# IPRO 324 – Power Measurement for Road Bicycles

March 2, 2009

# Presentation Outline

- Project Overview
- Background
- Cost
- Team Organization
- Goals
- Team Progress
- Obstacles

# Project Overview

- What is power measurement?
- Why are we doing this project?
- How will we do this?
- Who will this benefit?

# Background

- Existing Products
  - SRM, Power Tap, Polar,
  - Quarq CinQo
- Bicycle Computer
  - Garmin Edge 705
- Wireless Transmission Protocol
  - ANT+
- Strain Gages



# Cost of Current Products

- SRM PowerSystem
  - $2,607.80
- PowerTap
  - $999.00+
- Quarq Cinqo
  - $1495.00



# Cost of Components

- Strain Gages
  - $5/each, 20 needed
- Electrical Components
  - ~$80
- Garmin Personal Computer
  - $350
- Total: ~$530+

# Team Organization

- Mechanical
  - Team Leader
    - Brandon Marcellis
  - Team Members
    - Brian Lam
    - Brandon Marcellis
    - Henrietta Tsosie
    - Ivan Voukadinov
    - Rebecca Martin
    - Stefan Stevanovic
- Electrical
  - Team Leader
    - Bryan Kaminski
  - Team Members
    - Arkadiusz Ziomek
    - Bryan Kaminski
    - Edumaregbemiro Odunaiya
    - Stephanus Halim
    - Tarun Anupoju

# Goals – Mechanical Team

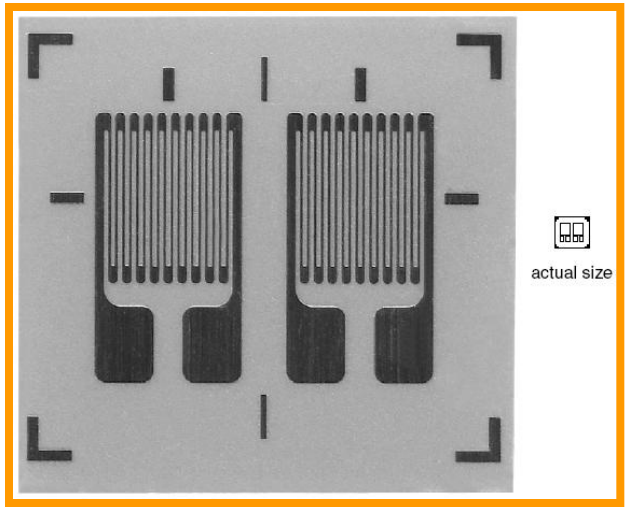
- Apply strain gages to crankset
- Design a holder for Reed switches
- Design a way for the Reed switches to measure crank angle
- Get the strain gage software operational
- Test the crankset/gage combo and develop algorithm for measuring the power output

# Goals – Electrical Team

- Implement and develop an algorithm to calculate the applied torque at the crank set
- Implement a fast and efficient switching mechanism for the Wheatstone bridge of gages
- Transmit the data wirelessly with minimal data loss to the Garmin Edge 705 using the ANT+ protocol
- Improve overall power efficiency of the circuit

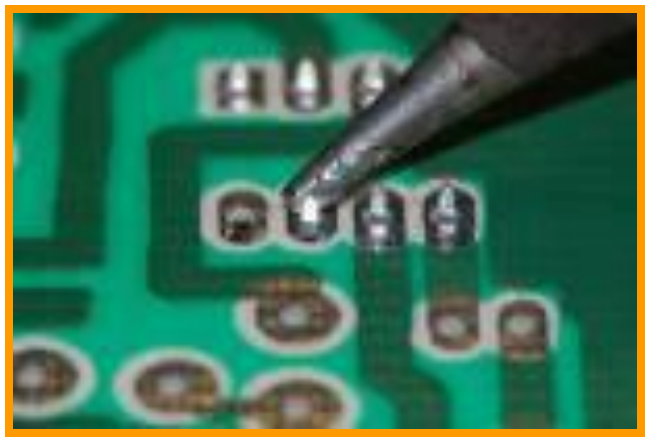
# Team Progress - Mechanical

- Applying strain gages to the crankset
- Sent measuring equipment to manufacturer for upgrade



# Team Progress - Electrical

- Soldered the switch IC into a board
- Tested each switch on the IC to a simple circuit containing LEDs
- Researched various documentation and code snippets for ANT+ wireless



# Obstacles – Mechanical Team

- Best position to mount gauges
- Make sure the software is calibrated and accurate
- Mounting the Reed switch in a simple manner and a protected location
- Making sure the algorithm is accurate and representative of the real power output

# Obstacles – Electrical Team

- Accurate crank angle measurement can be difficult
- ANT+ wireless device continues to be a challenge to write code effectively.
- Maximize battery life

# Any Questions?