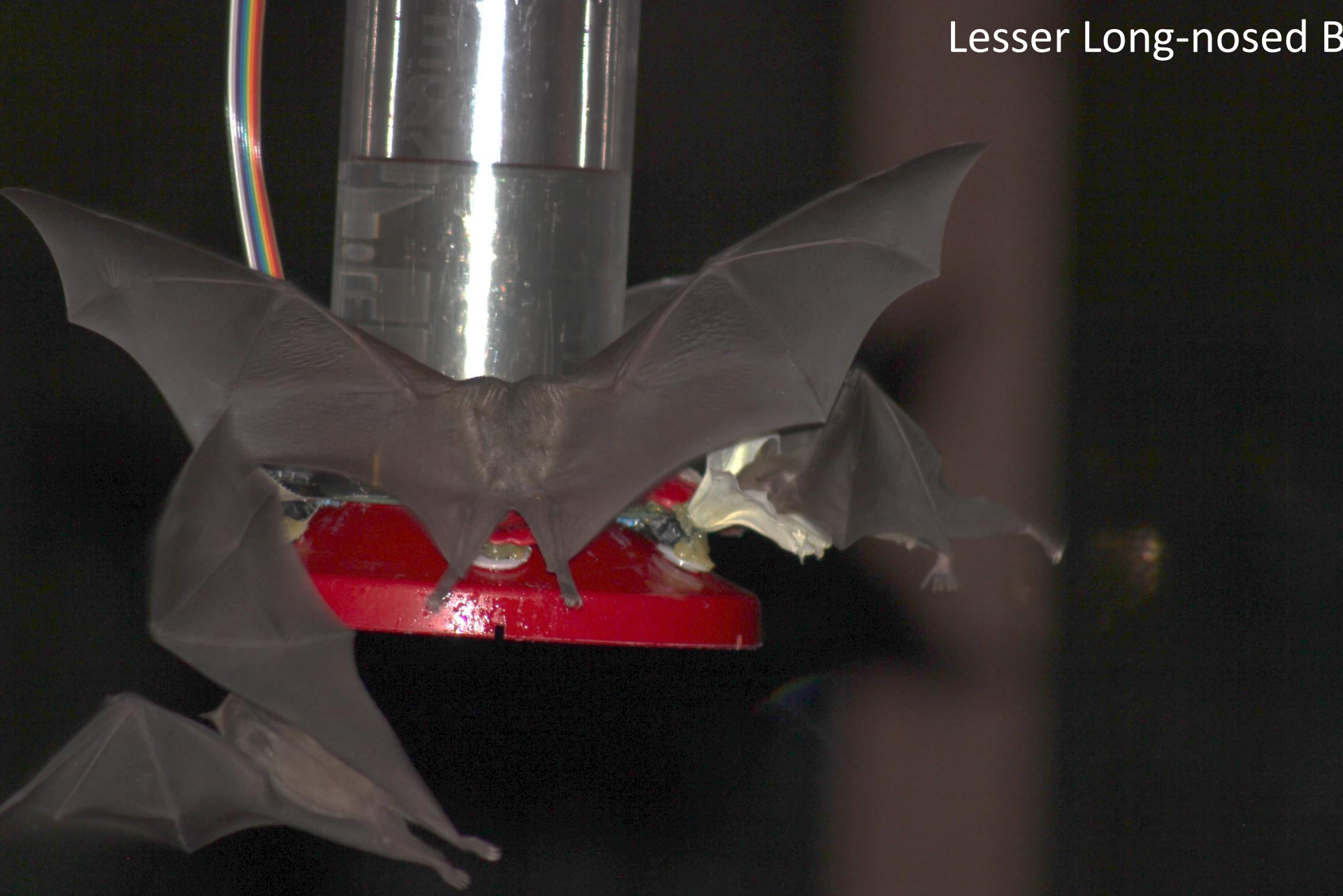
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11/25/2017

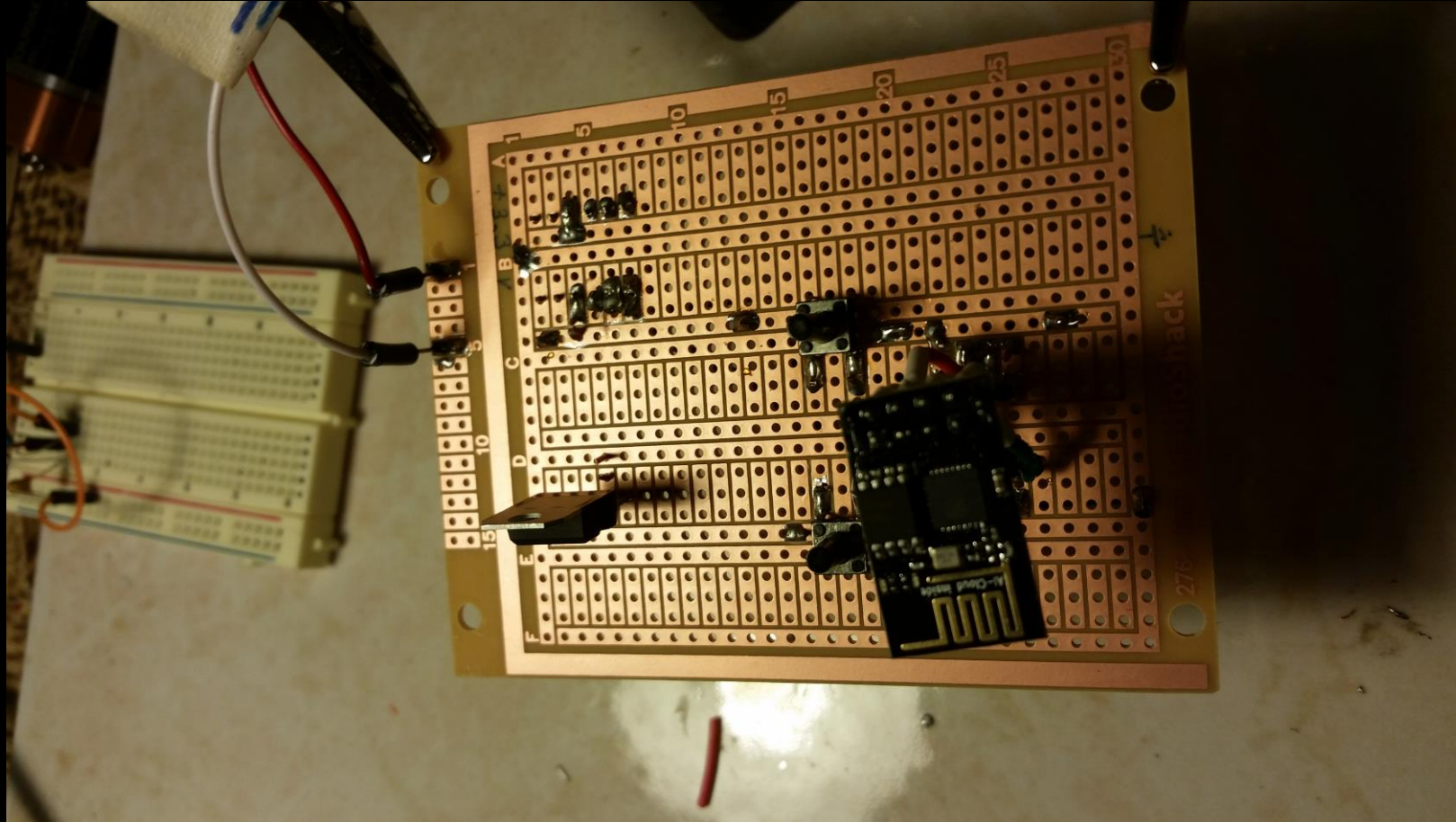
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HEIDORN2

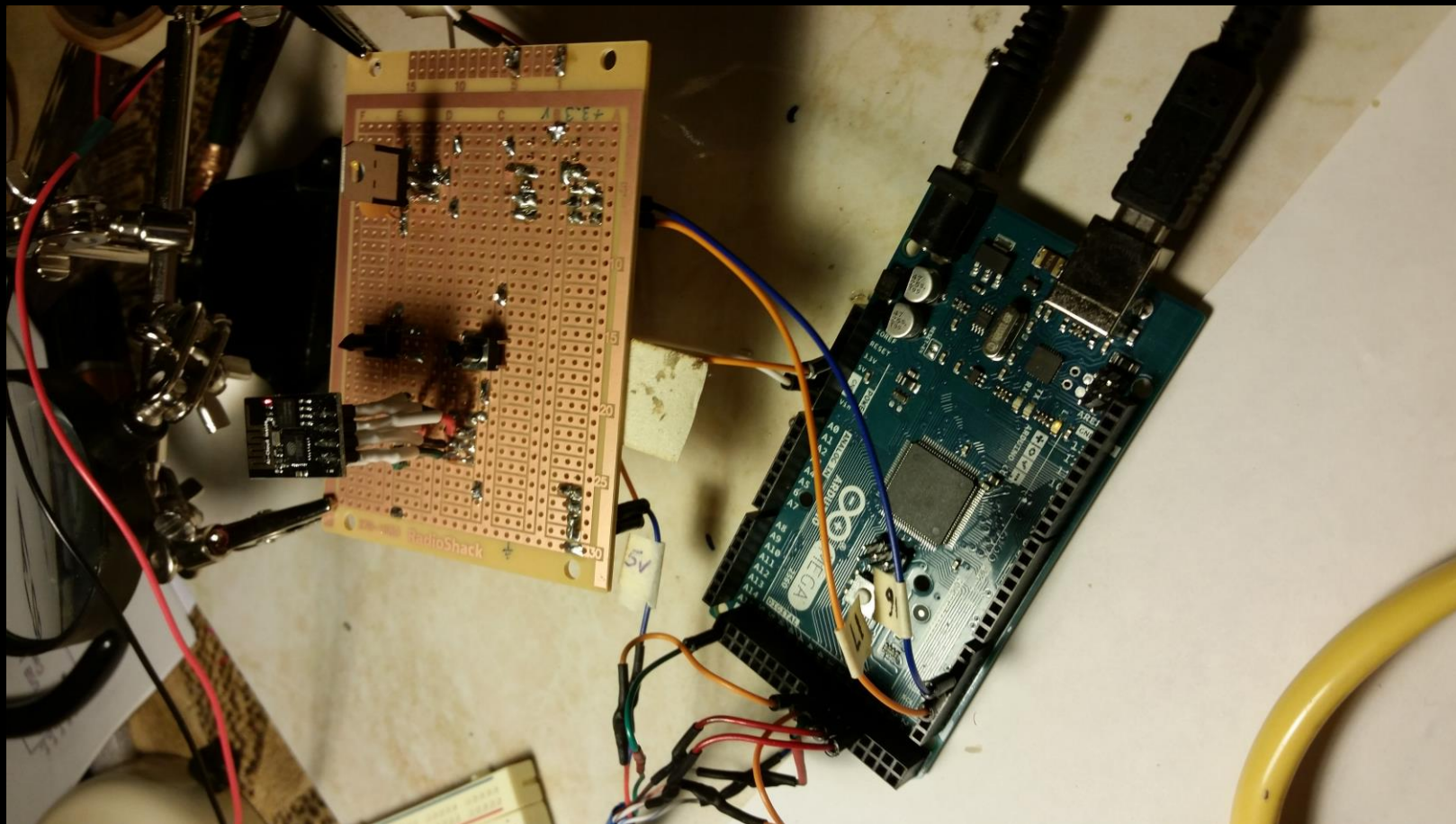
Lesser Long-nosed Bat



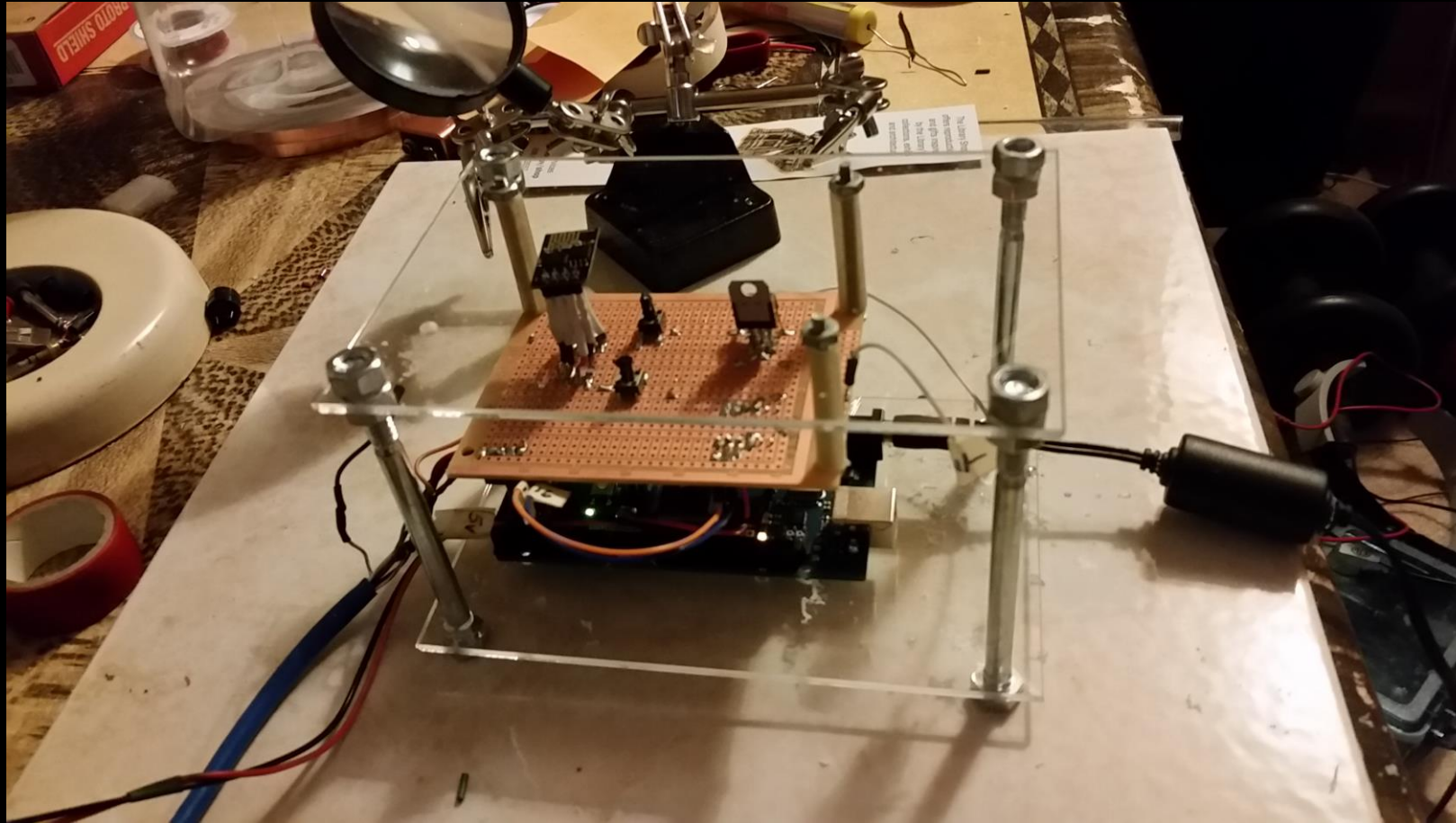
Custom WiFi Board



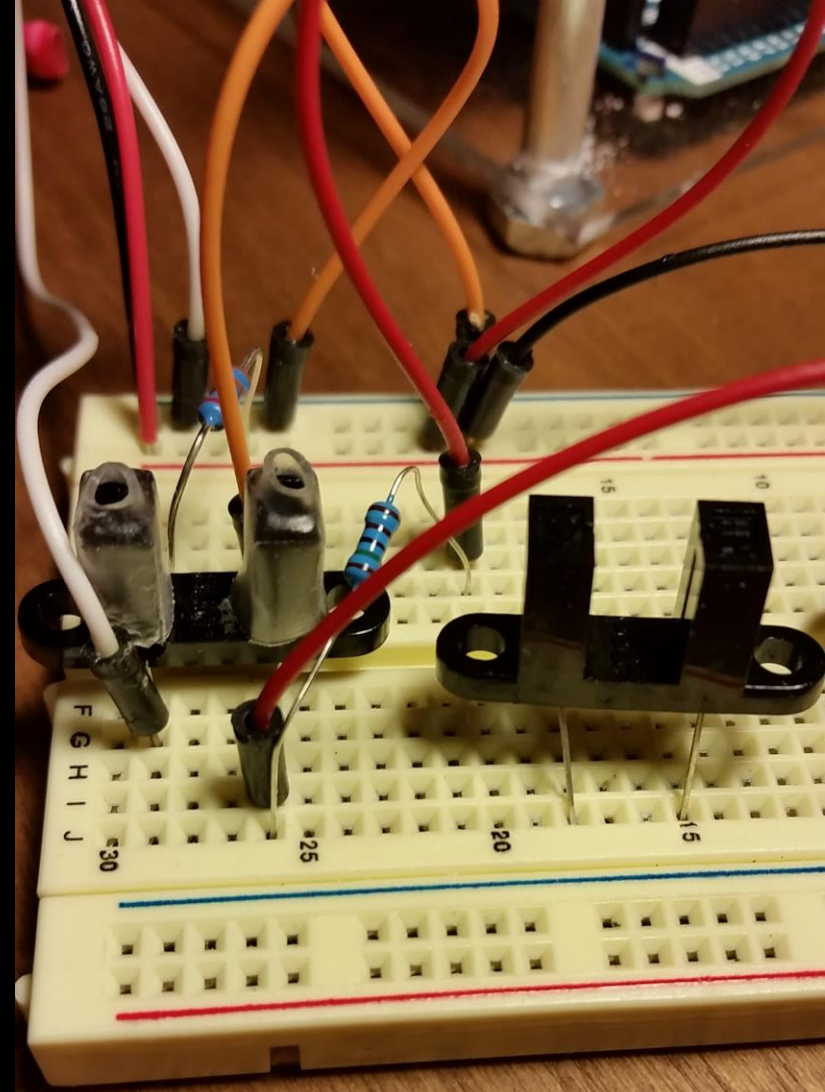
Arduino

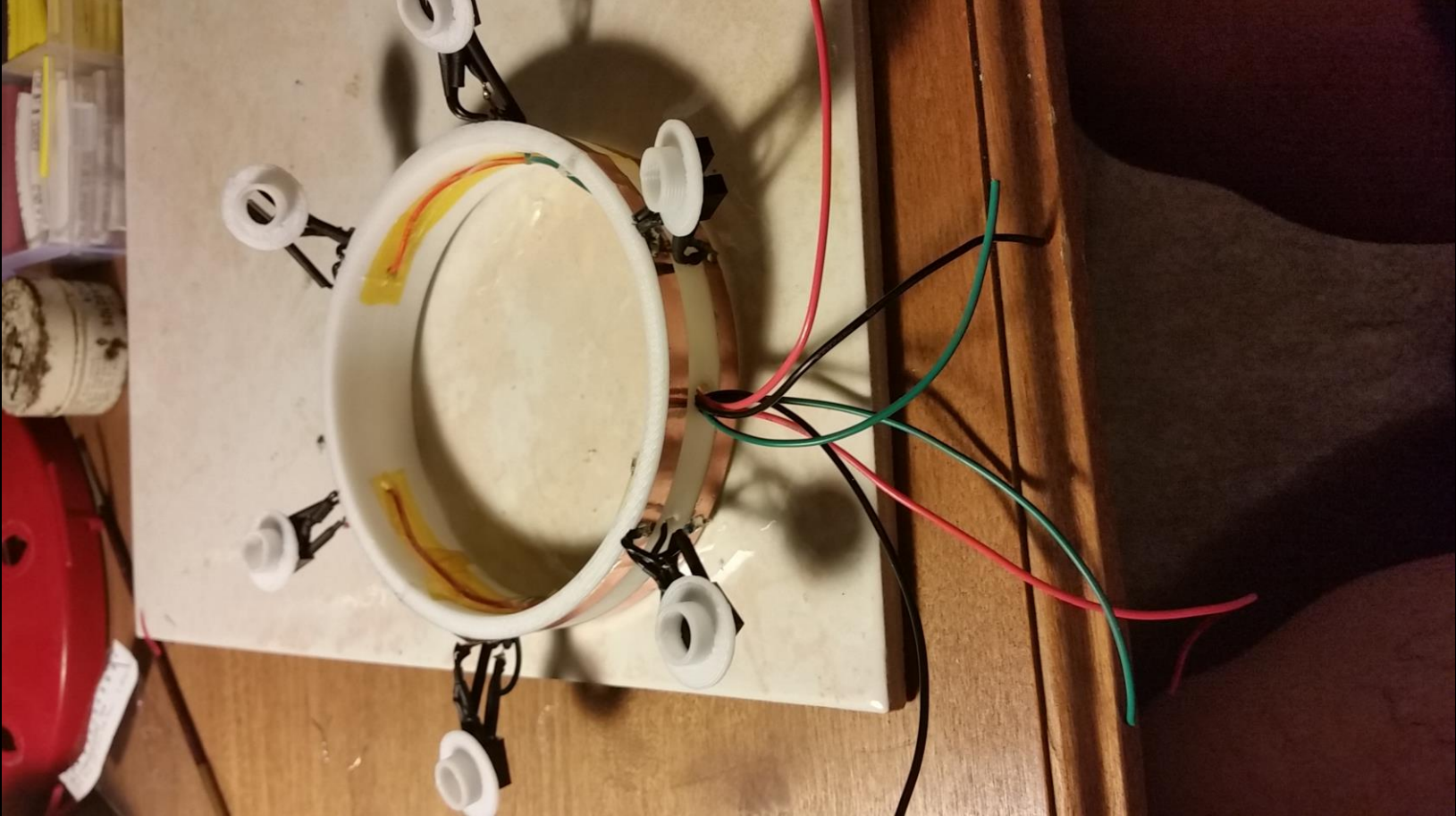


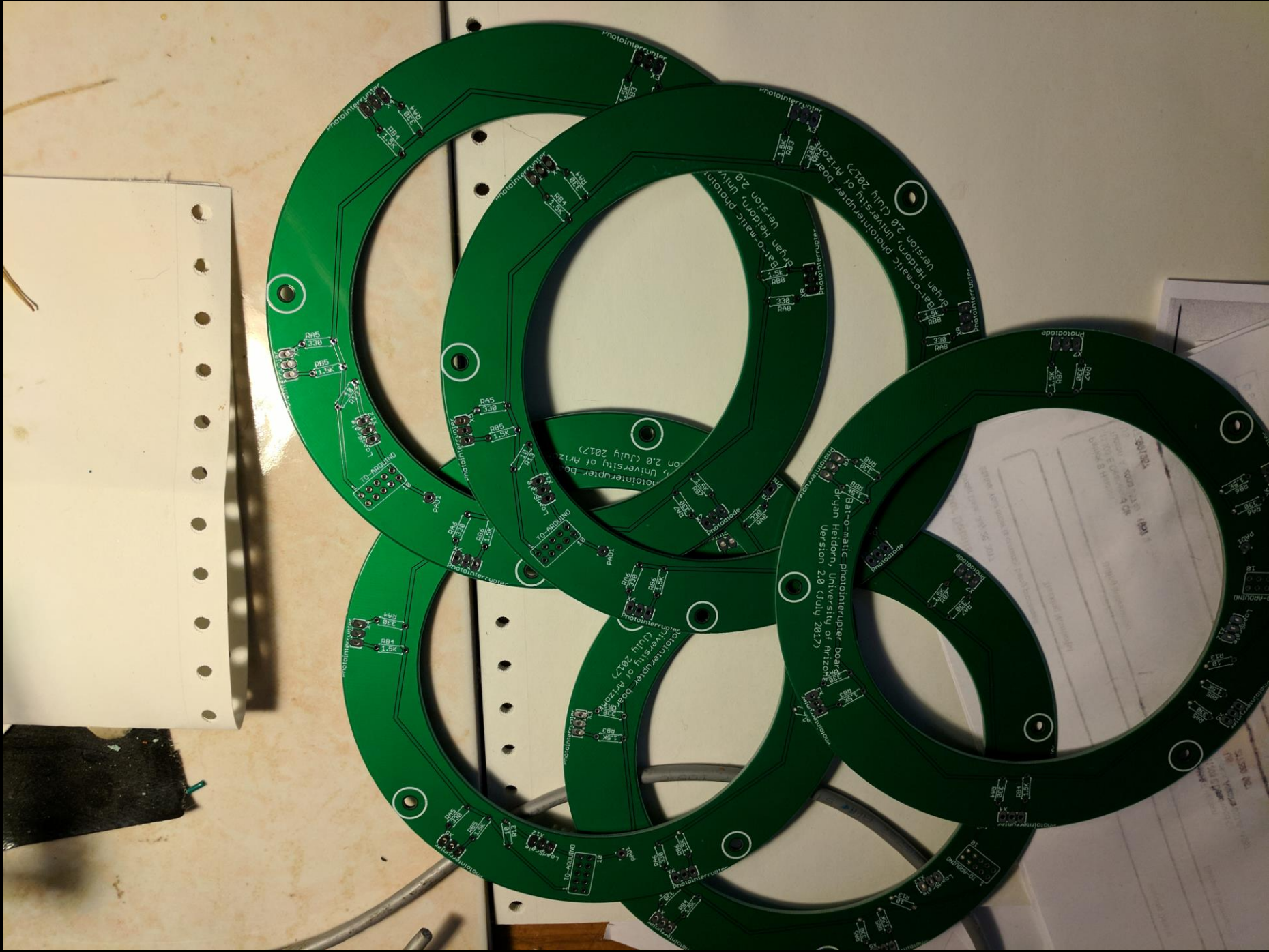
V1 Bat-o-matic 1000



The Photo Sensor (slot sensor)







Data

- Collected from prototypes last year
- Distributing to 3-4 Nature Naturalist Studying Agave bloom phenology
- Goal to cover the city with 100 or more.

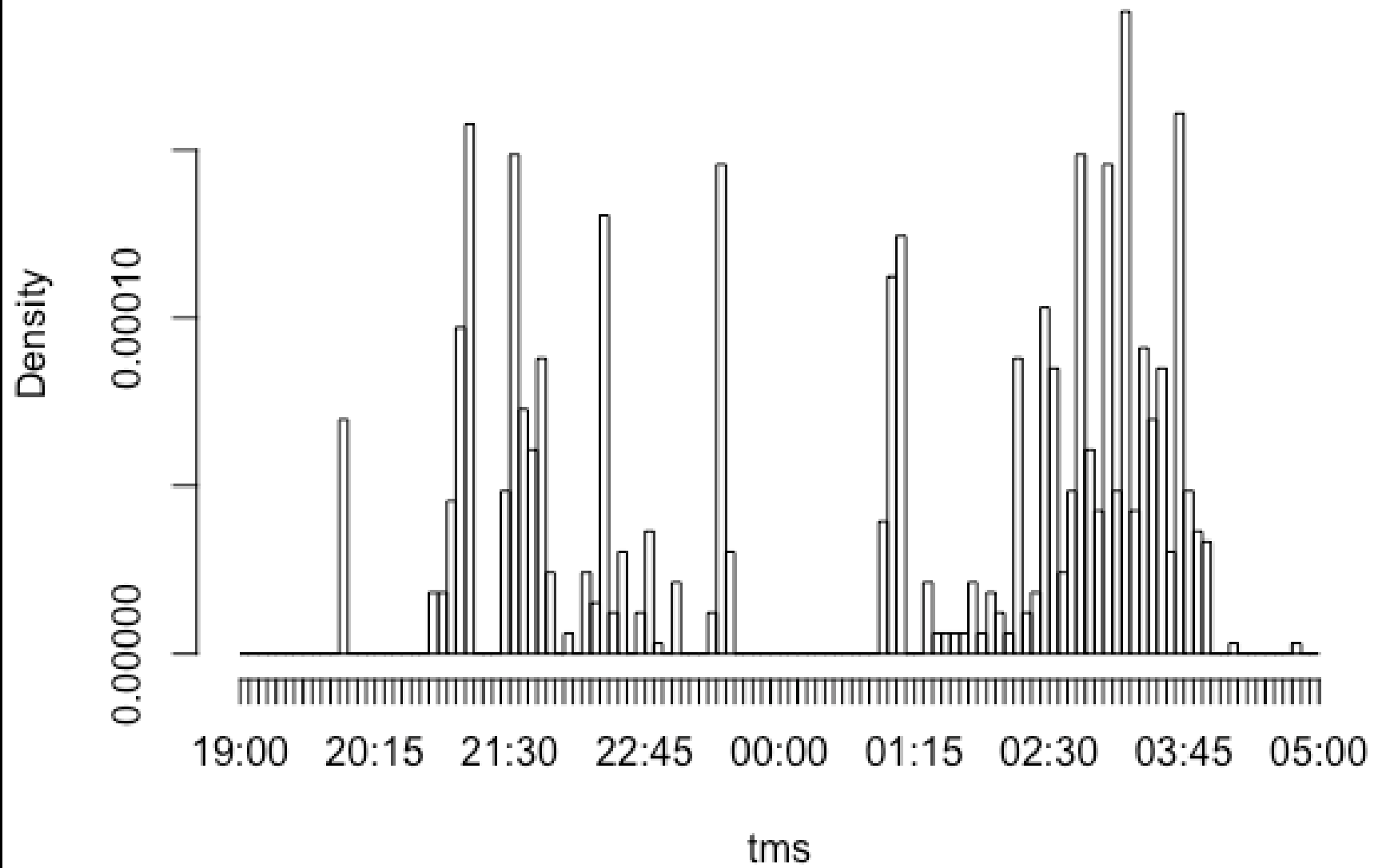
Sample Data

- File Name: Unit ID, Yr, Month, Day, [1-99]
- millis,unixtime,datetime
- 449, 1509989181, 2017/11/6 17:26:21
- millis,Sensor
- 452, -1
- 453, -2
- 454, -3
- 456, -4
- 457, -5
- 459, -6

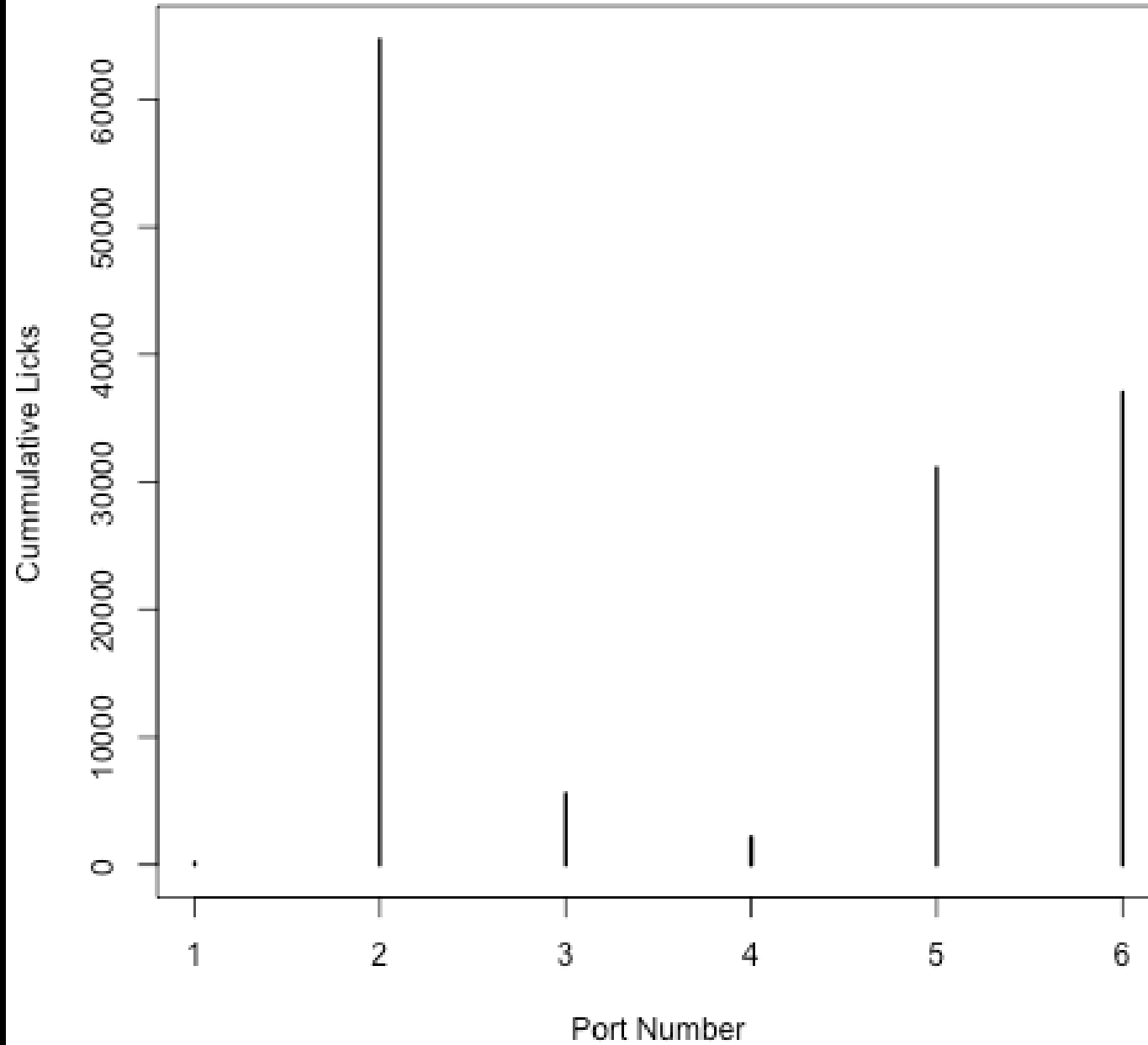
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5620393, 1
5620395, -1
5635550, 6
5635553, -6
5635655, 6
5635657, -6
5639925, 3
5639947, -3
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Bat Licks

2016/08/15-16



Frequency for feeding ports
2017-09-19 18:32:53



Don't know

- Species ID
- Number of Individuals

Data Questions

- Collection of data – OSF?
- Chips vs WiFi
- File name limitations
- Addition of collector information
- Conversion to presence & abundance data
- Visualization

Thank you
and
Questions



BatPlayback2

