# SpaceMonitor

Team: 2B || !2B

PowWow Energy

## Members:


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## Problem Description:

Farms are trying to make the most efficient use of their resources, but there could be room for improvement. Inefficiencies not only waste water and resources but also contribute to climate change. Therefore, a cheap and accessible method for evaluating efficiency of water usage should be provided to farms in order to help them identify and execute on areas in their crop fields that excessively use water. There does not seem to be any existing solutions that use geospatial remote sensing data to find areas where water use across crop fields is not uniform and water use is relatively high for the specific crop.

## Why is it important:

- Inefficient use of water and energy contributes to climate change
- Reduce cost of agriculture
- Minimize the effects of drought and water shortages
- More efficient use of farming yields more crops, helping disadvantaged California communities
- Starting on a small scale of affected farmers, the project leverages machine learning techniques to solve practical problems in agriculture that may be scaled to larger problem instances in the agriculture industry

## Current Existing Solutions:

- Efficiency evaluations are typically done by going to the field and manually look for irrigation issues. Groups that do this include field crews and Resource Conservation Districts (RCDs)
- Drones are used to take images of farms and send the data to recommendation engines, where an AI determines how to best improve efficiency on a farm.
- Sensors in water tanks detects blockages and leaks and reduces the cost of lost water
- Monitoring manually by farmers: water recycling, soil management, weather apps alerts, newer more efficient equipment (irrigation, piping etc.)

## Goals for our project:

- Use geospatial remote sensing data to find areas where water use across field is not uniform and water use is relatively high for the specific crop. This data comes mostly from publicly available satellite data
- Create a machine learning model to find which areas are inefficiently using water
- The algorithm should be generic and applicable to any farm
- Highlight a map to alert farmers to areas where they are being inefficient
- The users can create accounts so they can personalize the app for a particular set of farms

## Milestones:

- Sprint 1
    - Analyze the different data layers
    - Design the database
    - Create the skeleton code for the frontend and backend
    - Make a mock-up of what the final product should do
- Sprint 2
    - Write down use cases/user stories
    - Begin design phase and build prototype (end-to-end framework)
    - Connect the frontend, backend, and database
    - Stub out all the classes
    - Use of UML for system requirements modeling and design
- Sprint 3
    - Implement all the classes that were designed in sprint 2
    - Design an algorithm to process the data and find inefficient water use
    - Successfully test end to end functionality for each use case
- Spring 4
    - Finish minimum viable product
        - A basic working webapp
    - Add any additional features that we have time to impleent

## Technologies:

- Data Storage: PostgreSQL, Django
- Algorithm Development: QGIS, OpenCV, Pandas, Python
- Front End UI: React, Google Maps API

## Strategy

- Daily scrum meetings
- Weekly meetings with mentor (Thomas and Olivier)
- Working demo at the end of every 2 weeks
- Use Trello board to divide up tasks