IPRO 324: Power Measurements For Performance Bicycles

No Strain No Gain

IPRO It takes a team!
INTERPROFESSIONAL PROJECTS PROGRAM

ILLINOIS INSTITUTE OF TECHNOLOGY

Problem

➢Accurate measurement of power output of a performance bicyclist

Background

➢Existing solutions are inaccurate, expensive or require replacement of bicycle parts

➢Current Solutions:
- ➢Crank set strain
- ➢Rear wheel hub strain
  - ➢$500 and up
- ➢Chain vibration
- ➢Opposing force (gravity, air resistance, etc)
  - ➢Less expensive but inaccurate

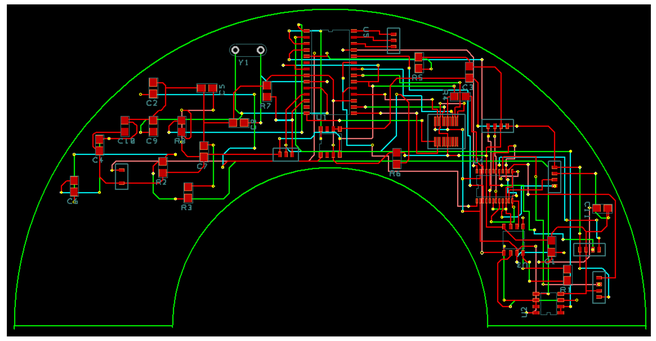
Objective

➢Create an inexpensive(within $100) and universal device to accurately measure the power output of the bicycle rider

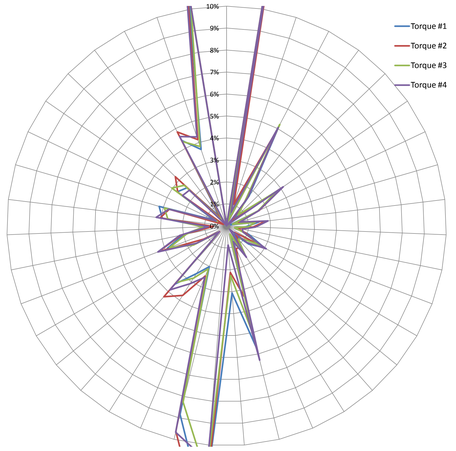
Circular housing for the electronic circuit

Methodology

➢Strain gauges provide crank set strain readings
➢Reed switches provide rpm/cadence readings
➢Electronic circuit processes data and transmits to cyclocomputer



Final circuit diagram designed to fit circular housing



Strain gauge bridge error for static load, small chain ring

Results

➢Static test data for Aluminum and Carbon Fiber (most popular materials) crank sets
➢Elegant and practical circular housing design
➢Redesigned circuit that fits the circular housing and incorporates new components and noise filters
➢System ready for dynamic testing

Future Work

➢Collect dynamic data
➢Manufacture new circuit design
➢Manufacture new housing
➢Follow-up EnPRO

Future Dynamic Testing

Team Structure

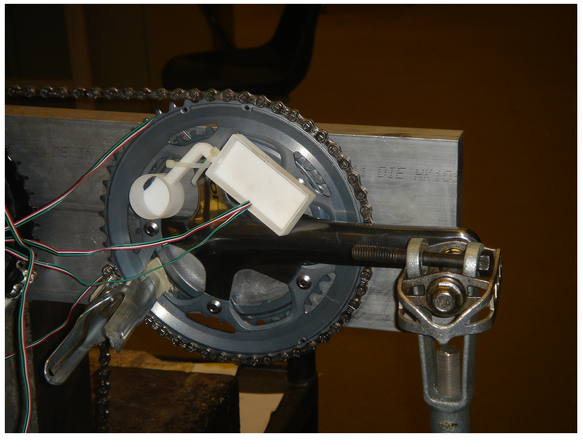
Advisors: Dietmar Rempfer, Sheldon Mostovoy
Team Leader: Mark Rhodes
Electrical Team:
Leader: Jeffrey Aigner
- •Jeonghun Lee
- •Seunggeun Lee

Mechanical Team:
Leader: Jonathan Swanson
- •Nick Gaulin
- •Yoshio Piediscalzi

Visual Team:
Leader: Brian Albee
- •David Rowell
- •Yuriy Sizyuk

Special Thanks

Russ Janota



Mechanical setup for static load testing