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Automatic Feedback Control In Support of Sensor Networks to Monitor Nitrate in Palmdale and in Merced Backyard (CON 2)

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Automatic Feedback Control In Support of Sensor Networks to Monitor Nitrate in Palmdale and in Merced Backyard

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Introduction: Prevention from Nitrate Pollution in Groundwater

Reclaimed Water is Reused for Agricultural Irrigation in Palmdale, CA



Merced Backyard Test Bed



Problem Description: Determine the Best Management Strategy for Pollution Prevention

Palmdale Deployment

- A **control algorithm** is required to maximize the reclaimed water input subject to groundwater protection.
- Real-time **parameter estimation** of the simulation models is needed using on-line data from sensors
- Novel **multi-level sensing stations (pylons)** are deployed at varying spatial densities over a portion of a 30 acre test plot.

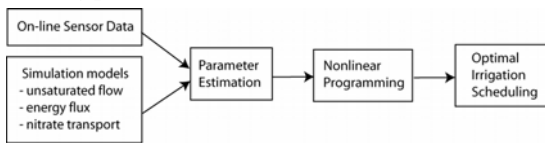
Merced Backyard

- A **test bed** for Palmdale irrigation control is set up
- **Automatic feedback controller system** is used to provide backyard with accurate flow rate obtained from optimization algorithm
- **Multi-level sensing stations** (soil moisture, temperature, nitrate sensors) are deployed to monitor conditions in 1-D

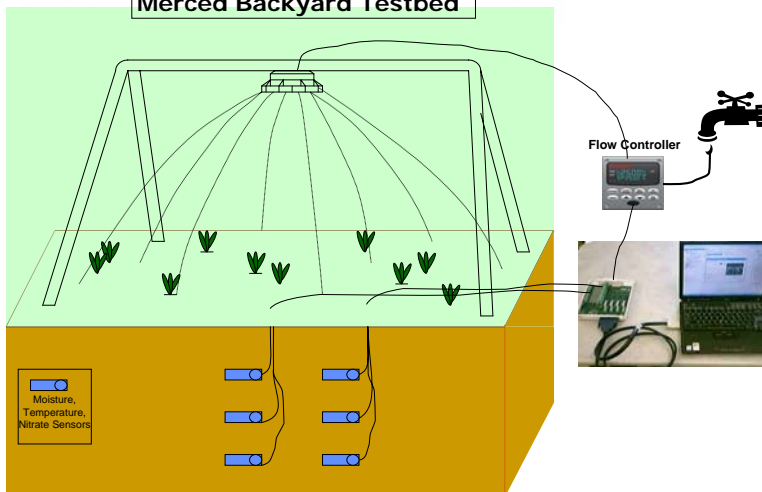
Proposed Solution: Automatic Feedback Control using Sensor Networks

Irrigation Control in Palmdale and Merced Backyard

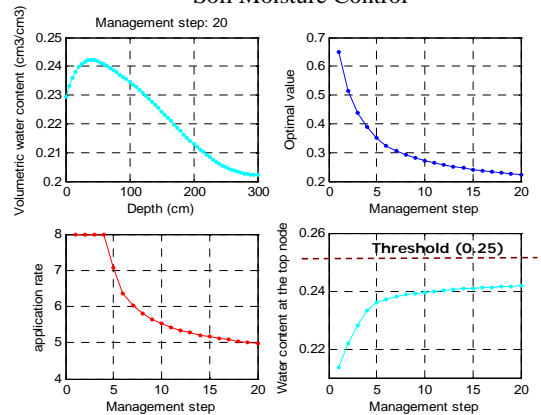
- The objective of irrigation control is **to determine the application rate** such that wastewater usage is maximized and the nitrate regulatory level is not violated.
- The control scheme is executed by using **on-line data feedback** from the pylons and providing control to the watering pivot.



Merced Backyard Testbed



Soil Moisture Control



Nitrate Control

