iSprinkle: when education, innovation and application meet

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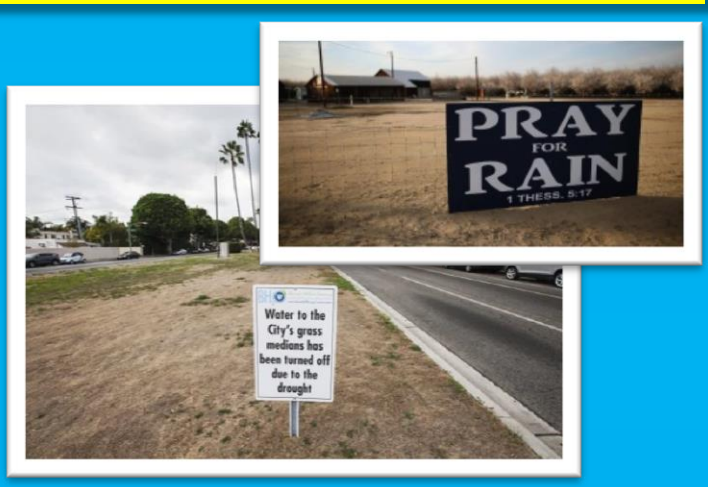
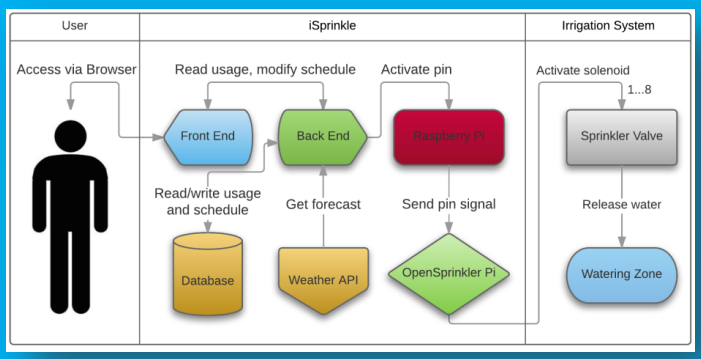
MOTIVATION

The student is easily motivated by the **real-life application of the project**. The Southern California draught is a complex problem that affects everyone. This project allows the student to make a contribution to the solution; this in itself has the effect of placing the project beyond "academia." From the point of view of the instructor, **the project** is an excellent opportunity for the student **to put into action concepts and techniques learned throughout the student's undergraduate years**: software design, programming, embedded systems, human-computer interaction, and how these technologies connect with social issues and the law. The students' work is both conceptual, and highly technical.

PEDAGOGICAL VALUES OF THE PROJECT

1. Smart water irrigation is a **well-defined topic**, and the **motivation is clear** to the student.
2. The student develops the system from the **requirement analysis** stage through **integration** of particular logical and physical **project's components**, up to the stage of **tests** and completing the **end-user documentation**.
3. Preparing a solution fulfilling the requirements such as low cost, usability, etc., is truly a **real-life exercise**.
4. The solution has significant **market potential** if the student decides to develop it and to provide a "take-to-market" plan.





iSprinkle

Raspberry Pi-powered **irrigation controller** connecting a weather forecast provider to obtain predicted local weather conditions and **adjusting the base watering schedule** as-needed. By doing so, iSprinkle is able to **irrigate more efficiently** compared to a system with a fixed schedule (most household systems) in terms of water usage. iSprinkle hopes to make it easier for homeowners to **conserve water** by automating adjustments to their irrigation schedule.

HARDWARE COMPONENTS

One of the most important assumptions about **iSprinkle** was that its cost should be minimized as much as possible. The hardware configuration applied in the project, including **Raspberry Pi 2** unit (RPi) as its core element, required about **$150 (126 €)** which is an acceptable price for such a solution

KEY SOFTWARE COMPONENTS

- **Raspbian** OS + software patches
- **Python** + Python's Standard Library + third-party libraries via PyPI
- Virtual Network Computing (**VNC**)

CONCLUSIONS

iSprinkle is the senior capstone project aimed at preparing a **low cost**, **open source-based** sprinkler working on the basis of weather forecast data provided by the external web services. The project covered assembling both hardware and software components. The latter ones were based on open source solutions and technologies: the Raspbian operating system, Python-based components, Angular, Bootstrap and others. The project required the **student** to develop **skills** in assembling together all **hardware** items; installing and setting up the OS and the **software** environment; **programming** using **advanced web technologies**. The basic assumption was **reducing the cost** of the solution. Meeting this requirement and relying on the open software, make **iSprinkle** to be **easily replicable**. This fact together with the environmental context, i.e. the common water shortages in California, open good prospects for **commercial application** of **iSprinkle**.