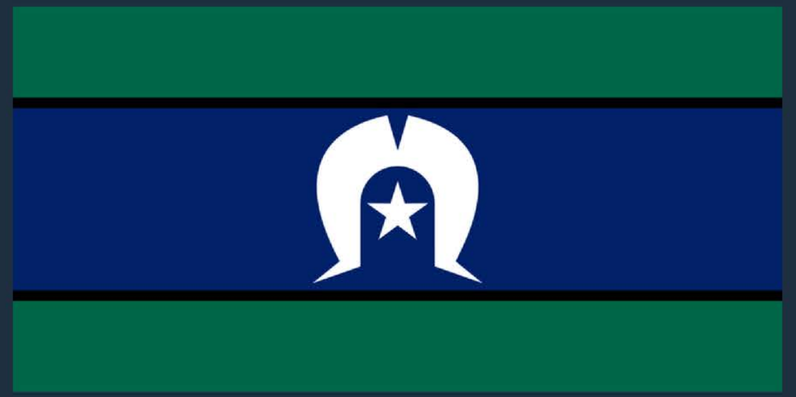
Creating a HABITAT for Healing at Banksia Gardens

Heat And Biodiversity Tracking through Automated Technologies

LILY BROMBERGER, STEPHEN FANNING, ERIC SCHUMAN & EMMANUEL VARGAS



In the spirit of reconciliation we acknowledge the Traditional Custodians of country throughout Australia and their connections to land, sea and community. We pay our respect to their Elders past and present and extend that respect to all Aboriginal and Torres Strait Islander peoples today.

We also want to pay respects to the Nipmuc Nation, the original custodians of the land that WPI resides on.

https://www.indigenous.gov.au/contact-us/welcome_acknowledgement-country#:~:text=The%20words%20are%3A,Strait%20Islander%20peoples%20here%20today

What are the biggest problems affecting Australia

Extreme Heat

Biodiversity Loss

Economic Inequalities

Banksia Gardens - Broadmeadows, VIC, AUS

"Transforming lives, strengthening communities, reducing disadvantage"
-Banksia Gardens' Mission

Climate Adaptation Garden Project

Heat Havens

Community Gardens

Food Forests

How can we evaluate the success of the Climate Adaptation Gardens?

How do we define sucess?

How do we define sucess?

Lower Surface Temperatures

How do we define sucess?

Lower Surface Temperatures

Increased Biodiversity

How do we define sucess?

Lower Surface Temperatures

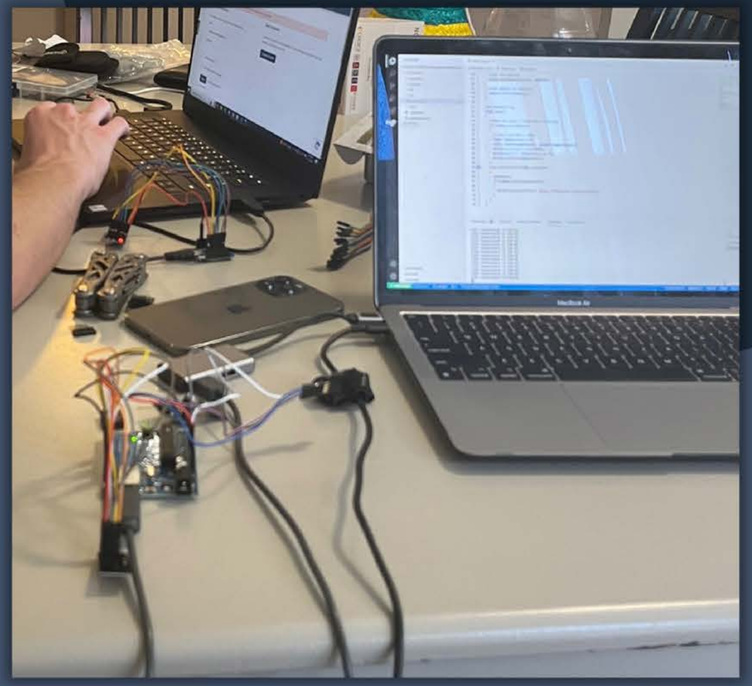
Increased Biodiversity

Prolonged Community Engagement

Temperature Sensor Network

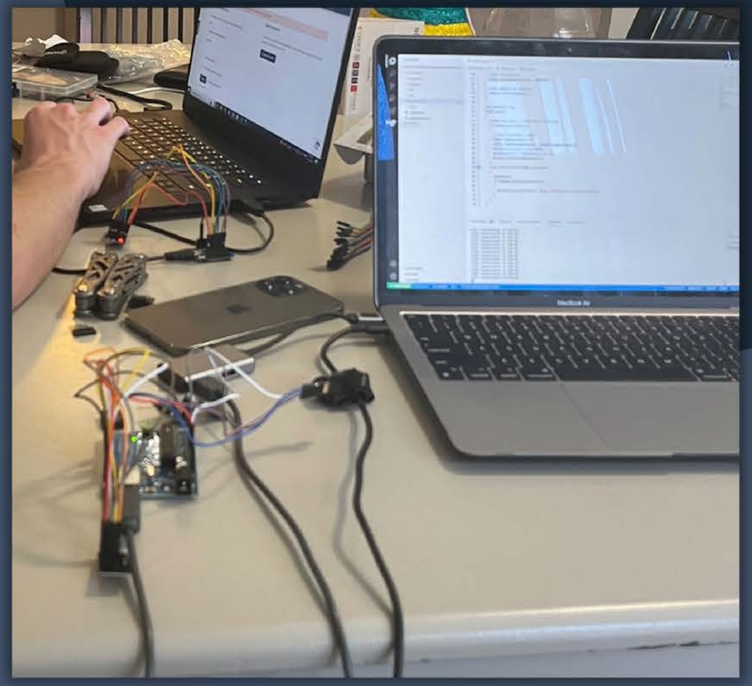
Connect to WIFI → Get Temp. Reading → Upload to Database → Sleep Until Next Reading

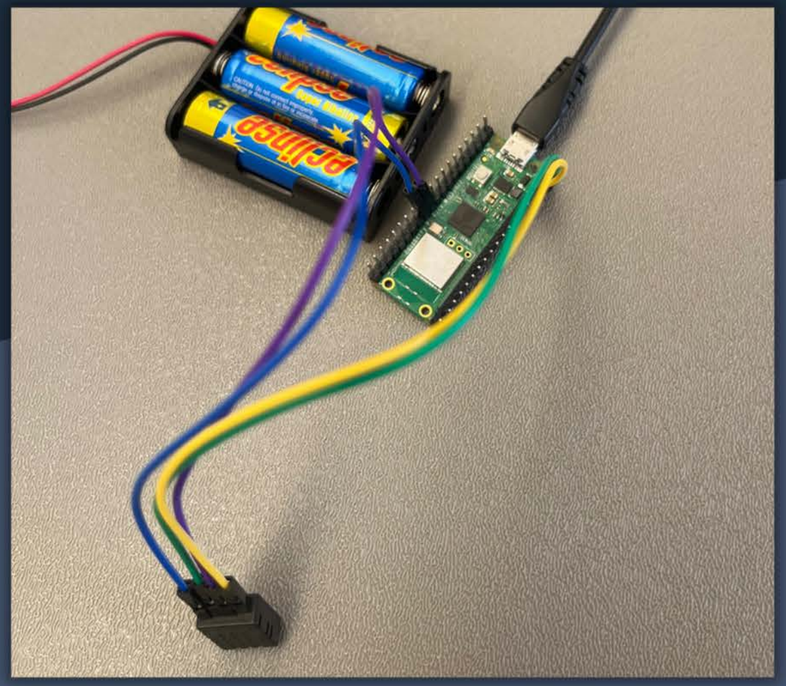
Designing a Temperature Sensor Network



Initial Design

Designing a Temperature Sensor Network

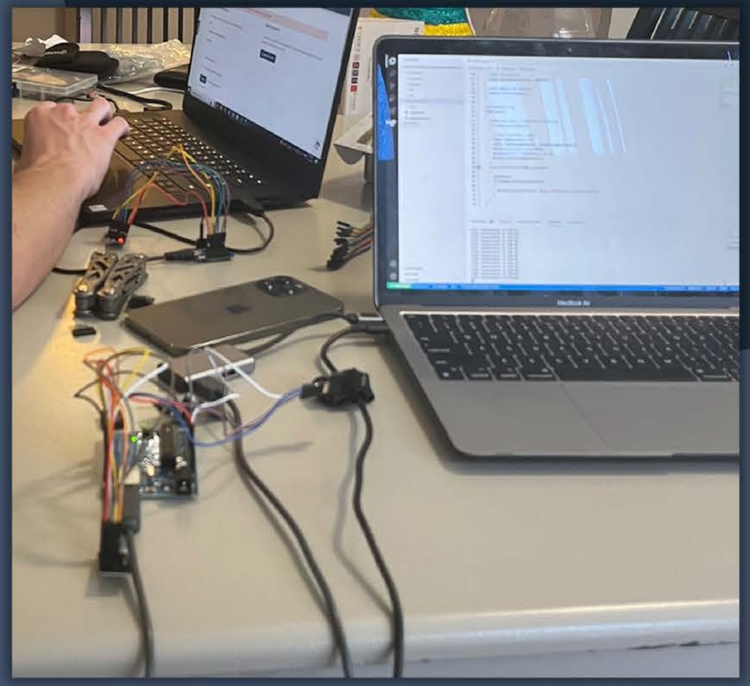


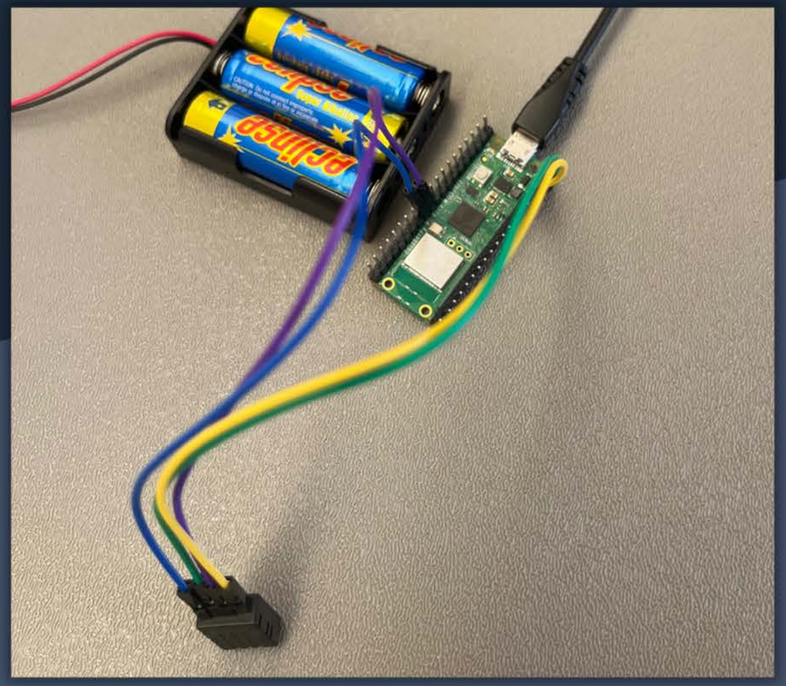


Initial Design

Prototyping

Designing a Temperature Sensor Network



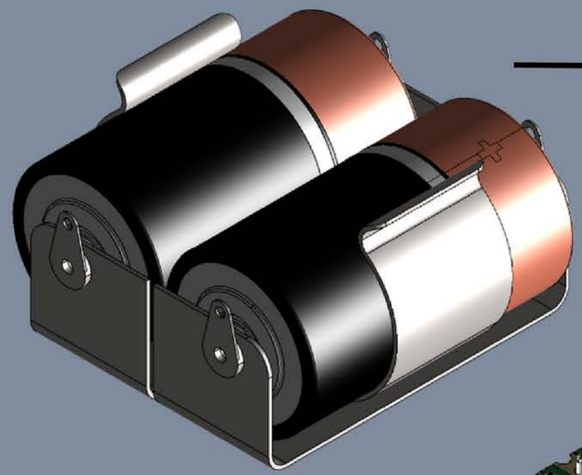


Initial Design

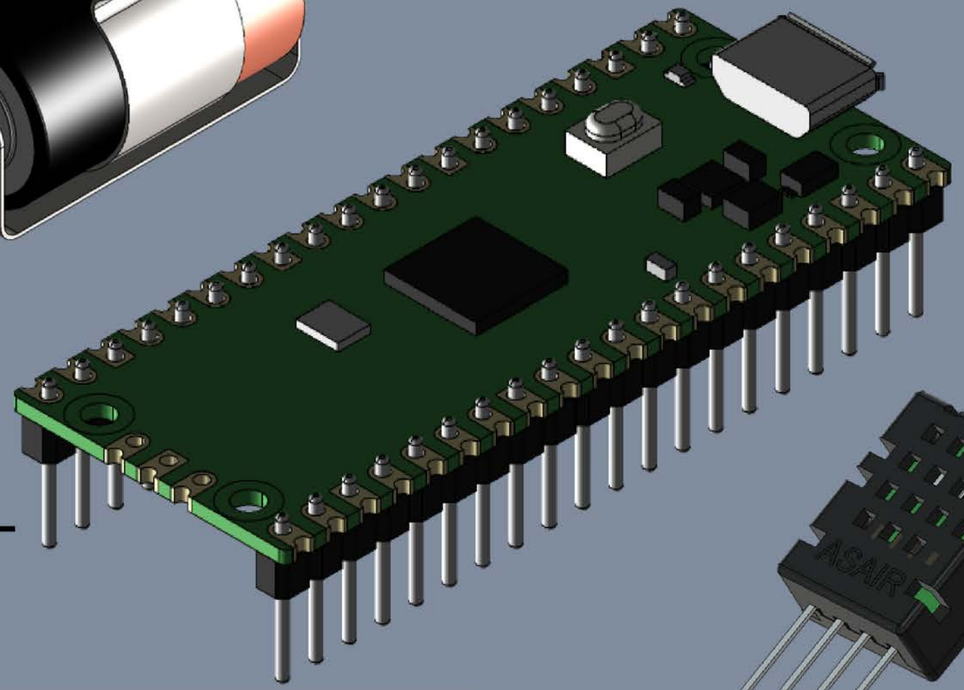
Prototyping

Testing

Sensor Design



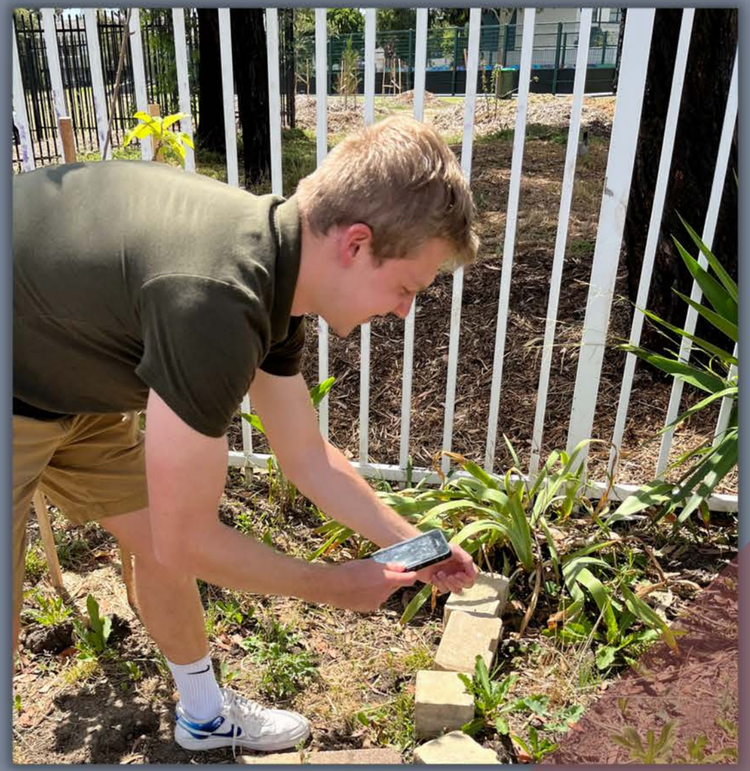
2 x D Battery Holder



Raspberry Pi Pico W Microcontroller

Adafruit DHT20 Temperature Sensor

Collect Information with Citizen Science

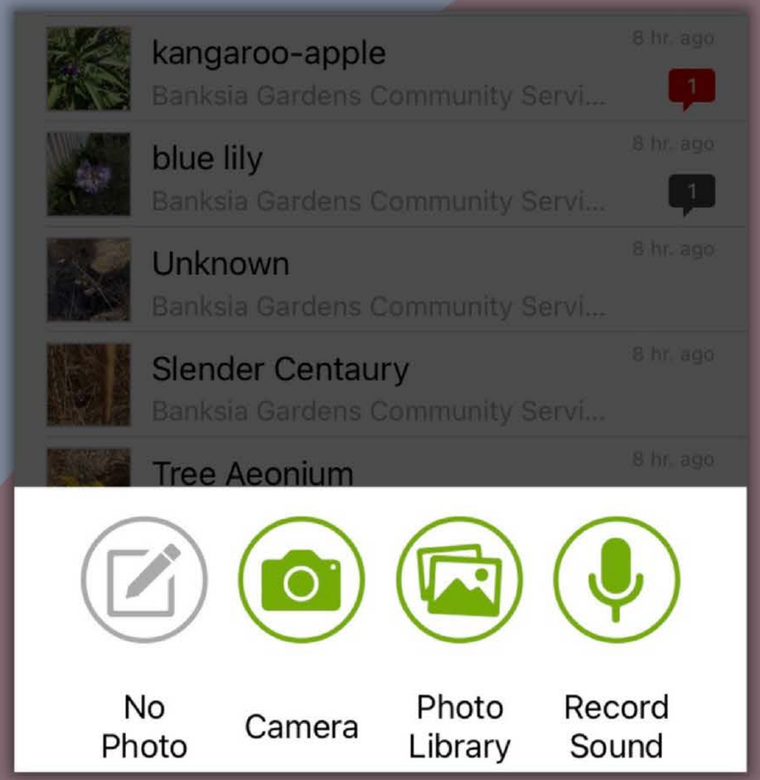


iNaturalist

Collect Information with Citizen Science

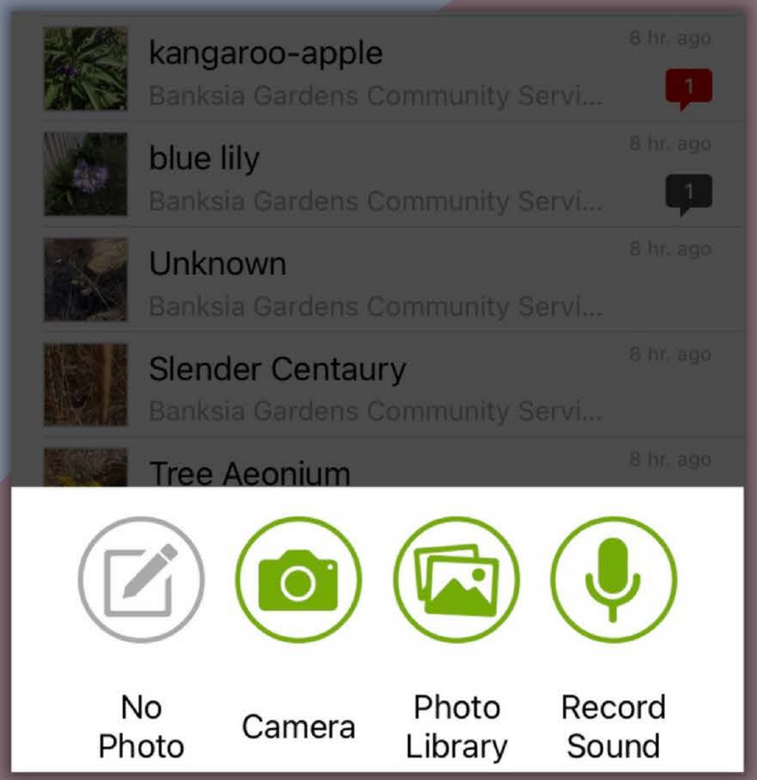
Take Photo of Specimen

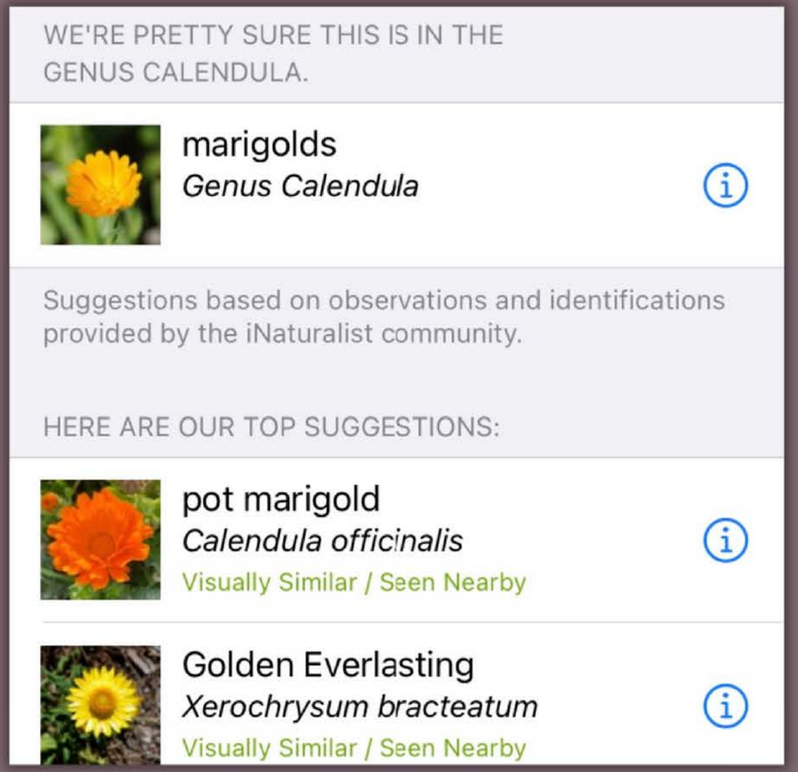
Collect Information with Citizen Science



Upload Photo to iNaturalist

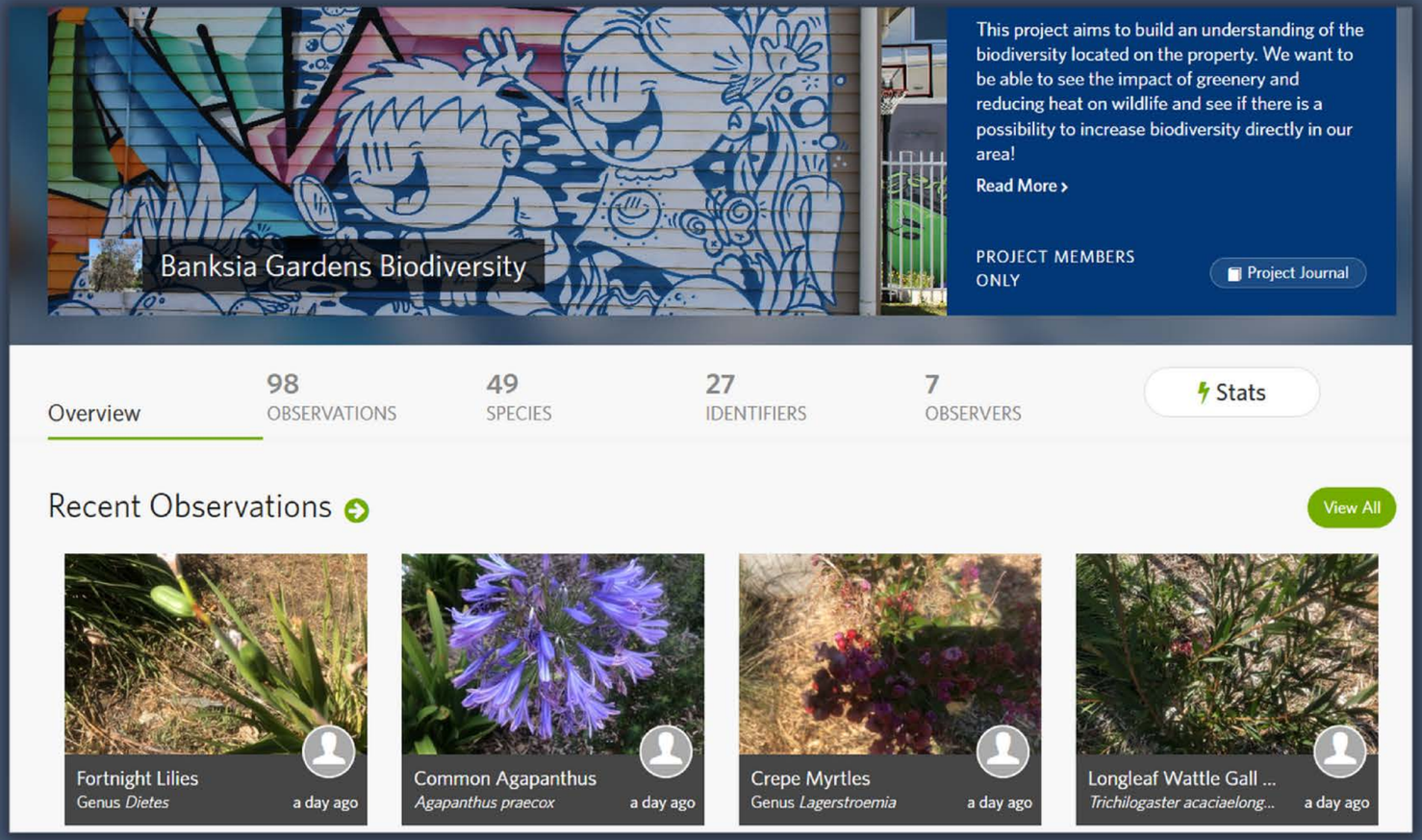
Collect Information with Citizen Science





Artificial Intelligence Suggestion

Creating a Biodiversity Database



Extract Data from iNaturalist → Filter Data → Manipulate Data → Upload to Database

Filter Data

quality_grade	observed_on_details.date	taxon.name	taxon.rank	geojson.coordinates	observed_time_zone	quality_metrics	location
research	2023-01-06	Fuligo septica	species	[144.919, -37.676]	Australia/Melbourne	[]	[-37.676, 144.919]
needs_id	2022-12-27	Tragopogon	genus	[144.918 -37.676]	Australia/Melbourne	[]	[-37.676, 144.918]
research	2022-12-13	Eristalinus punctulatus	species	[144.919, -37.676]	Australia/Melbourne	[]	[-37.676, 144.919]
needs_id	2022-11-16	Polistes	subgenus	[144.916, -37.677]	Australia/Melbourne	[]	[-37.677, 144.916]

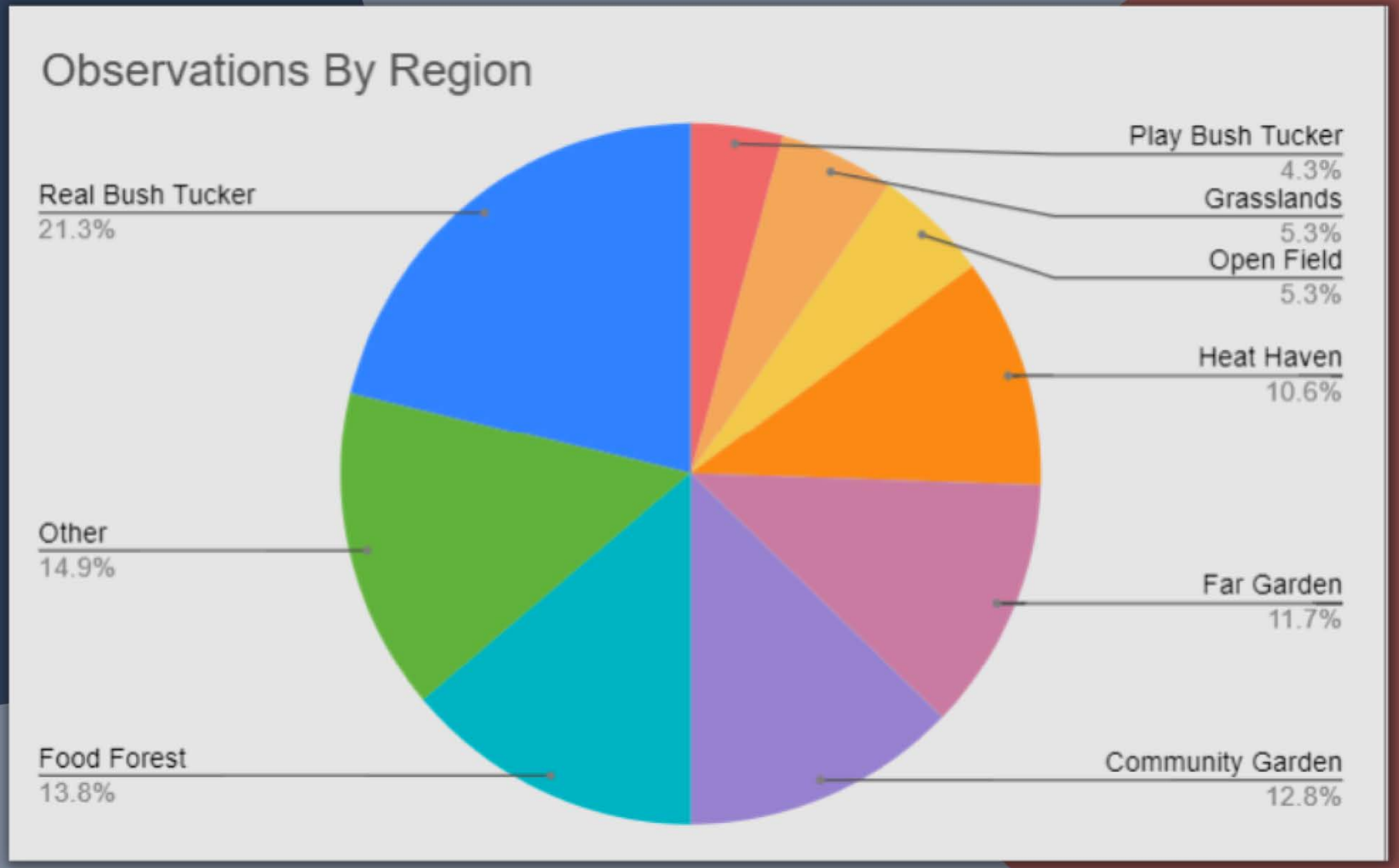
```
# Columns to keep
labels_of_interest = ['quality_grade', 'observed_on_details.date', 'observed_on_details.month',
                      'observed_on_details.year', 'observed_on_details.day', 'observed_on_details.hour',
                      'id', 'identifications_most_agree', 'species_guess', 'identifications_most_disagree',
                      'reviewed_by', 'description', 'updated_at', 'taxon.endemic', 'taxon.threatened',
                      'taxon.introduced','taxon.native', 'taxon.name', 'taxon.rank', 'taxon.extinct', 'taxon.id',
                      'taxon.wikipedia_url', 'taxon.default_photo.medium_url', 'taxon.iconic_taxon_name',
                      'taxon.preferred_common_name', 'num_identification_agreements', 'comments', 'uri',
                      'geojson.coordinates', 'user.login', 'photo_url']

column_list = df.columns
# Drop all columns we do not need
for label in column_list:
    if label not in labels_of_interest:
        df = df.drop(label, axis=1)
```

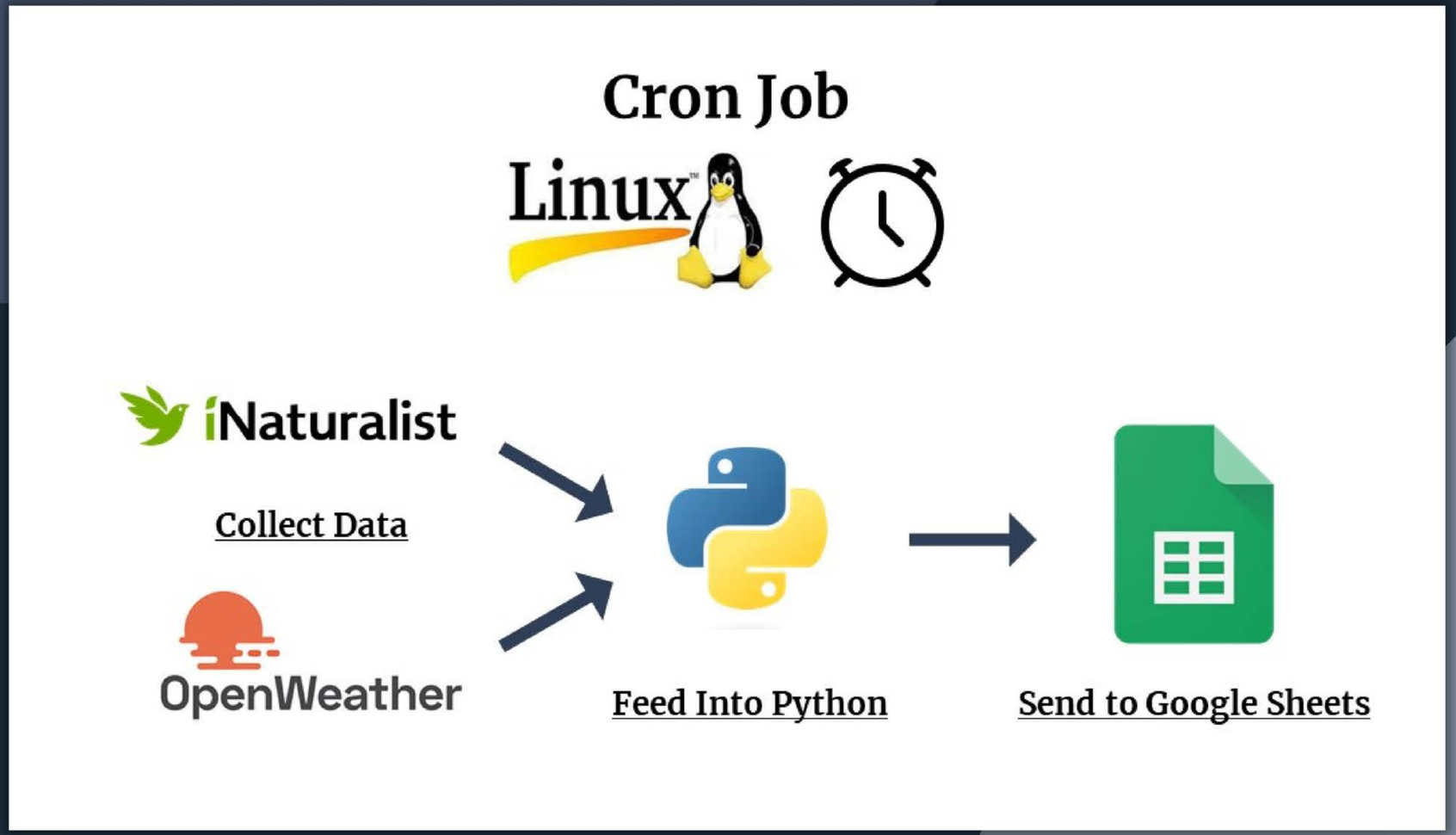
Manipulate Data

geojson.coordinates	region	on_property?
[144.9193416667, -37.6765216667]	Heat Haven	TRUE
[144.91925, -37.6766466667]	Heat Haven	TRUE
[144.9192966667, -37.6767166667]	Heat Haven	TRUE
[144.9192666667, -37.6767283333]	Heat Haven	TRUE
[144.918625, -37.6770633333]	None	TRUE
[144.9189616667, -37.67707]	Grasslands	TRUE
[144.9190833333, -37.6767783333]	Grasslands	TRUE
[144.9189, -37.67662]	Real Bush Tucker	TRUE
[144.9188216667, -37.676605]	Real Bush Tucker	TRUE
[144.9187783333, -37.676605]	Real Bush Tucker	TRUE
[144.9184116667, -37.6760666667]	Open Field	TRUE
[144.9182583333, -37.6761166667]	Open Field	FALSE
[144.9182133333, -37.6758583333]	Open Field	TRUE
[144.9182583333, -37.6756583333]	Open Field	TRUE
[144.9183666667, -37.6747333333]	Far Garden	TRUE
[144.9185333333, -37.674695]	Far Garden	TRUE
[144.918625, -37.674725]	Far Garden	TRUE
[144.9186866667, -37.67472]	Far Garden	TRUE

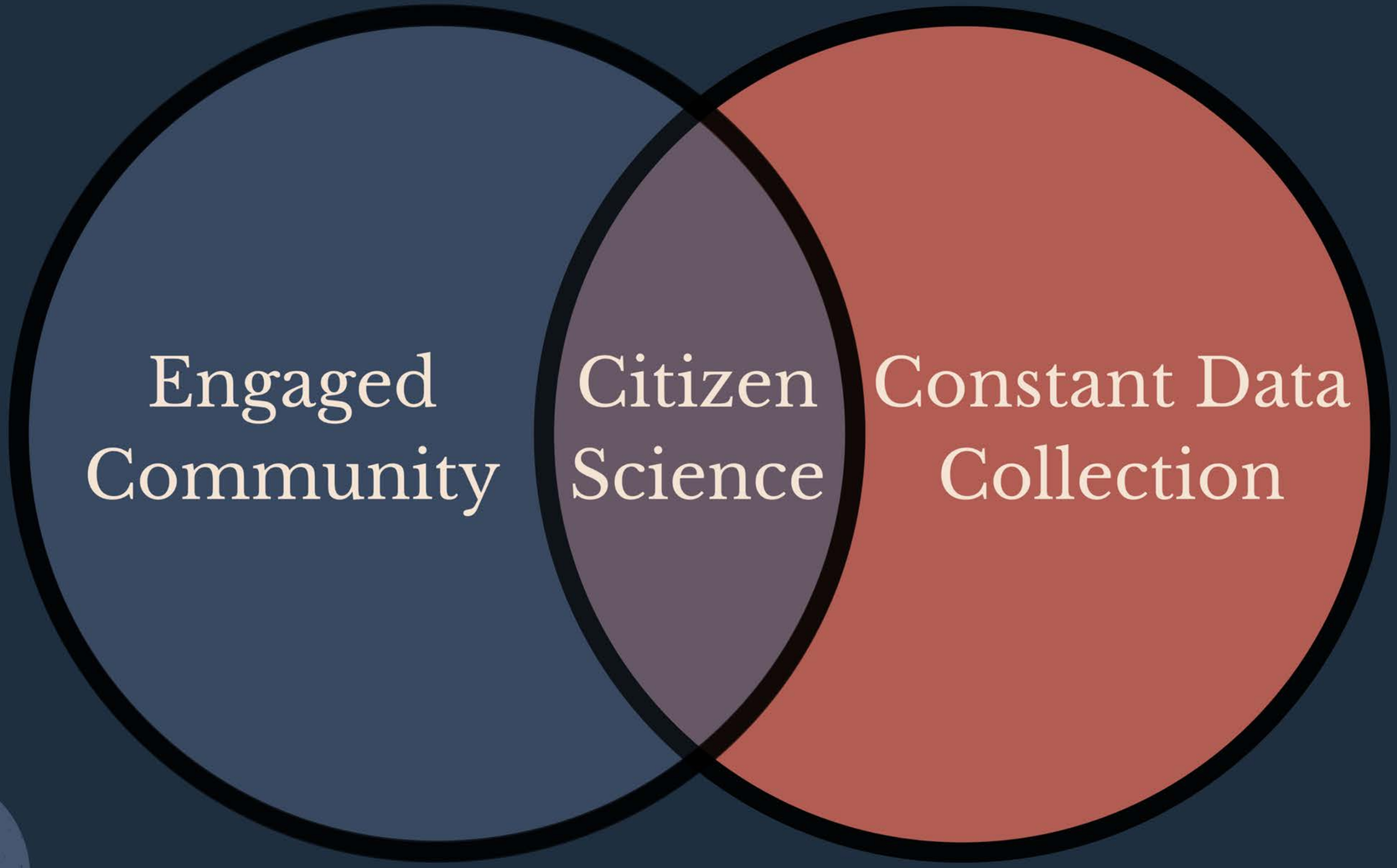
Visualizations



Data Processing is Automated



The role of Citizen Science



Citizen Science Activities

After-School Activities

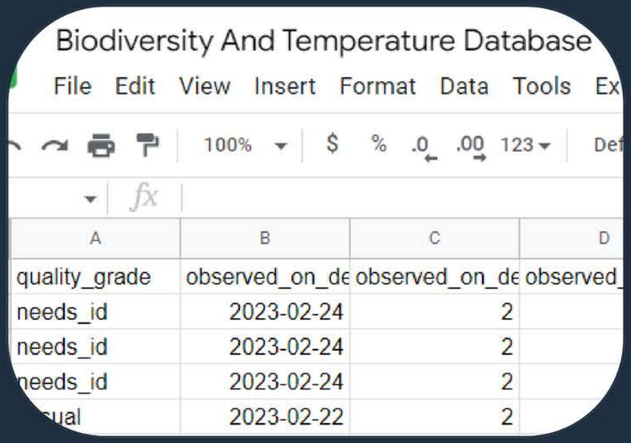
Community Days

BioBlitzes

Deliverables

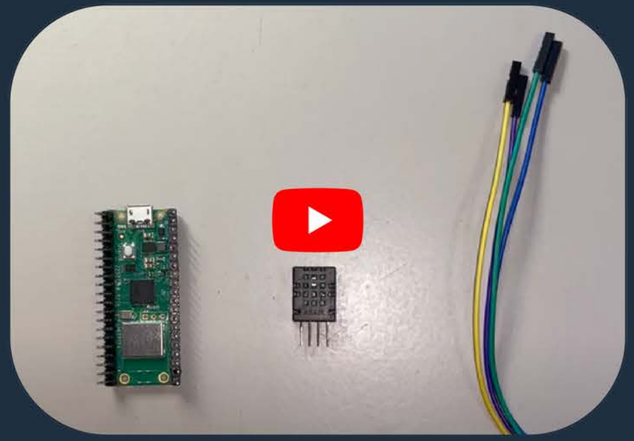
Recommended Activities & Resources

Network of Heat Sensors



Database

Heat Sensor and Biodiversity Manuals



Supplementary YouTube Videos

Centralized Website

Impacts

Thank you!

Banksia Gardens
Community Services

Citations:

Land Acknowledgement:

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