

## Results/Conclusions

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### Electrical Team

- Circuit modified to be more efficient and easier to miniaturize.
- Circuit virtually laid out on a PCB board.
- PCB board manufactured and electrical components integrated onto board.
- Coefficients uploaded to the program and power calculations written.

### Mechanical Team

- New testing procedure used to test crank set at proper chain orientation.
- New crank attachment procedure developed to eliminate testing errors
- Coefficients for weight-strain relationship calculated.
- Circuit housing designed and integrated onto crank set



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OF TECHNOLOGY

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3300 S. Federal St.  
Chicago, IL 60616 [www.iit.edu](http://www.iit.edu)  
Contact Info:  
[rempfer@iit.edu](mailto:rempfer@iit.edu)

## I PRO 324

Power Measurement for  
Road Bicycles

*"No Strain, No Gain"*



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### ADVISORS

Dietmar Rempfer  
Sheldon Mostovoy

### TEAM LEADER

Celeste Wegrzyn

### ELECTRICAL TEAM

Luis Adrianzen  
Christopher Antonio  
Mark Callan  
Matthew Gaylord  
Daniel Shaffer  
Patrick Tagny Diesse

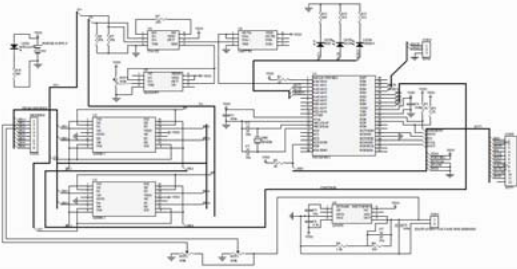
### MECHANICAL TEAM

Ross Allen  
Sara Claxton  
Gregory Herbert  
Celeste Wegrzyn

## Problem Statement

The goal of this IPRO is to develop a system that measures the applied forces at a bicycle crank set. This is then combined with advanced signal processing to provide the user with information on mechanical power input.

This differs from existing technology in that it will be possible to retrofit the system to an existing crank set. Ideally, accuracy will be increased while price is decreased.



## Background

Current available systems to measure mechanical power output:

- Crank set (strain in crank set)
- Free hub (strain in rear wheel)
- Chain (vibration and speed of chain)
- Opposing force (gravity, drag, acceleration, & wind velocity)

Pricing of these systems runs anywhere from several hundred to several thousand dollars.

## Objectives

- Miniaturize existing electrical system
- Obtain strain gauge coefficients
- Update existing code for the power calculation program
- Create a housing and mounting system
- Perform dynamic testing
- Minimize costs and power consumption

## Methodology

### Electrical Team

- Replace chip components with smaller and more efficient ones
- Remove redundant components
- Update code to automatically power down the system and adjust the torque formula upon startup

### Mechanical Team

- Modify the test fixture containing the crank set to be perpendicular to its initial position
- Test modified crank set and calculate strain verses torque coefficients
- Create a universal housing and mounting system for the chip
- Perform road testing of the system

## Obstacles

### Electrical Team

- Miniaturization of the board to fit on the crank set
- Source code updates to reflect results from this semester's testing
- Ways to increase power efficiency

### Mechanical Team

- Attachment of all components to crank
- Finding a way to obtain a bicycle. Blue City Cycles is sponsoring this portion of the IPRO
- Integration of mechanical and electrical designs
- Performing road testing in a short amount of time

