

Weather Triggered Wireless Telemetry

Lightning Talk

Detailed Design

Group: sdmay25-18

Nisha Raj, Alex Chambers, Colin Kempf, Aidan
Gull, Adam Fields, Alex Christie

Project Overview

- ARA is an advanced wireless research platform covering Iowa State University, Ames, and nearby rural areas.
- Tasked with creating a system that will recognize and predict when a weather event is occurring.
- This trigger, signals data collection before a given weather event has begun and allows us to continue collecting data until the weather event has passed.
- This weather data will eventually allow researchers to determine how the performance from the ARA framework differs during different weather events.



Agronomy Farm



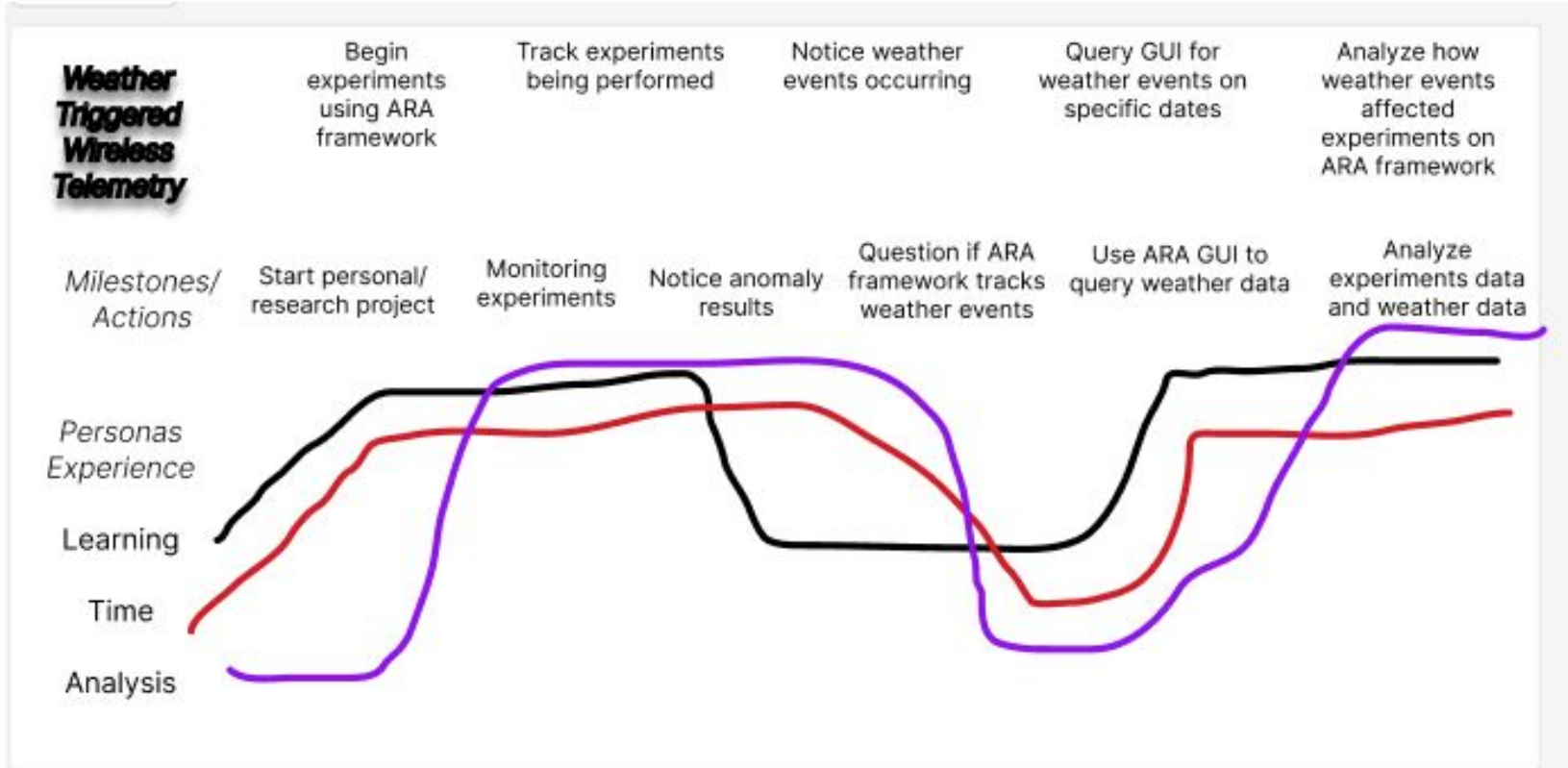
Wilson Hall

Problem Statement

- Want to intelligently collect a wide range of network data during a variety of weather events.
- Use forecast data to predict future weather events to gather data only when weather events we want to record are going to occur.
- Store collected data and allow for user queries to access and format selected data.



Artifacts-Journey Map



Artifacts - Pros/Cons Table

Pros	Cons
<ul style="list-style-type: none">• Modular Design• Accounts for false positive and false negative predictions on weather.• Ensures weather events close together are gathered together as one event instead of two• Can run as a background multi-threaded process	<ul style="list-style-type: none">• Storage Capacity• Constant API Key Calls• Weather instruments collect data could be unpredictable or could go down• Lead-in time metrics for prediction can vary• Identifying correct features from weather APIs to make accurate weather predictions

Artifacts- Internal/External Complexity



Internal	External
<ul style="list-style-type: none">● Multiple subsystems that are interconnected● Gathering and processing weather data● Weather data prediction model● Modular design of all subsystems● Cascading changes within subsystems	<ul style="list-style-type: none">● Incorporating weather APIs into our subsystems to predict weather events● Incorporating the ARA platform weather collection instruments along with APIs to correctly predict weather events occurring

Human

- First, we derived requirements that we will plan to implement in our design
- Determined a solution that addresses user needs well
 - Since we derived the requirements directly from the user needs
 - Allows users to query for weather data on certain days
- Changes could include integrated UI with ARA framework website so users can query data directly from ARA website

Economic

- Currently no similar large scale projects
- External Weather API's are an existing solution to a sub feature
 - Tomorrow
 - Open-Meteo
 - National Weather Service API
- Use multiple API's to mitigate failures

Technical

- Internal:
 - Multiple subsystems that are all interconnected and play off of each other
 - Gather and processing weather data and parsing into a common format
 - Weather data prediction model to determine when a weather event will occur
 - Ensuring modular design of all subsystems
 - Cascading changes within subsystems
- External:
 - Incorporating weather APIs into subsystems
 - Incorporating ARA platform weather instruments along with APIs to predict weather events

Conclusion

We have identified:

- The artifacts our team has developed
 - Journey Map
 - Pros/Cons Table
 - Internal/External Complexity
- How our solution addresses user needs
- The drawbacks of our solution
- How our solution builds on existing solutions
- Our justifications for the internal and external complexity of our design

