CPET 491/ECET 491
# Senior Design Project Phase II
Lecture 1

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CPET 491/ECET 491 Course Description

- Course Description: P: 490. Phase II includes, but is not limited to: (1) continued research and finalized design, (2) oral presentation to faculty and other interested parties, (3) standard-format written technical report.
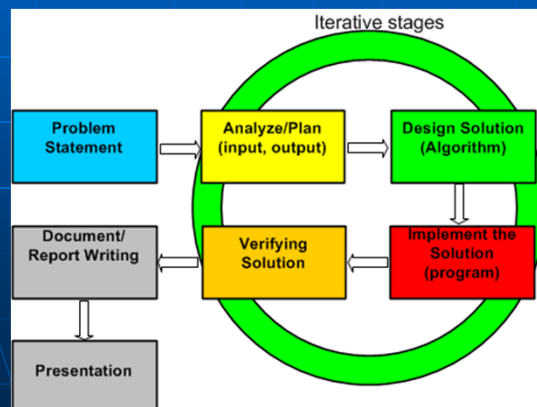
Project Specific Pre-requisites
for CPET 491/ECET 491

- CPET 470 Technology Project Management (completed)
- ENGW 234 Tech Report Writing (completed)
- ENGW 421 Tech Writing Projects (concurrently taking)
- ECET 491 students: completed all ECET required technical courses (ECET 307, ECET 357), and majority of project related preparation courses, MA 321
- CPET 491 students: completed all CPET required courses and majority of project related preparation courses, STAT 301

Course Outcomes

1. Use of knowledge and skills
2. Conduct unit and system testing, collect testing data and interpret results
3. Write progress and final project report
4. Make oral presentations
5. Demonstrate project performance

Course Outcomes (cont.)

1. Use of knowledge and skills
    1. Prototype product and assembly drawings
    2. System architecture/subsystems/PCB circuit layout and drawing
    3. Use of modeling/simulation (MATLAB, Multisim, etc.) techniques
    4. Use of project management tools
    5. Use of modern software and development methodologies
    6. Application of advanced mathematics
    7. Application of system engineering and management concepts

Course Outcomes (cont.)

1. Use of knowledge and skills
    8. Use of current and emerging technological knowledge
    9. Apply creativity in hardware system/subsystem/circuit design
    10. Apply creativity in software system/subsystem/program design
    11. Problem solving knowledge and skills

Course Outcomes (cont.)

2. Conduct unit and system testing, collect testing data and interpret results
    1. Valid and appropriate susbsystem testing results (signal acquisition, processing, reporting, HMI, etc)
    2. System construction and integration testing results
3. Write progress and project reports
4. Make oral presentations (progress report/review, milestone, final presentations)

Course Outcomes (cont.)

1. Use of knowledge and skills
2. Conduct unit and system testing, collect testing data and interpret results
3. Write progress and final project report
4. Make oral presentations
5. Demonstrate project performance

Course Outcomes (cont.)

5. Demonstrate project performance
    1. Experimental circuits setup, testing, and data analysis
    2. Creativity in design
    3. Teamwork – stakeholders: project sponsor, faculty advisor, project team, etc
    4. Project related research work
    5. Application of ethics – health, safety, wellbeing, etc
    6. Diversity in knowledge & solution
    7. Knowledge of societal issues – economic, productive, growths, etc
    8. Knowledge of global issues – environment, cultural needs, etc

Course Outcomes (cont.)

5. Demonstrate project performance
    9. A commitment to project quality
    10. A commitment to project timeliness – progress report, completion times, etc
    11. Project is operational and meet or exceed specifications requirements
    12. Familiarity with the project (including ability to answer questions)

Tools for Design, Simulation, Development, and Prototyping

- Microsoft Software and Tools
  - Microsoft office: Words, Excel, PowerPoint, Access
- Microsoft Visio
  - System architecture
  - Software design, block diagrams, flow charts,
  - Business process, data flow diagrams, database model diagrams, Web site and systems, enterprise applications
  - UML (Unified modeling language)
    - Activity diagram, Collaboration diagrams, Component

Tools for Design, Simulation, Development, and Prototyping (cont.)

- Microsoft Visio
  - UML (Unified modeling language)
    - Use Case
    - Static Structure (data type, class, object, interface, package, etc)
    - Activity diagram
    - Collaboration diagrams
    - Component diagram
    - Deployment diagram
    - Statechart (state transition) diagram
    - Sequence diagram

## Tools for Design, Simulation, Development, and Prototyping (cont.)

- MATLAB
  - Math and calculations modeling, analog and digital control system design and modeling, communication system, etc
- Multisim/Ultiboard
  - Electrical, Electronics, Digital Circuit design and simulation
- Other Software IDEs
  - Microsoft Visual Studio.NET 2012
  - Eclipse IDE, Android, Java
  - etc

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System Design Example 1

- Sensor System Architecture

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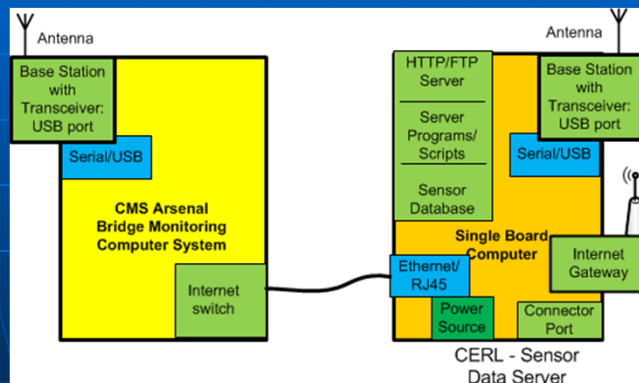
System Design Example 1 (cont.)

- Sensor Data Acquisition and Communication System Design, Simulation, and Prototyping

Sol-Gel Corrosion Sensor (1 to 4) - Remote Monitoring Node at Fixed Locations
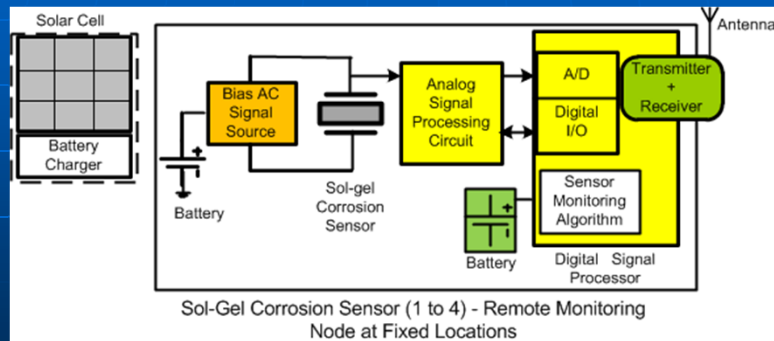
System Design Example 1 (cont.)

- Sensor Node for Data Acquisition and Communication

Sol-Gel Corrosion Sensor (1 to 4) - Remote Monitoring Node at Fixed Locations
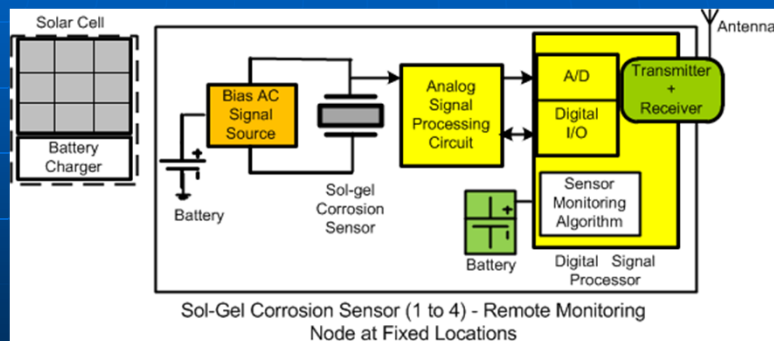
System Design Example 1 (cont.)

- Detailed Sensor Data Acquisition Diagram - 1
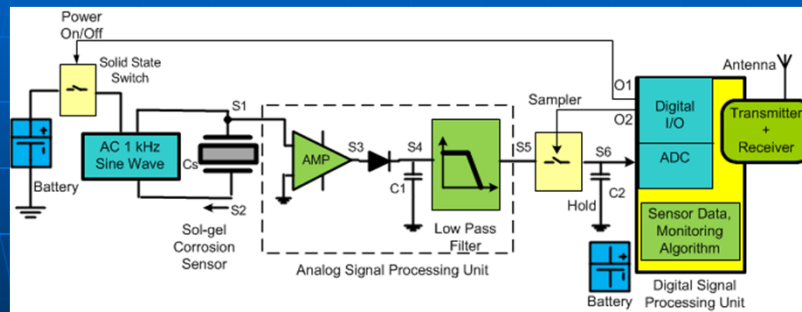
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System Design Example 1 (cont.)

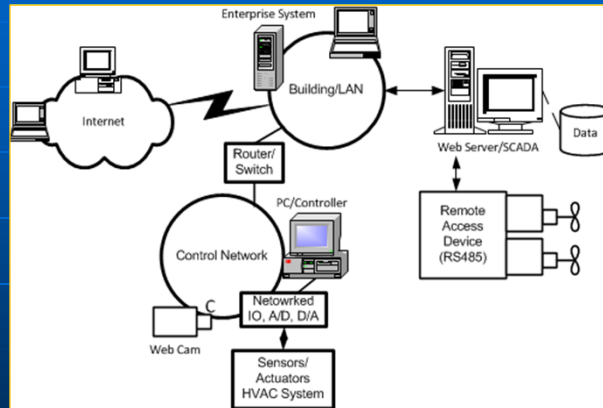- Detailed Sensor Data Acquisition Diagram - 2
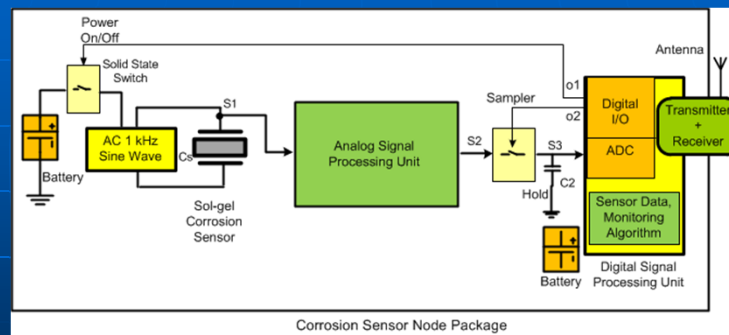
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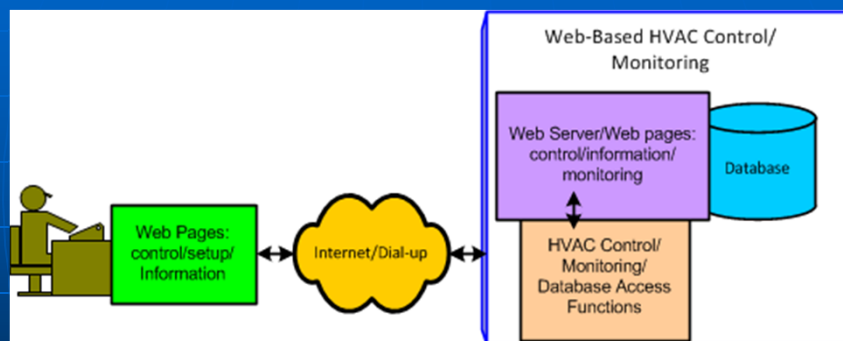# Web-Based HVAC Monitoring & Control System Example 2

- System Architecture

Web-Based HVAC Monitoring & Control System Example 2
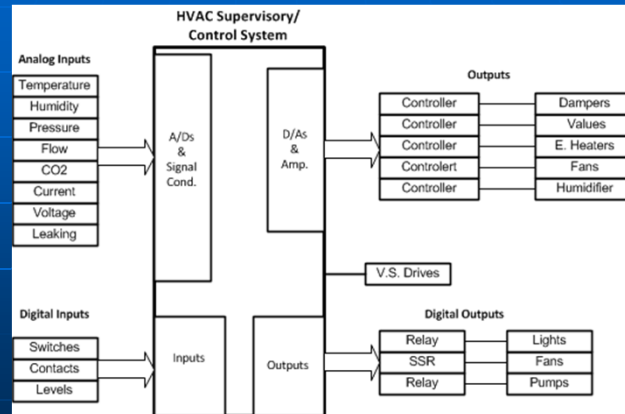
- HMI & System Interaction Diagram

Web-Based HVAC Monitoring & Control System Example 2

- I/O Interface Diagram

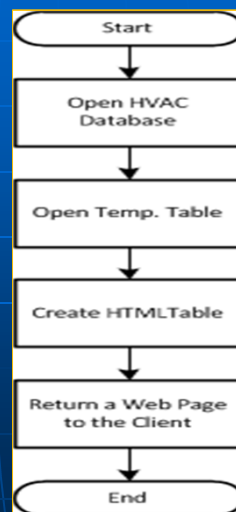## Web-Based HVAC Monitoring & Control System Example 2

- A Flow Chart for Accessing Web-based HVAC Sensor Database