High Speed Video Lightning Observations Using Raspberry Pi Camera Network

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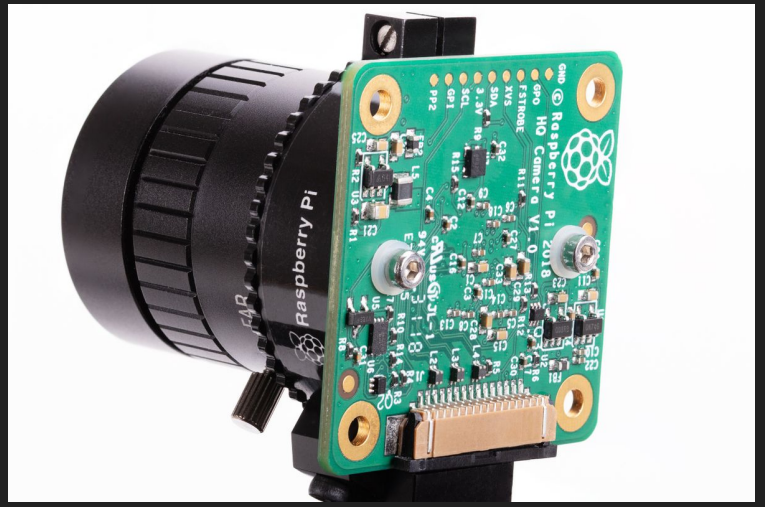
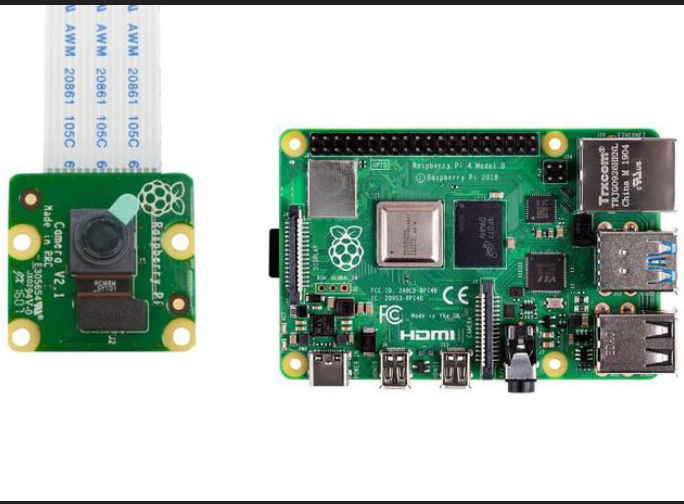
Objectives

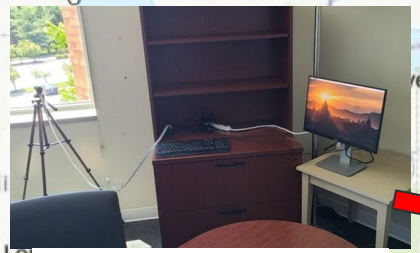
- Use low-cost methods to expand upon existing observation network of Raspberry Pi cameras
- Capture high speed video (90 FPS) of lightning behavior
- Analyze lightning characteristics in different regions of the country
- Use footage as ground truth to compare with detection networks





= Future work

Raspberry Pi Camera Network



Germantown, MD

Tempe, AZ

Tucson, AZ

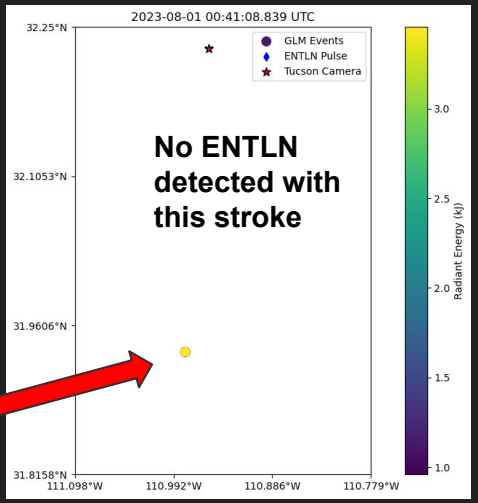
Wilmington, NC

College Park, MD

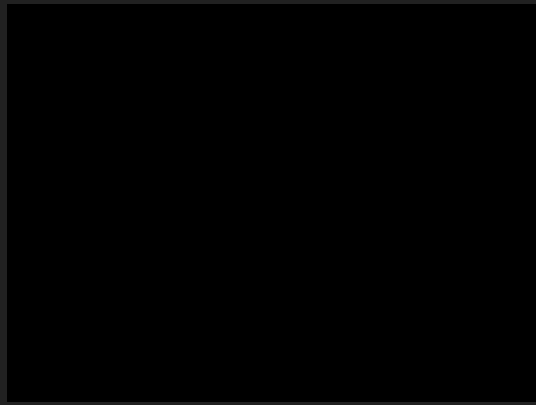
Results

- 12 seperate sites with 17 cameras total were deployed this summer (up from 8 cameras last summer)
  - States include MD, CO, AZ, OK, and NC
- 14 thunderstorm days from College Park, MD
- 6 thunderstorm days from Germantown, MD
- 8 thunderstorm days from Tucson, AZ

Single stroke flash in Tucson, AZ



Cloud to ground flash in Germantown, MD



7 Stroke flash in College Park, MD

High speed video lightning observations over the ocean in Wilmington, North Carolina.

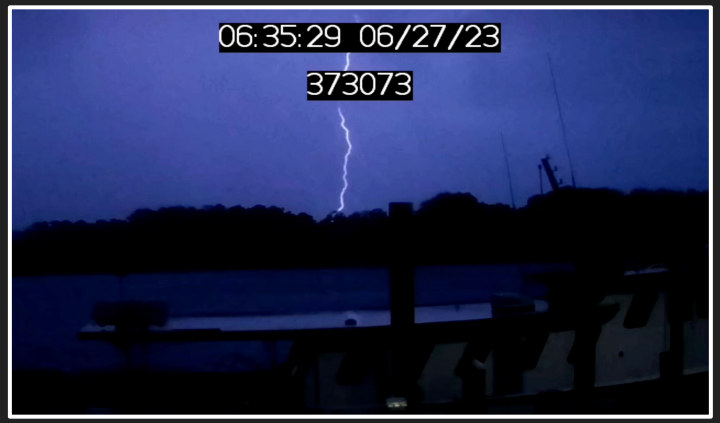
Observation location: On the coast of Wilmington, North Carolina, camera aiming towards the Atlantic ocean.

Objectives:

The purpose for the location in Wilmington is to analyze thunderstorms and lightning over water compared to over land.

Results- Wilmington, NC

- Three major thunderstorms recorded
- Less lightning recorded over the body of water compared to other raspberry pi locations
- Zero daytime lightning events. This begs the question- why is there little to no daytime lightning over the water in Wilmington NC? Further investigations needed!



This site is controlled by the American Monsoon
What is an American Monsoon?

- The American Monsoon is a season during the summer and early fall that encapsulates the time of year where there are the most thunderstorms. This seasonal change is strengthened by a change in the prevailing winds, bringing cold air to warm regions.
  - Goes from mid June to end of September
  - Lack of storms in Central Arizona
  - Wet winter could have affected it
  - Can be affected by the temperature of the surface and the temperature in the ocean.

Results

- There were very few thunderstorms this year, which is abnormal for monsoon season, but it isn't over yet. The reason behind this currently unknown. The triple La Niña events can be one of the causes.
- Hurricane Hilary from August 18th-21st did some minimal impacts in Arizona, bringing the most amount of consecutive rainfall we've had so far this season.