Automated Industrial Wind Tunnel Controller

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Presentation Agenda

- Project Goals
- Work Completed from Previous Years
- System Description
- Work Completed this Year
- Schedule of Upcoming Work
- Additional Tasks
- Questions

Project Objectives

- The overall objective is to create an automated controller for an existing wind tunnel located in the Mechanical Engineering department of Bradley University.
- This controller will allow a user to position objects inside the tunnel with linear actuators, turn on the wind tunnel and adjust speed.
- A user will be able to control the tunnel through existing manual controls, on a local PC or remotely through the internet.

Previous Work in 2010 by Benjamin Morrison and Michael Firman

- Performed system analysis on the wind tunnel.
- Acquired solid state relays to control damper and blower through a microcontroller.
- Designed H-Bridge circuitry to control linear actuators through a microcontroller.

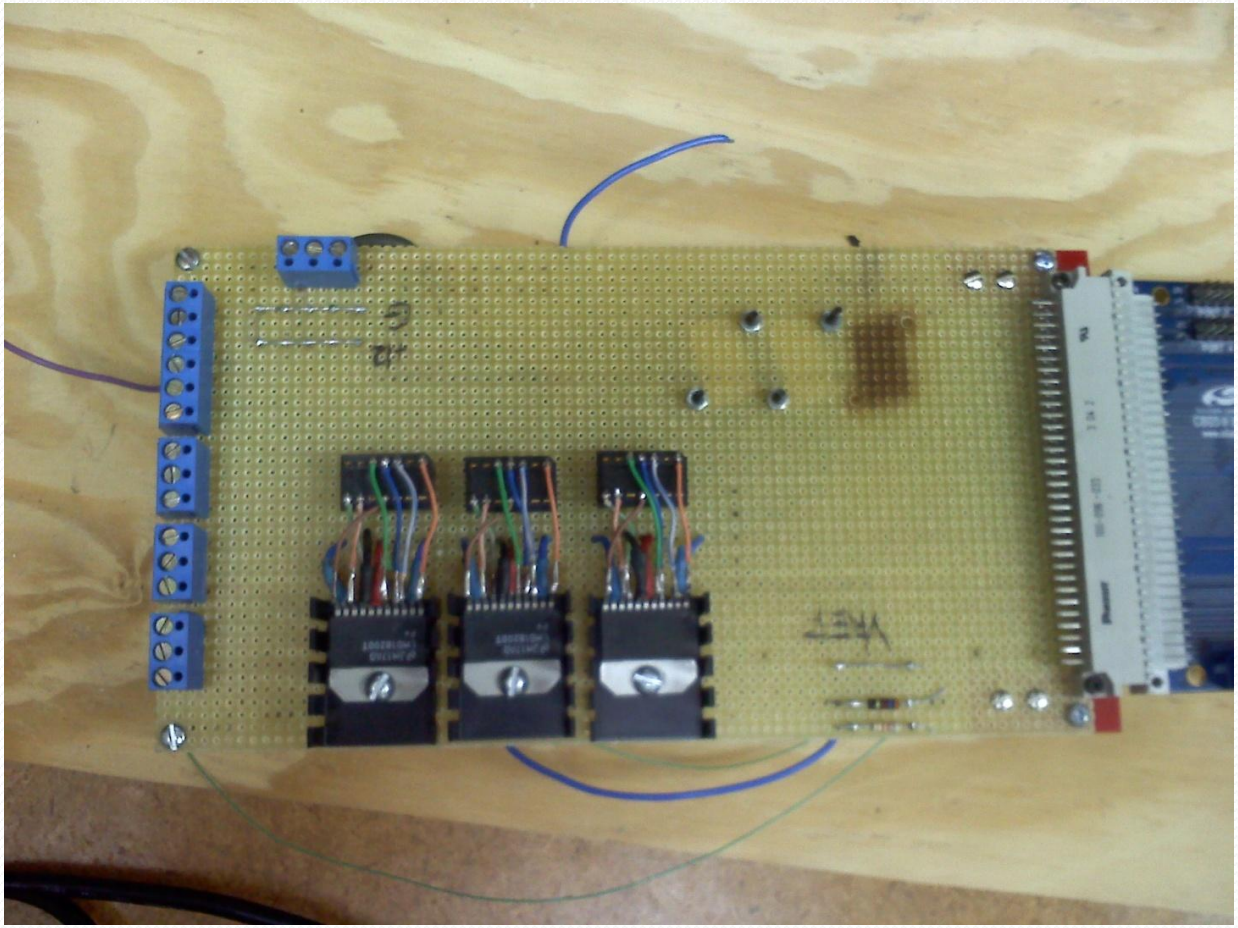
Previous Work in 2011 By Adam Green

- Rewired H-bridges and added power resistors to aid power dissipation.
- Added a National Instruments digital to analog converter to take over some controls of the wind tunnel and facilitate communications between the lab PC and microcontroller.
- Developed microcontroller software and LabView setup to control wind tunnel.

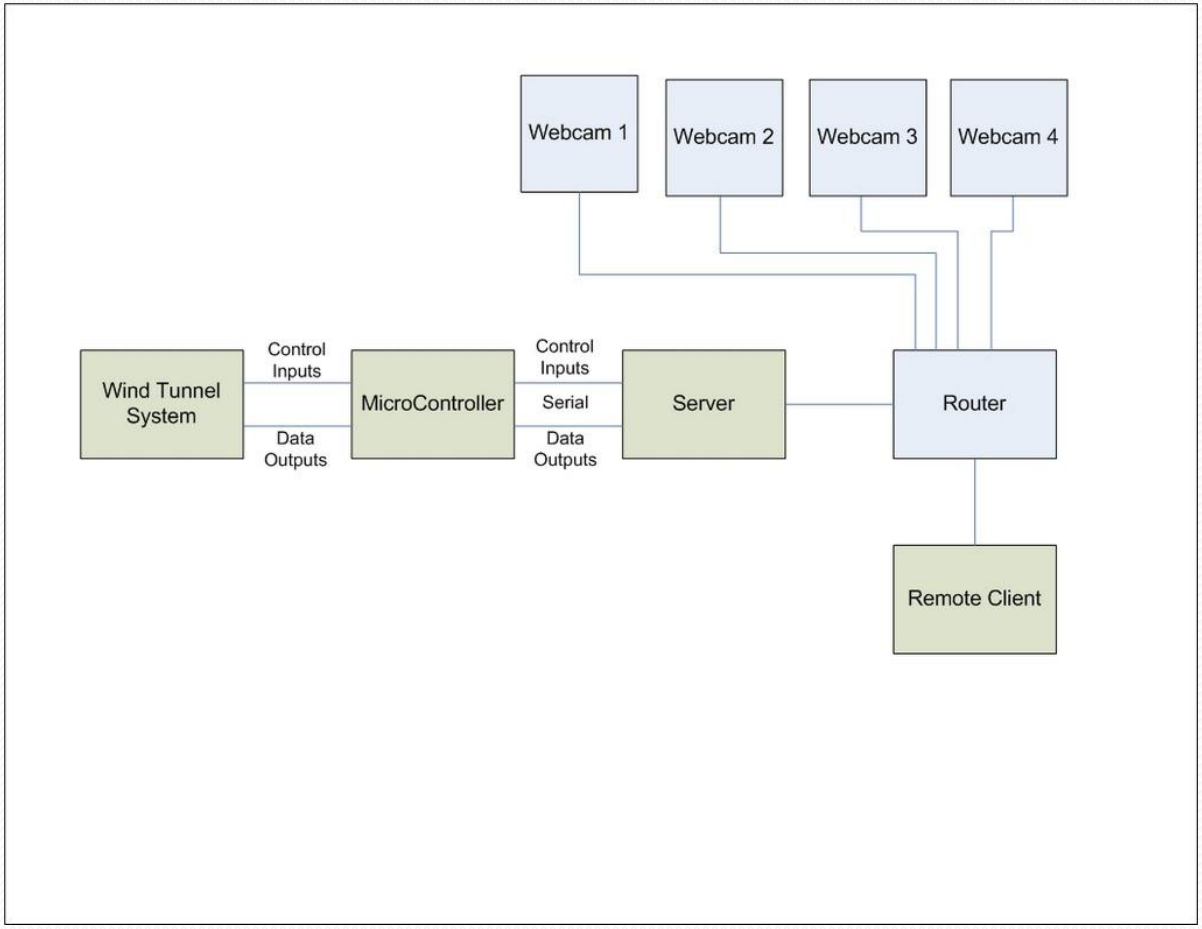
Changes to previous Work

- The National Instruments digital to analog converter is to be removed. All communications between the user PC and the microcontroller will be made through a serial connection.
- The microcontroller software will be rebuilt to allow for a safety shutdown to the H-Bridges.
- Incorporate webcams into project.
- An simple method of switching between electronic and manual control will be implemented.

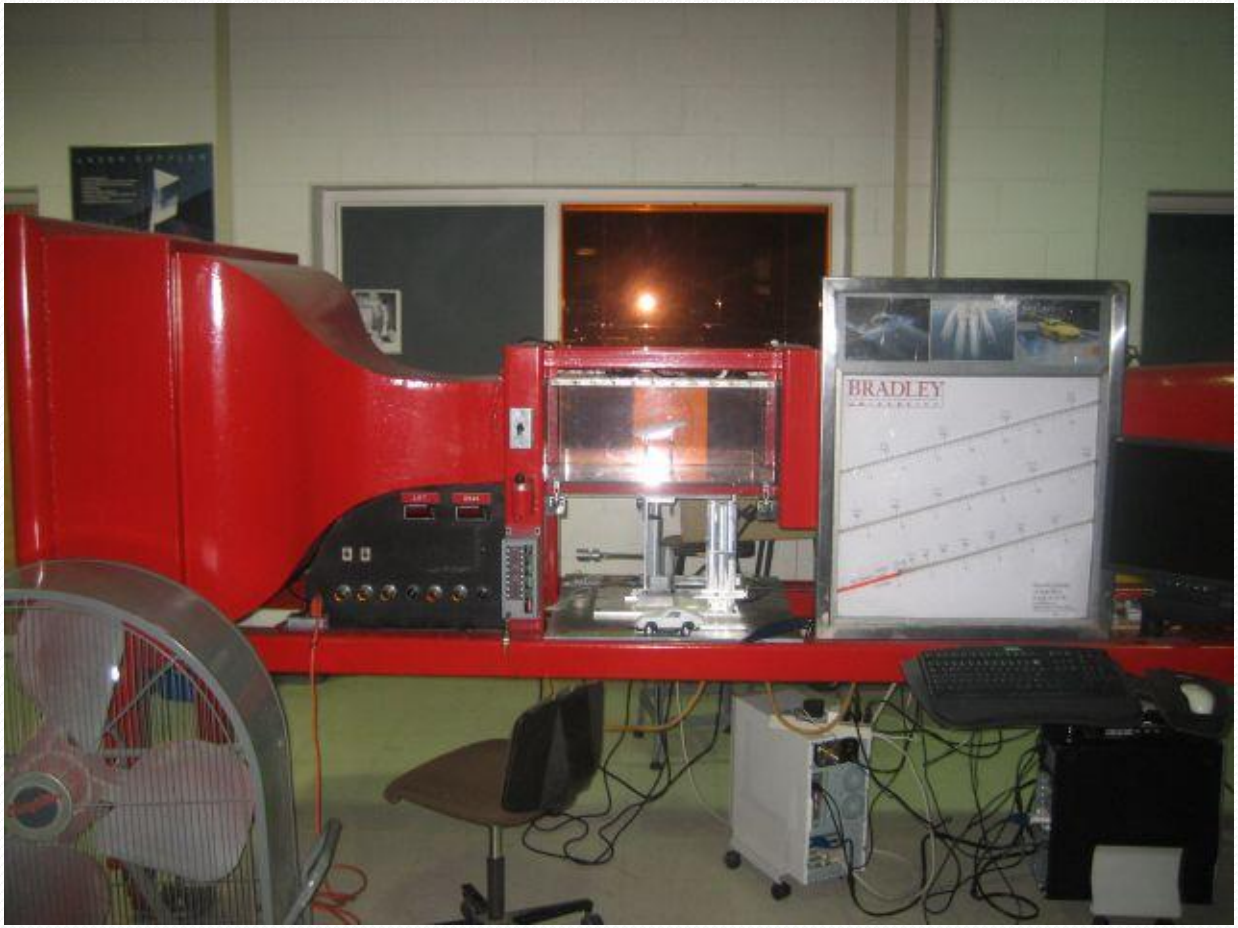
Damaged Power Resistor



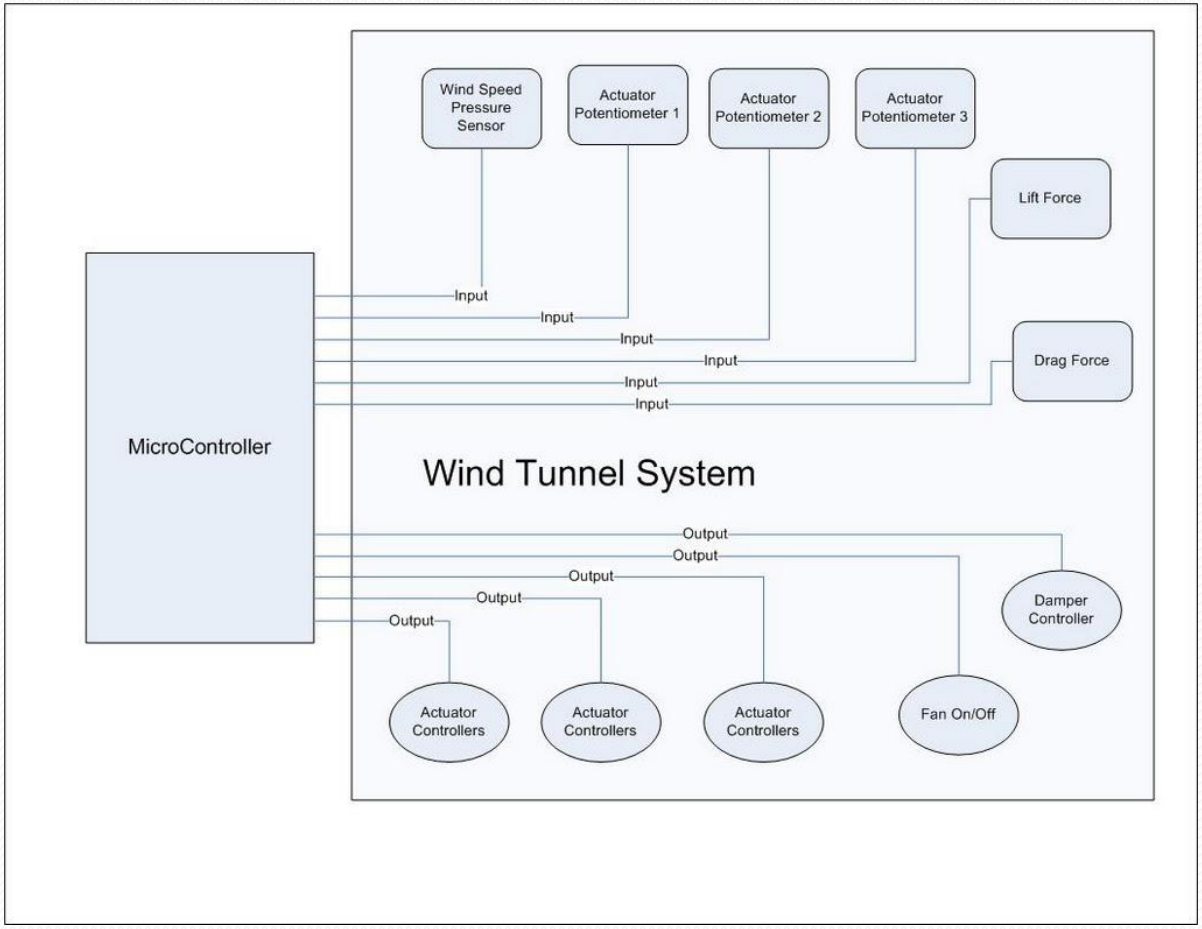
System Block Diagram



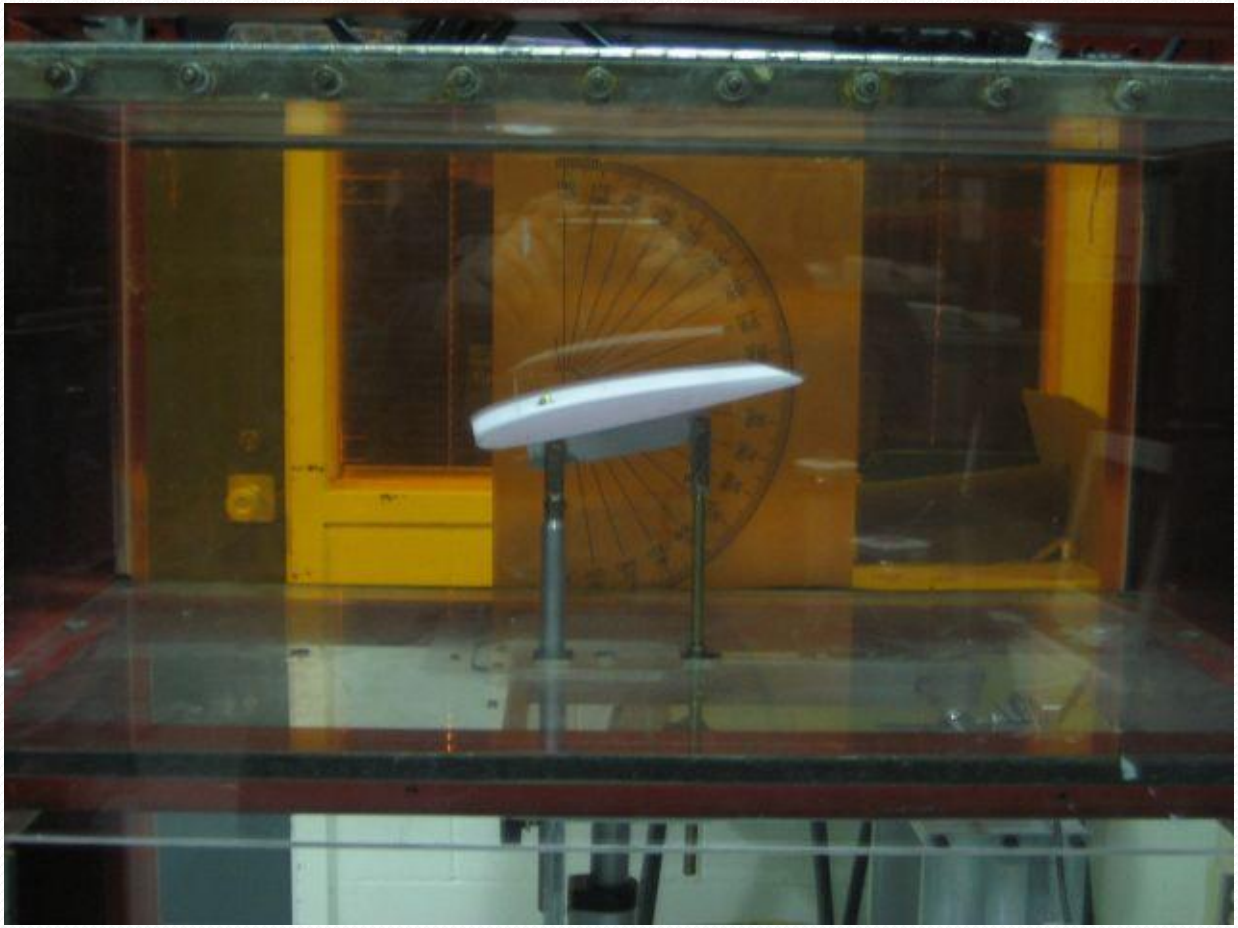
Manual Controls



Wind Tunnel Block Diagram



Actuator To Adjust Target



Work Completed

- Initial analysis on existing setup (some of it has been disconnected by ME staff to allow for manual control.)
- National Instruments Digital to Analog converter has been disconnected from microcontroller.
- Code for microcontroller currently is being rebuilt (Nick).
- LabView user interface and server is currently being updated (Daniel).

Schedule of Upcoming Work

	Fall 2011	Weeks 1 - 2	Weeks 3 – 5	Weeks 6 - 7	Weeks 8 - 10	Weeks 11 - 14
Daniel	Complete LabView and server setup.	Connect all relays back to wind tunnel.	Test and debug LabView on wind tunnel.	Analyze existing transducers measuring lift, drag and wind speed and determine how to measure and display values	Set up and test remote access.	Prepare for final presentation
Nick	Complete UC setup.		Test and debug UC on wind tunnel.		Set up and test webcam network.	

Additional Tasks (if time permits)

- Increase sophistication of user interface.
- The microprocessor and local PC could be removed and replaced with a Beagle Board.

Questions?