Irrigation Pylons: Project Proposal

Nico Garcia, Tyler Dale, Ellen Halverson,
Kenneth Harkenrider, Trenton Kuta

Introduction: Flood Irrigation

- Common in Southwest
- Water crops by flood
  - Diverted river water
  - Canals, ditches, valves
- Process Automation
  - Moisture Sensors
  - Wireless Control
- Project: Irrigation Pylons

Problems with Flood Irrigation

- Time Consuming and Labor Intensive
  - Up to 36 hours
  - Water pressure varies - needs constant checking
- Risk of Overwatering
  - Flooding nearby properties/roads - property damage
  - Water is precious - minimize waste

Proposed Solution: Irrigation Pylons

- Water Sensing Pylons
    - Determine advancement of water
    - Communicate with Hub
- Hub
    - Informs farmer of progress via app
    - Controls Valves
- Valves
    - Starting/Ending Irrigation Remotely

Demonstrated Features

- Water Detecting Pylons
  - Separate soil and other debris
  - Measure the amount of water present
  - After threshold broadcasts status
- Communication to central hub
  - Pylons transmit data to central hub
  - Central hub collects status of pylons
  - Central hub communicates to valve to open/close

Demonstrated Features

- Central hub controlled valve
  - Stop valve used to control output
  - User has option to open and close valve
- User Interface
  - Updates with status of pylons in the field
  - Allows user to open stop valve to start process
  - Allows user to close stop valve when is best for the field.

Available Technologies

- Wireless Communication
  - Wi-Fi
  - Bluetooth
  - ZigBee
  - 6LoWPAN
- Water-sensing Devices
  - Resistive
  - Capacitive
  - Neutron Interaction

Available Technologies

- Valves/Motors
  - Retrofit or Replace
- Power
  - Solar Battery System for Pylons
  - AC for Central Hub
- User Interface
  - iOS/Android App
  - MatLab

Engineering Content

- Three Subsystems
    - Valve Control, Pylons, Central Hub
    - Individually constructed/tested
- Integration
    - Communication between subsystems
    - Communication between hub and farmer
- Power systems

Engineering Content

- Valve Control
  - Valve on/off
  - Recognize state
- Pylons
  - Read the sensor
  - Turn off
- Central Hub
  - Wireless signal to user interface
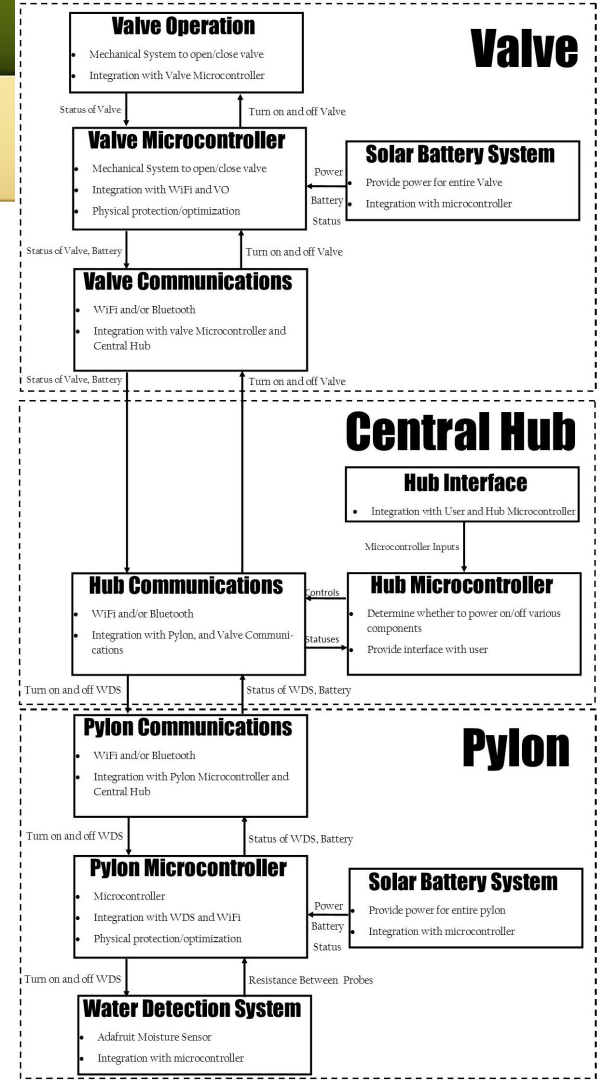
Conclusion

- Potentially Marketable Product
- Useful for Agriculture
- Combination of Engineering Skills
  - Internet of Things, Sensor Appropriation, Hardware Construction/Design
- Ideal for Senior Design