

Automated Clay Conditioning for Foundations “ACCF”

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Team No.: 12
Course/Selection: ELET 4308/12652
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University of Houston
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ACCF = Automated Clay Condition Foundation

presented by: Kevin Aldridge

- **How is foundation damaged by simple weather conditions?**
 - Cracking
 - Expulsion
 - Tilting
- **Why do we need this system?**
 - To prevent foundation damage due to high expansive soil such as clay
 - Specially designed system that works better than a simple time based system.
- **How does it work?**
 - Resistive Sensors used to measure moisture
 - Microcontroller
 - Watering time
 - Servo settings

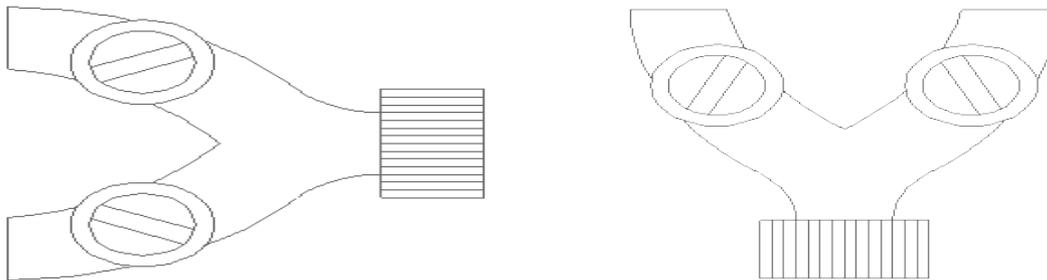


Product Requirements

presented by: Sevin Phu

- **Prototype**

- at least 2 specific watering zones
- Controlled weather sample
- Microcontrolled watering system
- Statistical foundation movement chart
- Soil analysis of a designated area

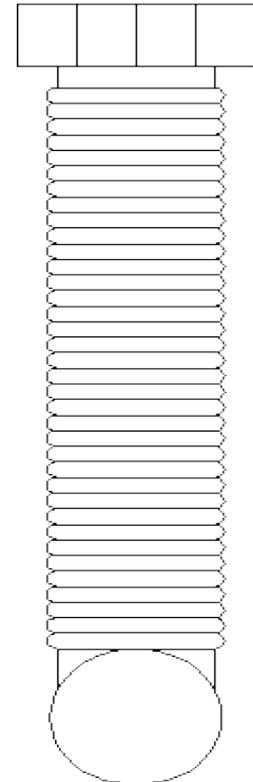


Product Requirements

presented by: Sevin Phu

Theoretical Disruptive Model

- ACCF is designed for residential usage
 - Control box
 - 2 or more watering servos
 - 2 or more moisture sensors
 - PVC piping
 - Soaker hose
 - Shovel and or digging material
 - Water splitter
- Additional components
 - 120V 60Hz AC input
 - AC to DC transformers
 - Digital logic device
 - Time based clock



Design Alternatives

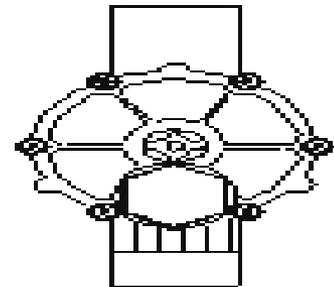
presented by: Sevin Phu

- Streets and road management
- Connect to the current systems
- Single power supply
- Different sensors
- A user specified minimum watering time

Hardware Design Specification

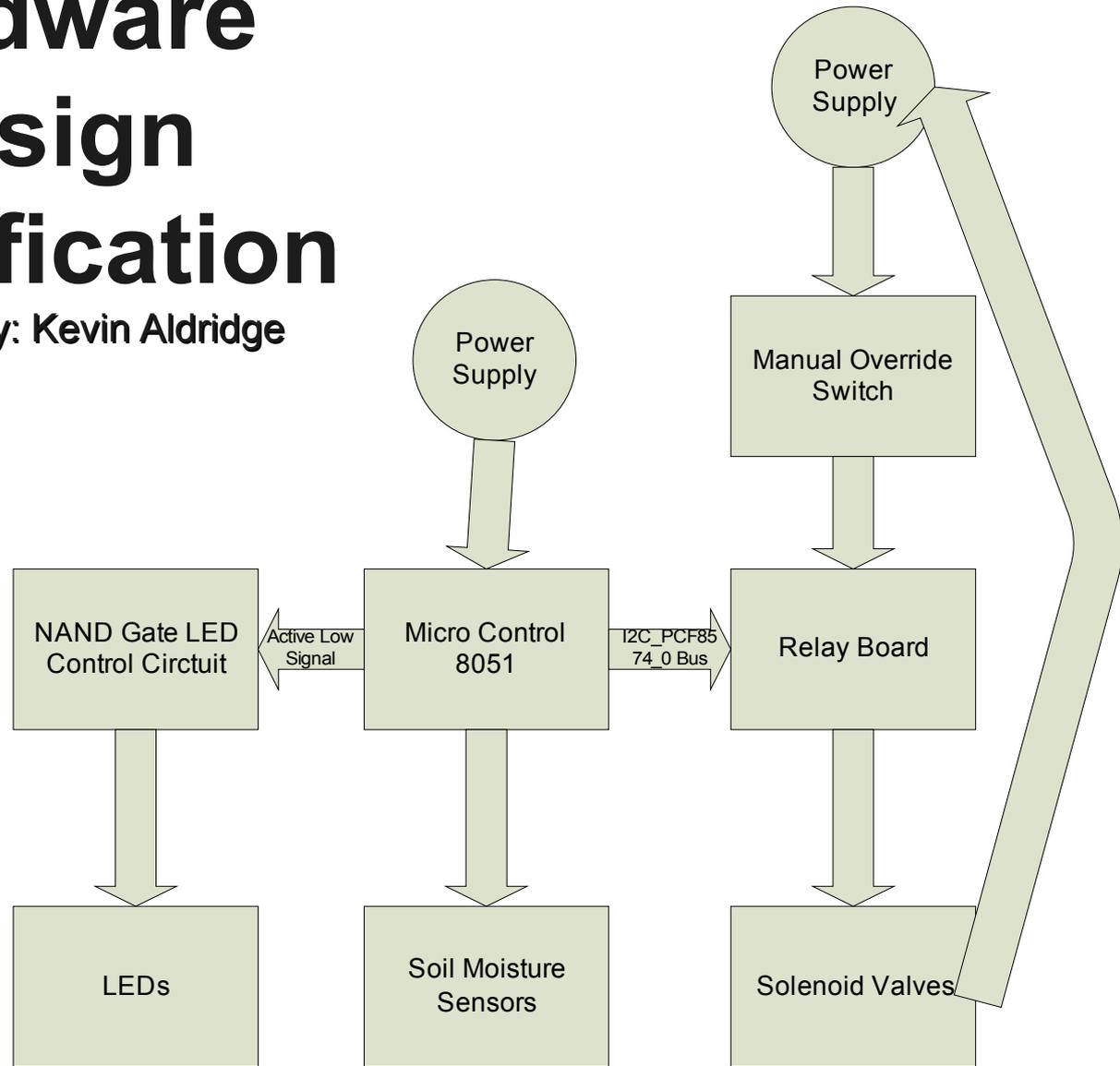
presented by: Kevin Aldridge

- BiPom - Mini-Max 51-C2 8051 microcontroller
- BiPom – 8051 training board
- BiPom – 4 reed Relay Peripheral Board
- 24V AC 650mA Transformer
- 2 Rain Bird automatic Sprinkler Valve
- 2 Water Mark Moisture Sensors
- PCB – Printed circuit board
- 74LS00 NAND gate
- PVC piping



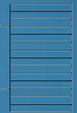
Hardware Design Specification

presented by: Kevin Aldridge



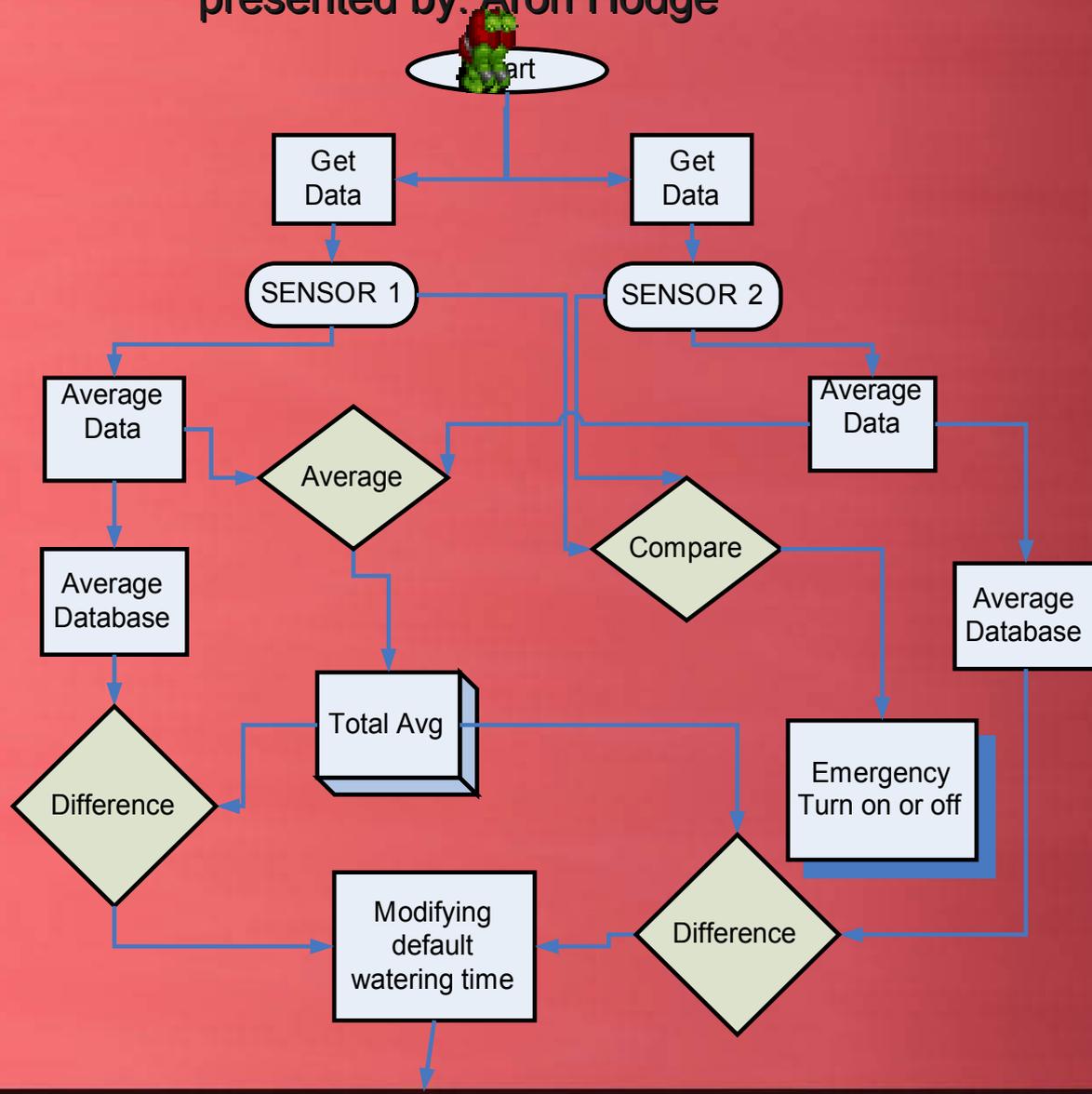
Hardware Design Specification

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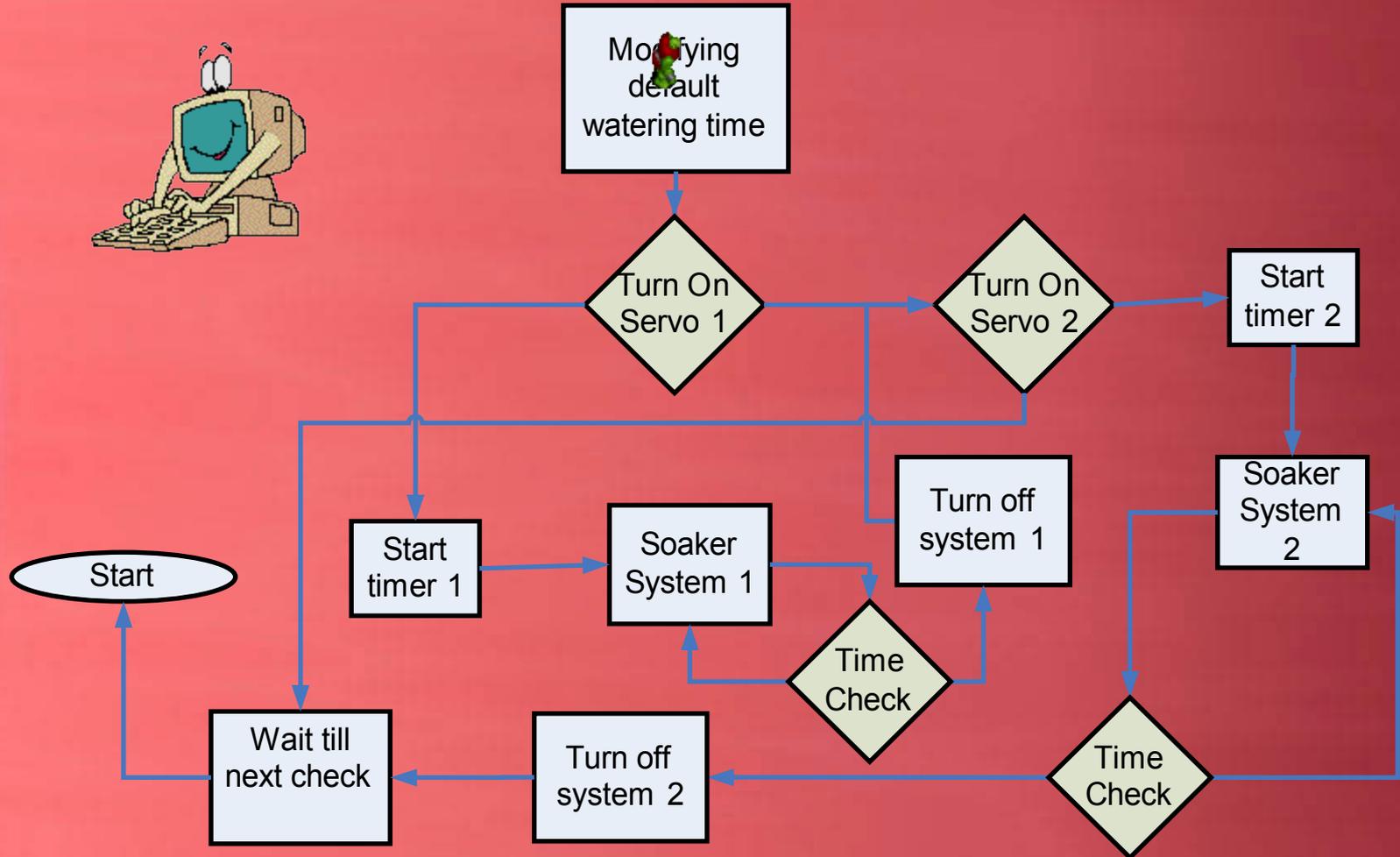
Software Design Description

presented by: Aron Hodge



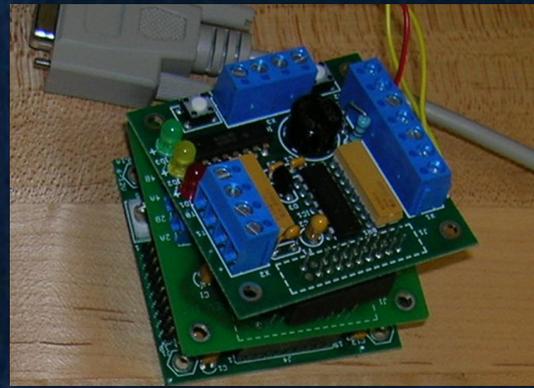
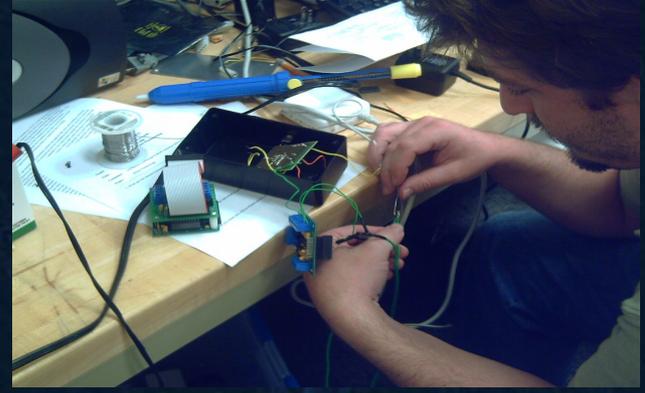
Software Design Description

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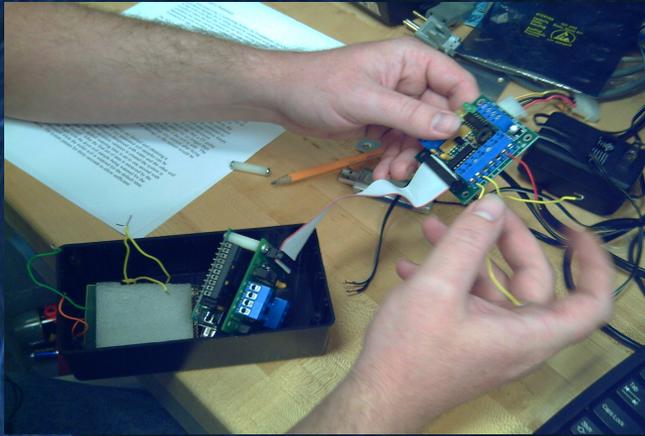
Construction Details

presented by: Collin Gallagher



Construction Details

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Variation & Testing

presented by: Collin Gallagher

- **Component testing**
 - **Hardware**
 - Sensor monitoring
 - Servo control
 - PVC leakage
 - LED connection
 - **Software**
 - Timing control
- Mathematical calculations
 - Relay activation
 - Sensor input

Variation & Testing

presented by: Collin Gallagher

- **Integration**
 - Set values for moisture sensor
 - LED activation
 - Servo Activation
 - On / off system Timing
 - Voltage distribution
- **Full system test**
 - Watering quantity
 - Watering timing
 - Equivalent moisture monitoring
- **System Analysis**
 - Maximum voltage drop
 - Longevity of equipment used



Cost

presented by: Collin Gallagher

- **Parts Total Cost \$ 310.67**
 - **Lowes, EPO, Radio Shack, etc**
 - **Hardware & Electrical Components**
- **Labor Total Cost \$ 22,500.00**
 - **Estimated \$ 25 per hour pay rate**
- **Tools and Lab Equipment Cost \$ 4,294.00**
 - **Meters, power supply, oscilloscope, pc**



Conclusion

presented by: Aron Hodge

ACCF is:

- **Cost Effective**
 - \$10,000 home improvement
 - Component cost is comparable to current systems being placed in homes with less than a 10% increase in cost.
- **An “improvement”**
 - Time-based systems damage homes as much as prevent damage while ACCF is an actual improvement that prevents damage.

Questions & Comments

