PROJECT BASED LEARNING AT OLIN COLLEGE

2011 ABET Annual Conference
Specifications

Design

Prototype
Modeling and Control
Real World Measurements
Principles of Engineering
User-Oriented Collaborative Design
Design Depth Elective (e.g., Product Design)
Capstone Experiences: SCOPE Program (Two Semesters)
AHS or Entrepreneurship Capstone (One Semester)
Model

Implementation

analyze, implement

abstract, schematize

validate, predict

Physical System

Behavior

Repopulation Dynamics:
Improving the Model for Growth of Small Populations
Physics of a Pherris Wheel with Sliding Gondolas

Abstract

The dynamics of a ferris wheel with sliding gondolas presents an exciting opportunity for learning about the physics of a pendulum that evolves and translates. Attempts to model and analyze the governing equations of motion of the system which were then used to create ferris wheel simulations in Matlab. Simulation of this system allowed for a greater understanding of the physical principles involved in large scale engineering projects.

Gondola Position vs. Angular Velocity
as \( R_{overt} \) increases in proportion to \( R_{max} \).

Pivot Position vs. Angular Velocity
as \( R_{overt} \) increases in proportion to \( R_{max} \).

Free Body Diagrams

The Governing Equations

\[
\begin{align*}
\sum F_x &= 0 \\
\sum F_y &= 0 \\
\end{align*}
\]

Validation

Phases

\( F_{net} \)
Bicycle Messengers

Layers
- Change w/ weather
- Wick, Warm, Wet
- Can’t avoid getting wet!

Helmet
- Required by law, and yet
- Many complaints
- 36% don’t wear one

Per Year Injuries
- Injured: 106,100 messengers
- Lost Work: 47,100-155,100 messengers
- Medical Help: 31,100-105,100 messengers
- Hospitalized: 11,100-105,100 messengers

National Avg. 3.5/100

Bikes
- Flexible & SIMPLE
- Fewest moving parts possible (fixed years)
- Self-maintained

Radio
- To communicate with dispatchers
- Keep close to mouthpiece
- Used while riding

Gloves
- For warmth
- Protection from abrasions
- Rp & karate
- Decrease dexterity

Shoes
- As much fun riding as for walking
- Stiff riding shoes are uncomfortable
- Sole’s wear out quickly

Dispensers
- Makes client calls and accounts
- Assign deliveries to messengers
- Some are former messengers
- Dispatcher quality can make or break a courier company

Awareness
- Supernatural awareness of all activity in a block
- Injection
- Takes years to develop
- Given the edge needed to thrive as a messenger

Receptionists and Mail Staff
- A quick dropoff

Locks
- Small and quick
- Key must be quick to access

Pants
- Seat wears out
- Patching for durability
- Cut-off or roll-up cuffs to keep out of bike chain

Contents of typical Couriers Bag
- Empty Kind wrappers
- Water bottles
- Multi-tool
- Stopwatch
- Koozie
- Water/coffee
- Alter tweaks
- Tickets
- Inhale
- Good kick check

Typical Boston Courier
- Age: 27 yrs
- Gender: Male
- Health inc to: 37%
- Experience: 5 yrs
- Deliveries/Day: 25
- Hours/Week: 40

Designers by Couriers for Couriers

Other Items
- 30.6 kg
- Will carry
- Time
- Everything forecast
- Cell phones are much more important

Pedestrians
- Follow patterns
- Easily spooked

Hazards
- weather (though rain is good for business)

Dependency
- Market
- F-type
- Grate
Some Closing Thoughts
Early experiences matter. A lot.
Be willing to make trade-offs.

And be explicit about them.

Ethics
Opportunity Assessment
Diagnosis
Design
Contextual Awareness
Lifelong Learning
Communication
Teamwork
Qualitative Reasoning
Quantitative Reasoning

Strongly Disagree
Disagree
Neutral
Agree
Strongly Agree

Thank you.

Questions?

jessica.townsend@olin.edu