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**Executive Summary:**

# Embedded Web Server for Remote Data Acquisition

The goal of this project is to provide a low-cost remote data acquisition system on an embedded microcontroller. This data acquisition (DAQ) system will consist of a remote microcontroller which communicates to a centralized data server through a local Ethernet network. Environmental data (e.g. temperature) will be collected by the remote microcontroller and shall be accessible, via the internet, from anywhere in the world. Additionally, data from the remote microcontroller will be collected by a centralized data server and inserted into a database. This remote DAQ system will provide potential customers with a relatively inexpensive, yet dependable solution for remote data acquisition applications.

As compared to the original requirements, the entire DAQ system has exceeded all functional requirements. The SSSwApp and the AccessDB have been created, tested and successfully validated. The PICDEM board's firmware has been created and the temperature input circuitry is hardwired to the microcontroller's input. The firmware/hardware's extensive validation process has been completed and the DAQ system has successfully met all original requirements. Some areas of this project have far exceeded the project's functional requirements, which enhance the user experience and increase product reliability while maintaining a low cost solution. The DAQ system's final testing was performed and each component performed precisely and accurately.

# Embedded Web Server for Remote Data Acquisition

## Final Project Presentation

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## Presentation Agenda

- Introduction
- Background
- Project Goals
- Deliverables
- Approach
- Results
- Demonstration

# Background

- Data Acquisition (DAQ)
- Embedded Devices
  - TCP/IP Protocol
  - CWRU Local Area Network
- Web Server
  - HTTP
  - FTP
- PICDEM .NET Demonstration Board



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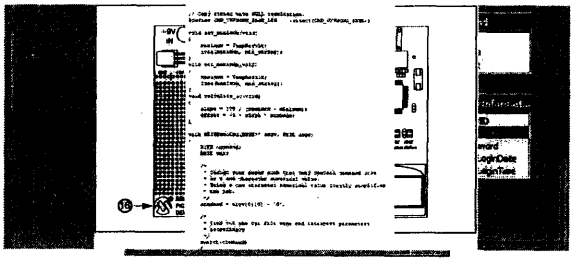
# Project Goals

- Low Cost
- Multi-purpose
  - Commercial
  - Industrial
  - Personal
- Easily Customized
- User-Friendly
  - Software GUI
  - Hardware Configuration
- Privacy

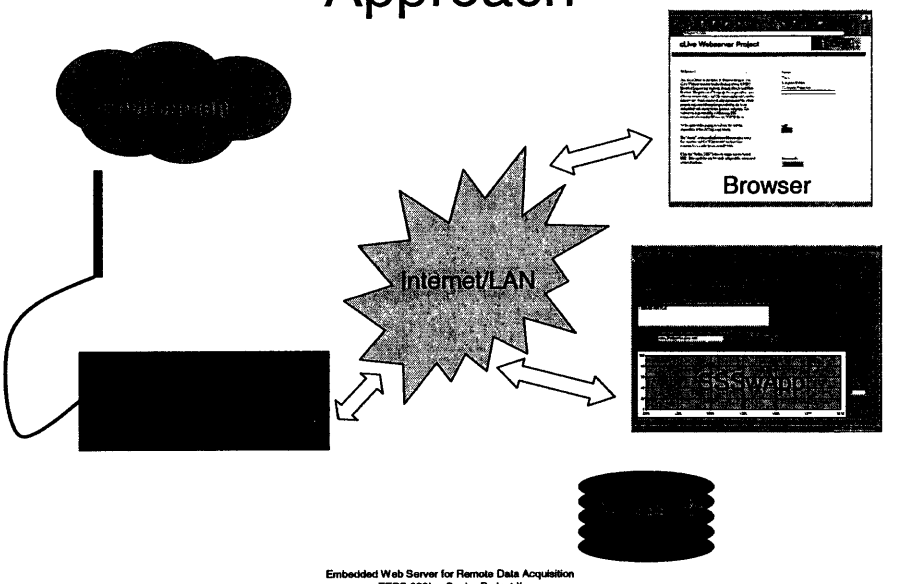


# Deliverables

I. Microsoft Access Database
II. Server Side Software Application
III. Hardware Implementation
IV. PICDEM Firmware



# Approach



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# Results

I. Microsoft Access Database
   1. DDX and ODBC interface
   2. Controls access to the SSSwApp
   3. Stores data chronologically for trending purposes

II. Server Side Software Application
   1. Requests/Receives data from PICDEM Board
   2. Formats data
   3. Inserts into the AccessDB
   4. Keeps log of user activity
   5. Provides real-time graphical trending capability



# Results (cont'd)

I. Hardware Implementation
   1. RTD provides analog input to PIC analog input
      - Accurate to +/- 0.8 °C
   2. 8 bit A/D conversion
      - Accurate to +/- 1 LSB ≈ 0.05 VDC

II. PICDEM Firmware
   1. Successful implements the TCP/IP Stack & HTTP v1.0
   2. Supports connection to the SSSwApp
   3. Dynamic website accessible via Internet/LAN
      - Displays real-time environmental data
      - Allows controlled configuration
      - Normalizes data for output

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http://PicDemNet.cwru.edu



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# Questions