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

Permalink
https://escholarship.org/uc/item/50p1p17v

Authors
Yeonjeong Park
Jose Saez
Thomas Harmon

Publication Date
2006
Automatic Feedback Control In Support of Sensor Networks to Monitor Nitrate in Palmdale and in Merced Backyard

Yeonjeong Park¹, Jose Saez², and Thomas C. Harmon³
¹UCLA Civil & Environmental Engineering, ²Loyola Marymount University Civil & Environmental Engineering, ³UC Merced School of Engineering

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.

Soil Moisture Control

Nitrate Control

Merced Backyard Testbed