Mobile Applications for Agricultural and Urban Irrigation Schedule Support

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Introduction

Fresh water supplies shortages are increasingly common in the Southeast of United States. The growing population in this region has been suggested as a key component contributing to this water stress (Seagar et al. 2009). Being agriculture a significant user of water supplies, it is essential a better management on irrigation schedule for achieving more efficiency on water resource usage.

Computerized irrigation schedule management tools have an important role on this efficiency enhancement in water supplies usage. We believe that bringing these tools to mobile devices will certainly improve its use and provide easy access to irrigation recommendations and best practices. Producers will be able to access this information anytime and anywhere through their handheld devices.

Objectives

This project aims to build four mobile irrigation support tools for strawberry, citrus and cotton, as well as urban lawn.

Respective icons for each of the covered crops

These tools will be available for download in mobile devices with iOS and Android operating systems through their official stores App Store® and Google Play® respectively.

The first three apps, for Strawberry, Citrus and Turf irrigation support, are already developed and current are being evaluated together with stakeholders. They will be available for general download in the fall of 2013. The Cotton irrigation app is currently being developed and will be available for download in the first quarter of 2014.

The Models

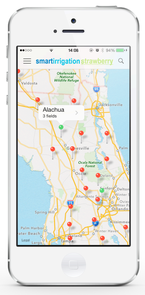
The four models for the apps have the intent that input requirements and outputs generated are appropriate for use on a smartphone. The apps developed for each model allow users to input specific information to be used in generating irrigation practices to meet crop water needs. Models will include plant growth stage and seasonal variations based on real-time weather observations.

The real-time aspect will use a simplified water balance calculation that considers the field capacity, rooting depth, evapotranspiration (ET), rainfall, minimum allowable depletion, and irrigation system characteristics. ET will be estimated using appropriate crop coefficients and ET estimation techniques that require readily available weather parameters from FAWN's and GAEMN's automated weather networks.

The Apps

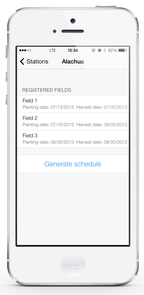
The apps share a familiar structure with map and list based views presenting all FAWN's and GAEMN's automated weather stations. The user is able to select the nearest weather station to his field, this selected station will be used as reference for the weather data needed for the model's calculations along with the field and irrigation system information that the user needs to input to generate the irrigation schedule.

As an option, the user can register his fields and have all the field and irrigation system information stored in AgroClimate's server (Fraisse et al., 2006), by registering fields, the user will be able to generate future irrigation schedules without having to enter all information again.

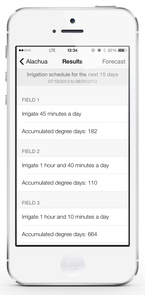


Map view with geo-located stations presented.

Station search list for easy reference.

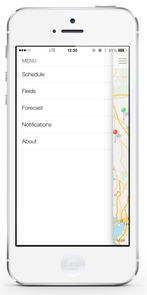


List of fields already registered for the selected station.



Irrigation schedule results and accumulated GDD from planting date.

Forecast from NWS.



Menu to access other features available in the app.

After the user select a station and input all information requested, the user can tap the "Generate schedule" button and the app will send all the parameters to the AgroClimate's server, run the models and return just the results for the user's device. The result screen presents an irrigation schedule duration and frequency and depending on the crop needs, the app can also suggests irrigation delays for when it rains.

Along with these irrigation schedule recommendations the result screen also presents a button that gives access to forecast information from National Weather Service. This forecast information can help producers with the irrigation schedule duration and frequency for the next days.

Notifications

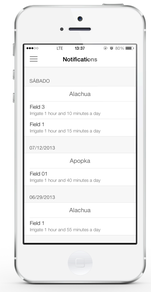
The developed apps have an option where the users can schedule a day of the week to receive irrigation schedule updates for their registered fields.

This irrigation schedule updates are sent for the users via push notifications. Push notifications work like a text message but unlike text messages, push notifications are sent through Internet connection and don't have charges to be sent or received.

By using this notification service the users don't even need to keep checking the app for irrigation schedules updates, they will be notified about these changes and this makes great use of a mobile integrated system.

Notification received while device screen is locked.

Notification received with device screen unlocked.



All recent notifications received by the user.

References

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