Effective Technical Communication: Posters

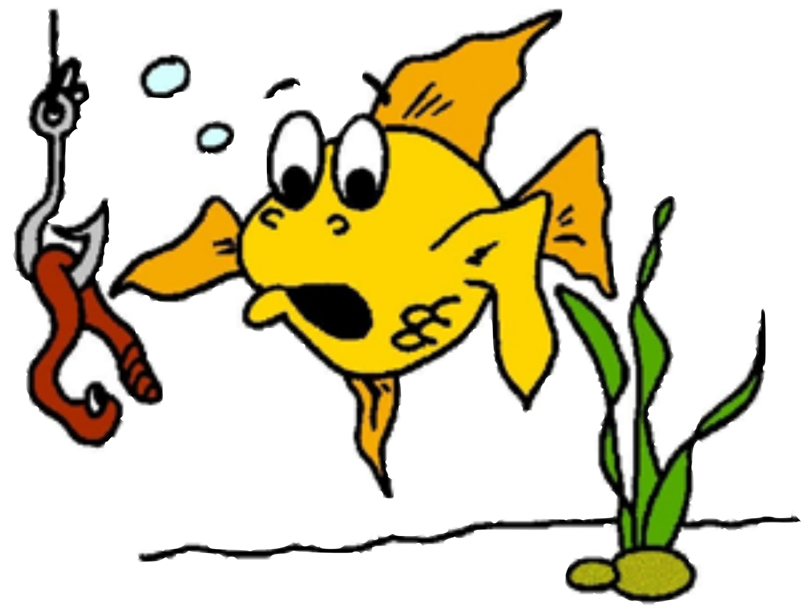
Edwin Olson
University of Michigan

Poster Essentials

- What is your poster *about?*
  - Have a *concept*, a *claim*, that you wish to convey.
  - Your goal is to effect a state change in the reader.

- A good poster is *not* a collection of space-consuming "things", added until the page is full.

Poster Basics



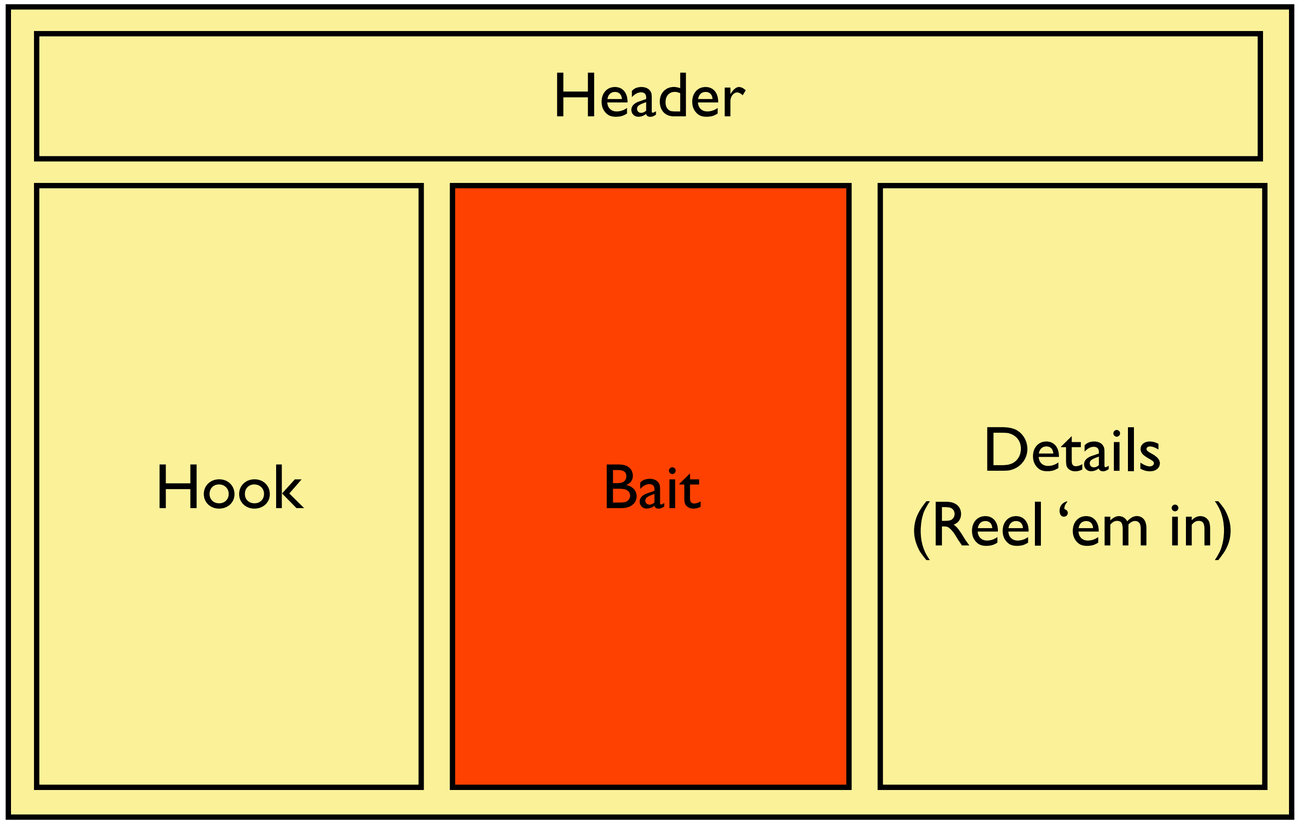
1. **Bait 'em**
   - A poster should draw the eye-- attract your prey from across the room.
   - Something visually stunning, and perhaps a bit unexpected/confounding.
     - Almost always a large image

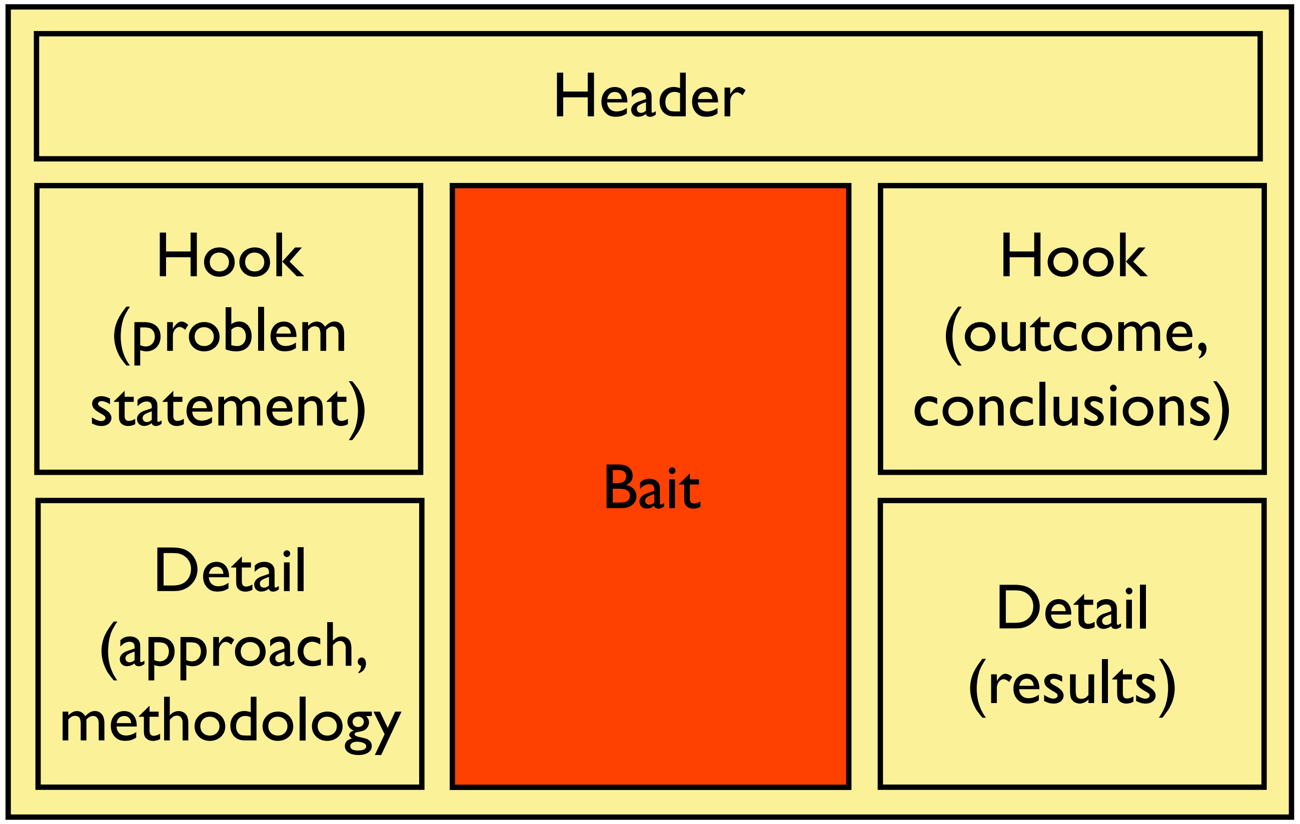
2. **Hook 'em**
   - Your prey has approached your poster, but they're not yours yet!
   - What's the juicy morsel that is exciting?
     - Your title / figure caption that convinces them you've done something neat, even if only at a simplified level.

3. **Reel 'em in**
   - Now they're reading your poster.

4. **Release 'em**
   - Poster judges have other posters to see. Practice your 30 second and 2 minute pitch. Respond to questions.
   - Leave on a high point. Thank them for their interest.

Parts of a poster (e.g.)



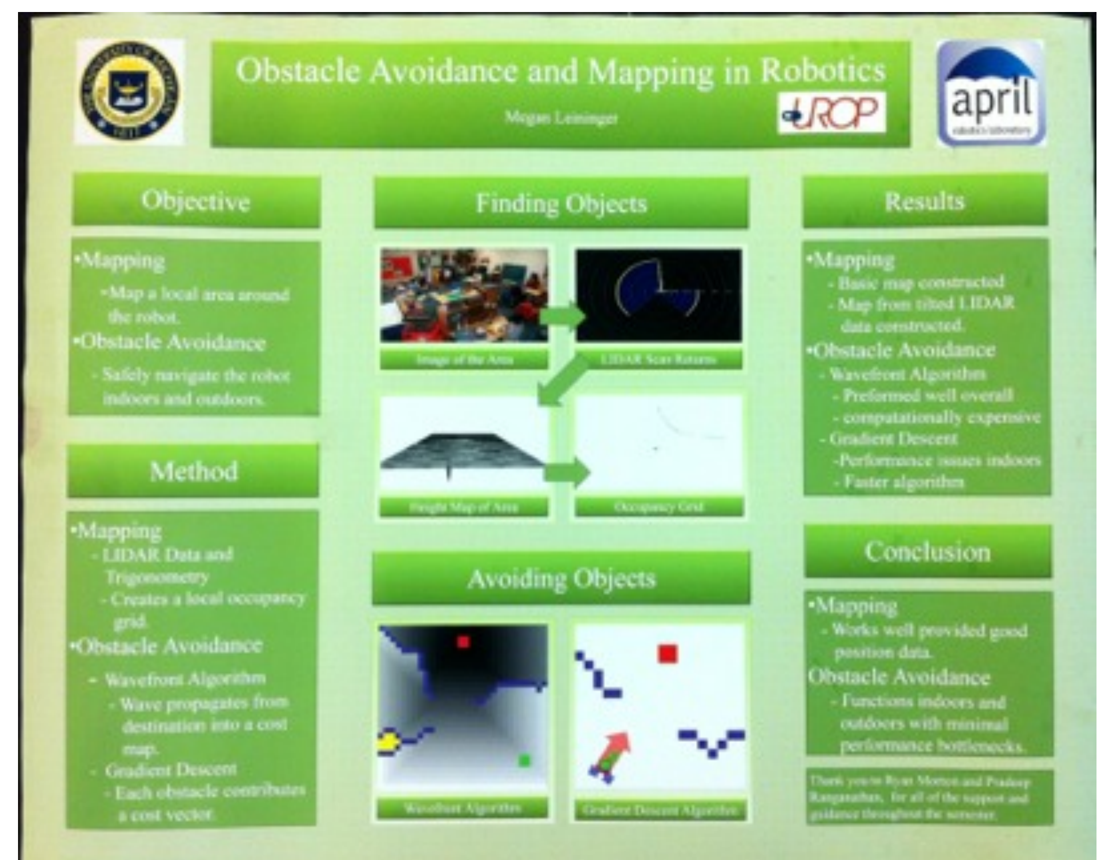


Header

- Title
  - Pithy but descriptive
  - Interesting
- Author List
  - Which order? There's a protocol to learn for your discipline! Could be:
    - Alphabetical
    - In (decreasing) order of contribution.
    - Advisor's name last, or sometimes omitted. Ask!
- Affiliation Logos
  - Get the *right* logos. Make sure they're high quality: no jagged edges!
  - Get the transparency right!
  - Avoid NASCAR syndrome.

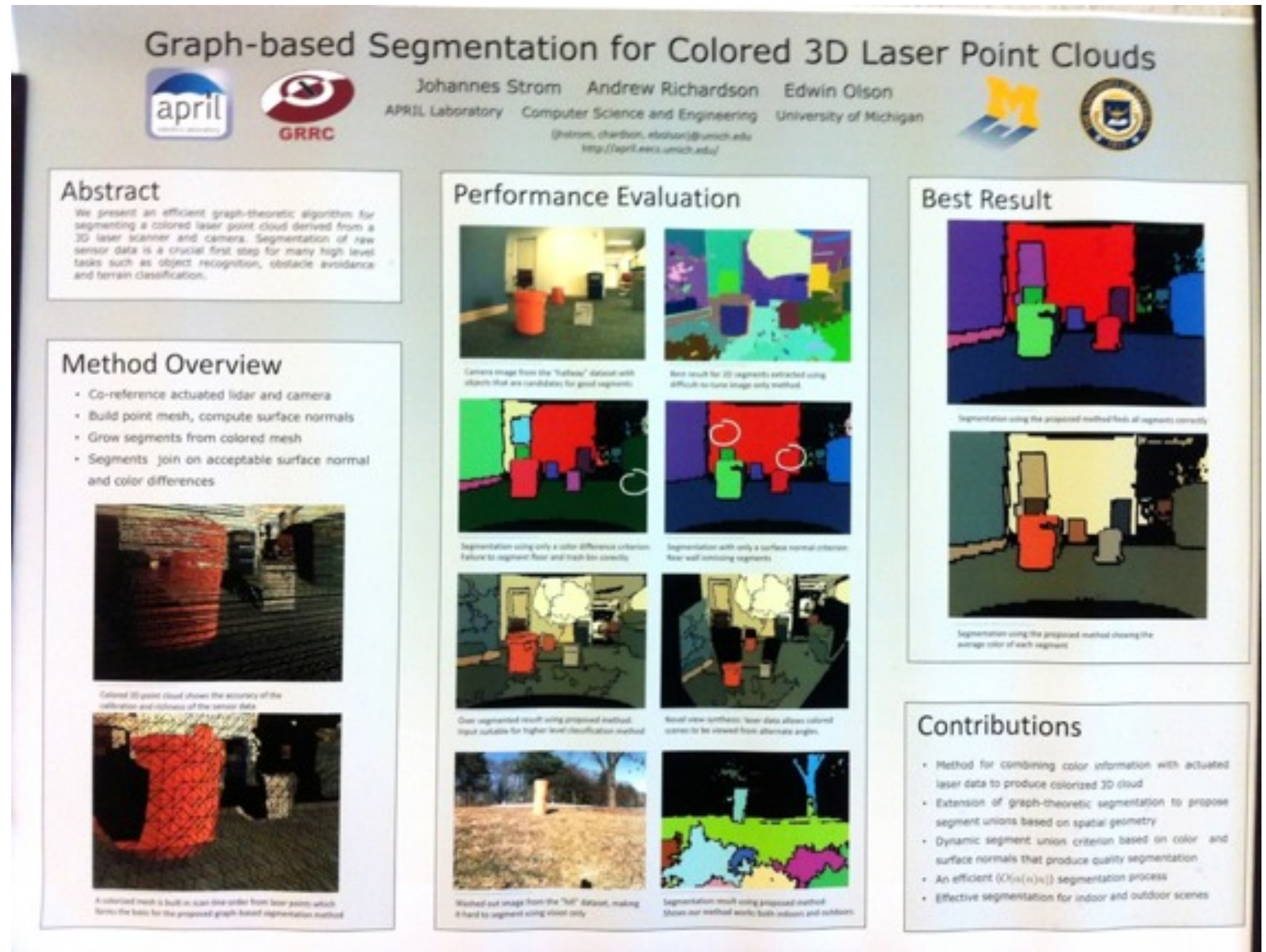
Bait 'em

- Goal: lure them in
- Your budget:
  - A quick glance from across a room. About a second.
- A big provocative picture
  - "That looks neat! Even if I don't understand what it is!"
- A series of pictures that tells a story
  - Great for algorithms that can be described as a sequence of steps.



Hook 'em

- Goal:
  - Tease them with an interesting conclusion, idea, result
- Your budget: about two sentences.
- Tools
  - Title plus a bullet or two
  - Can use your abstract
  - A more involved figure

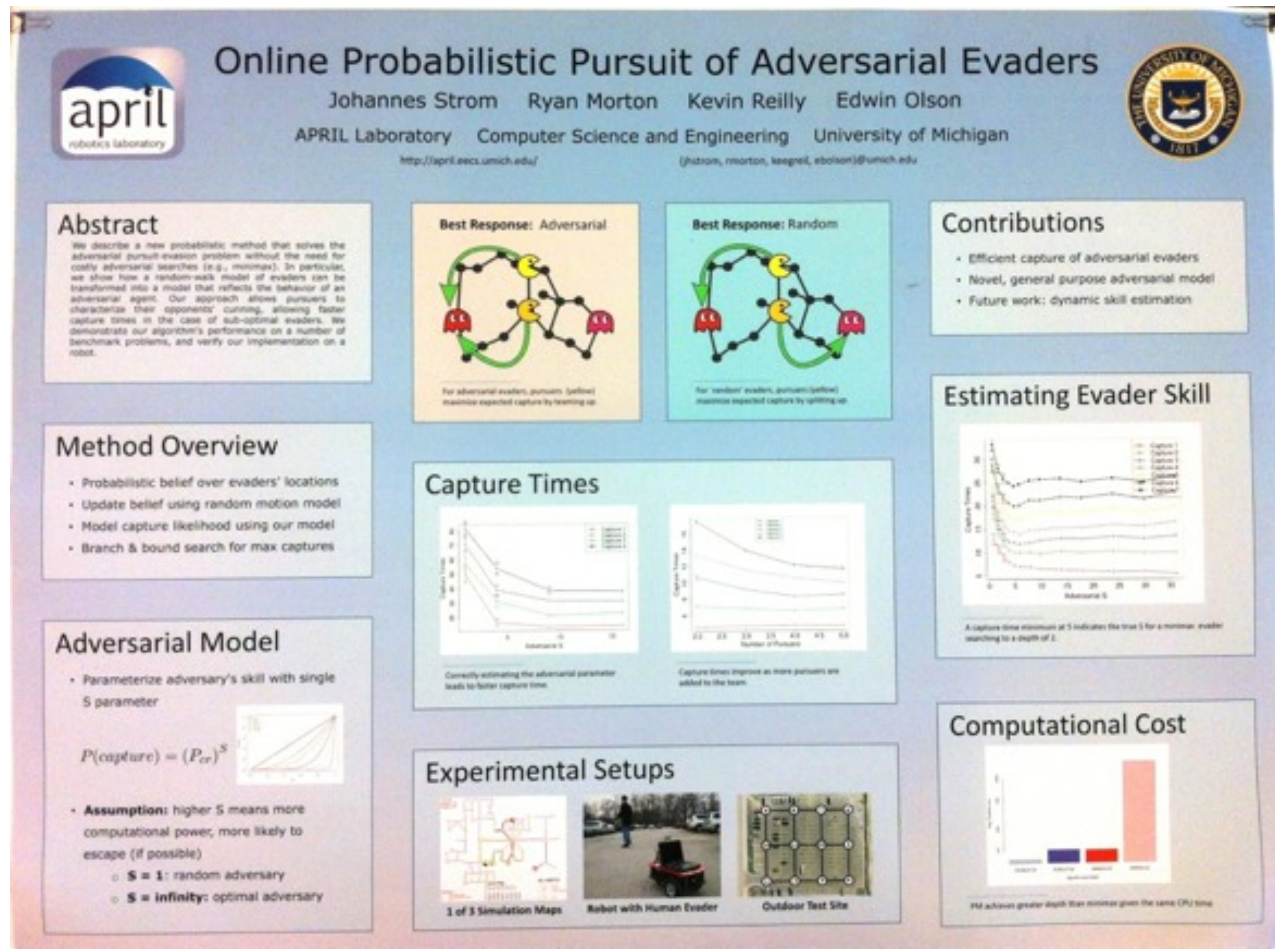


Reel 'em In

- Goal:
  - Sell them on it.

- Your budget: about 2-4 minutes.

- Tools
  - It's the poster *and* you. (But poster should suffice if you're grabbing a coffee.)
  - Greet them.
    - "Any Questions?" NO! Walk them through your idea and results. 30 second pitch.
  - Explain your data.



Abstract

- Almost always answers four questions:
    - What's the problem?
        - *What is this poster about?*
    - Why is it interesting?
        - *If it's not interesting, then who cares?*
    - Why is it hard?
        - *If the problem is easy to solve, then who cares?*
    - What did we do about it?
        - *Should generally describe a **claim** that is evaluated by the work.*

- A large block of text is impenetrable.
    - A bullet-form abstract is okay on a poster.

Bullets

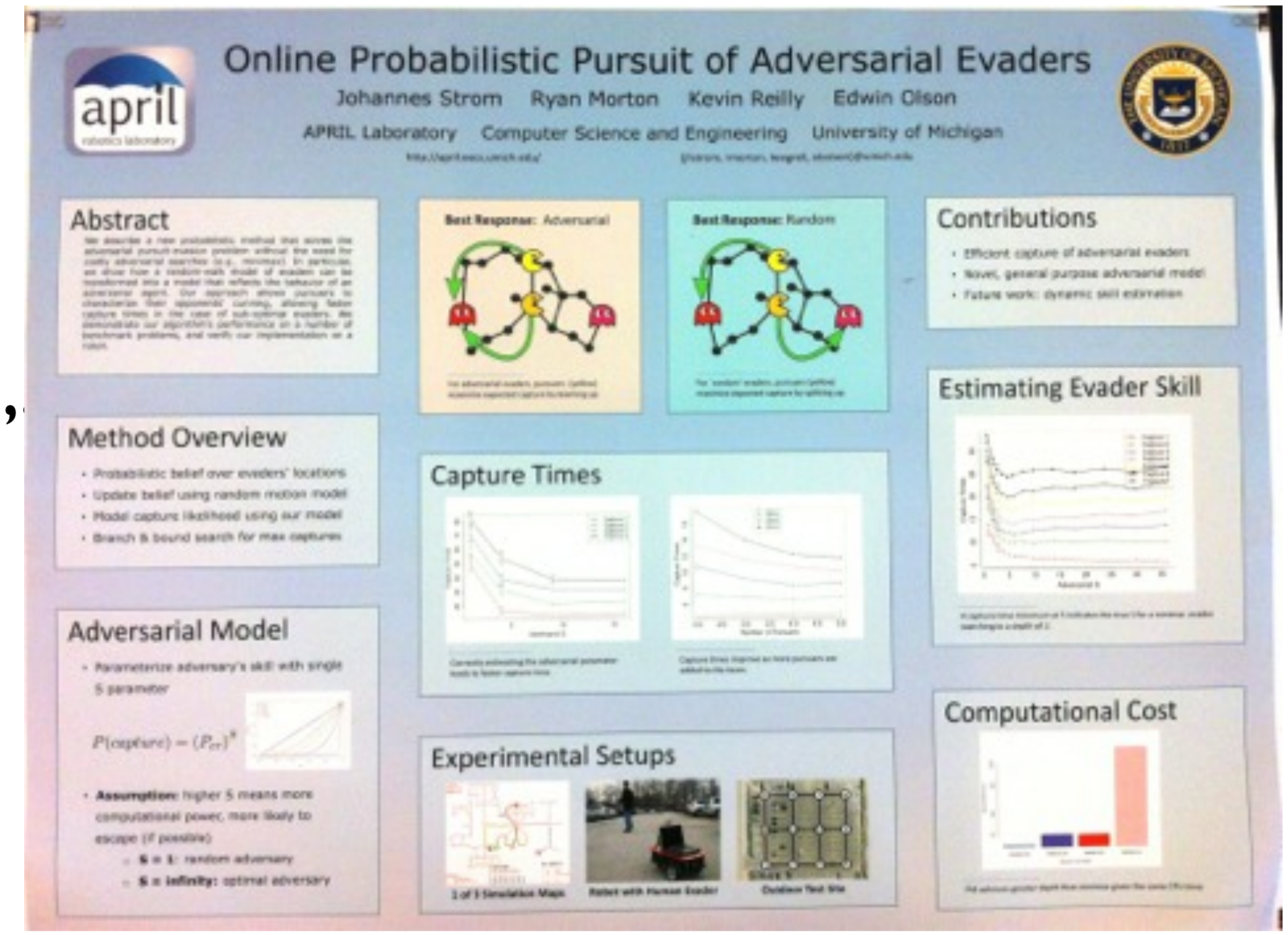
- Bullets must exhibit parallel structure
  - A complete sentence is formed by the bullet header and *each* bullet item.

- Examples:
  - The goals of this project are:
    - Develop algorithms to detect colored balls
    - Understanding principles of computer vision
    - We implemented our own Union-Find algorithm

  - The goals of this project are to:
    - Develop algorithms to detect colored balls
    - Understand principles of computer vision
    - Explore methods for accelerating the Union Find algorithm

Results/Evaluation

- The “meat” shot
  - A photo/cartoon/block diagram
  - Immediately and intuitively conveys that “the method works”



- The “squiggly line” plot
  - Generally used to compare proposed method versus an alternative method
  - Gives a feeling of rigor, and a scholarly understanding of related work.

Figure Captions

- Parts:
  - Title. (A sentence fragment).
  - Description. (Describe what the figure is showing; explain axes if necessary.)
  - Analysis. (What should the reader conclude from the data?)

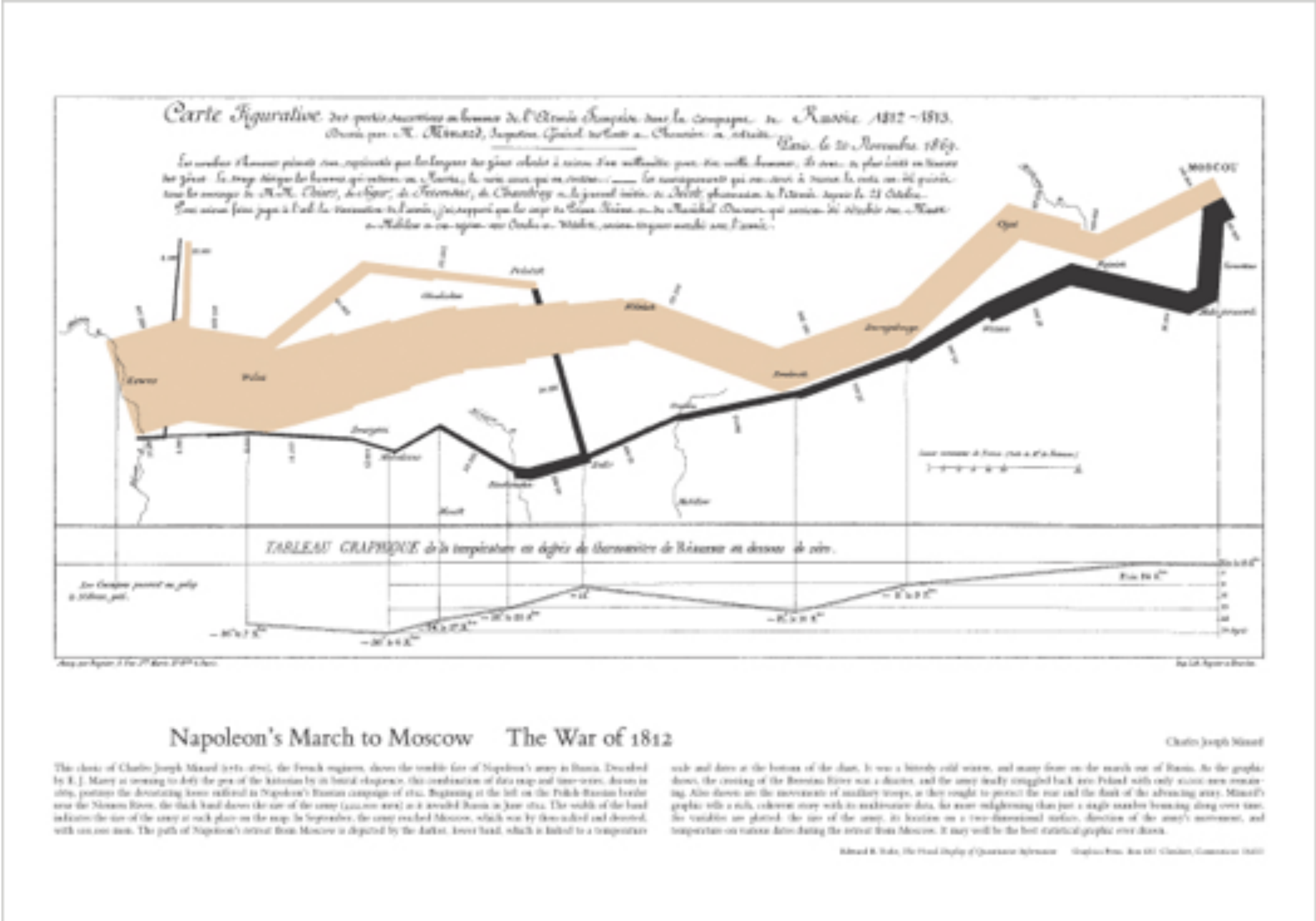
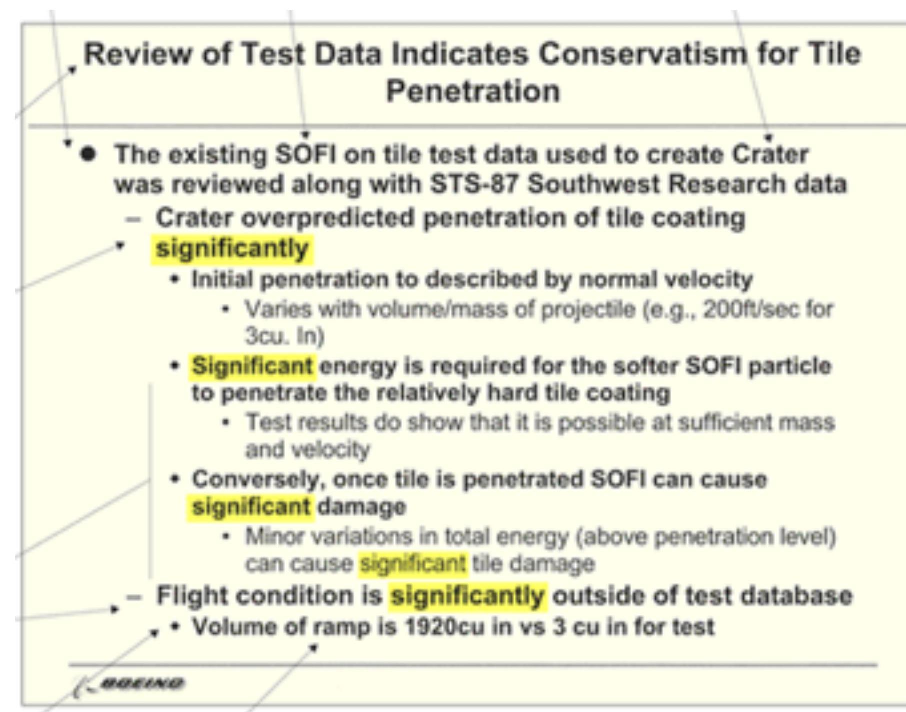


Figure 1. Visual communication of quantitative information. Minard's classic graph depicting the size of Napoleon's army on its Moscow campaign effectively communicates both geographical and quantitative information by combining color and varying rendering styles. It is a classic example of an excellent visualization.

Effective technical communication via posters and slides is *hard*

- Poor effectiveness and clarity of powerpoint slides cited as contributing factor to Columbia disaster.
  - “Some tools are better than others for engineering, and technical reports are better than PowerPoint.” -CAIB
  - Promotes “un-nuanced” understanding by reader
    - Smaller bullets seem “optional”
    - Complex ideas often forced to fit one page
  - Extra effort required to include proper notation/ units/equations
  - Slides often transmitted via email as stand-alone document.
- Culture unlikely to change soon--- how will you mitigate the challenges?



http://www.edwardtufte.com/bboard/q-and-a-fetch-msg?msg_id=0001yB&topic_id=1

Edward Tufte on PowerPoint

PP is a competent Projector Operating System for full screen images and videos, replacing the little forward-back button in old-fashioned projector systems. PowerPoint is neither the best nor the worst Projector Operating System. It faces strong competition from the projector itself with its own forward-back controls. A Projector Operating System, however, should not impose Microsoft's cognitive style on our presentations.

PP has some low-end design tools helpful in constructing PowerPoint parodies.

PP might also help show a few talking points an informal meetings, but why not instead print out an agenda on a piece of paper?

PowerPoint may now and then benefit the bottom 10% of all presenters. PP forces the really inept to have points, some points, any points.

-- Edward Tufte

Graphic Design Basics

- **White space:** the empty ("negative") space is just as important as the filled space. More white space emphasizes what remains. More white space is generally "classier" and "more elegant".

- **Shading and blocks:** Background blocks provide a sense of organization and lead the eye. But go too far and the blocks are distracting!

- **Eye flow:** Be able to predict how an eye will trace over the poster.
  - Is your intended flow a natural flow?
  - Z-shapes

Graphic Design

- **A cohesive design:** Avoid the "10 sheets of paper tacked to posterboard" look.
- **Use a light color:** Easier to get a better print quality.
- **Make reading easy:** Minimize text and maximize reading speed.

An experiment (1)

Two text snippets, same length. Narrow column should be faster to read.

An experiment (1)

John Adams (October 30, 1735 (O.S. October 19, 1735) – July 4, 1826) was an American Founding Father, lawyer, statesman, diplomat and political theorist. A leading champion of independence in 1776, he was the second President of the United States (1797–1801). Hailing from New England, Adams, a prominent lawyer and public figure in Boston, was highly educated and represented Enlightenment values promoting republicanism. A Federalist, he was highly influential and one of the key Founding Fathers of the United States. He came to prominence in the early stages of the American Revolution.

Two text snippets, same length. Narrow column should be faster to read.

An experiment (2)

An experiment (2)

James Madison, Jr. (March 16, 1751 (O.S. March 5) – June 28, 1836) was an American statesman and political theorist. He is hailed as the “Father of the Constitution” for being instrumental in the drafting of the United States Constitution and as the key champion and author of the United States Bill of Rights. He was the fourth President of the United States (1809–1817). He served as a politician much of his adult life. Like other Virginia statesmen, he was of the landed gentry; he inherited his plantation known as Montpelier, and owned hundreds of slaves during his lifetime to cultivate tobacco and other crops.

The New York Times

WEDNESDAY, OCTOBER 6, 1999

DANCE REVIEW

Inspired by the Traditions of Africa But Ruled by a Contemporary Spirit

By ANNA KISSELGOFF

MONTREAL, Oct. 3 - How can one remain inspired by tradition but break free of its clichés as a creative artist? That is the question that several modern-dance choreographers from Africa have answered impressively and sometimes brilliantly at the International New Dance Festival here.

The response has different images: a powerful all-female dance of pain that uses avant-garde techniques of "contact improvisation," an exuberant stylization of urban dances in a protest piece about street children, a dramatic duet about failed relationships and **a hypnotic woman's solo.**

The emergence of experimental African choreographers is not exclusively a 1990's phenomenon, but the deliberate focus on African troupes within the Montreal festival suggests that a new development needs more attention.

By the same token, the festival's presentation of well-known European ". choreographers (Susanne Linke, Mathilde Monnier and Clara Andermatt) who use African dancers-in pieces stemming from their visits to Africa, reveals how much two-way traffic is in progress.

It was, in fact, a pleasant shock to see dancers of the Sylvain Zabli Company from the Ivory Coast so soon after performances by the American choreographer Ronald K. Brown at the Joyce Theater in New York last week. The recent change in Mr. Brown's choreography, which now incorporates fluent stylization of African dance idioms, obviously owes something to the residency that Mr. Brown had in Abidjan, Ivory Coast, a few years ago. Mr. Zabli worked with Mr. Brown there and in New York, and he notes that the influences were mutual. Mr. Brown gave classes, Mr. Zabli said, and led him to integrate recited poetry into his choreography, as Mr. Brown does.

Mr. Zabli met Mr. Brown through Rokya Koné, a choreographer from the Ivory Coast who attended the American Dance Festival in Durham, N.C. Similarly, the choreographers Seydou Boro and Salia Sanou from Burkina Faso

Avant-garde techniques, power and daring at a Montreal festival.

stunning Tchétché female troupe from the Ivory Coast, have studied or danced with Ms. Monnier in Montpellier, France. Since Ms. Monnier's mentor was the American teacher Viola Farber, once Merce Cunningham's partner, the line of descent and influences is more complex than first apparent.

If any choreographer encompasses these issues in her own dancing body it is Zab Maboungou, whose intense mesmerizing solo, "Incantation," embodied the contemporary and the traditional on a polished intimate level. Born in the Congo Republic, she has lived in Montreal since 1973 and is also a philosophy teacher.

Although the Montreal Festival is not a theme event, it does occasionally spotlight companies by country or region within a larger event. Eleven countries are represented in the festival, which ends on Saturday. This spotlight on African choreographers attuned to the so-called post-modern esthetic is more than welcome.

Some good work in this field has been done by the African Odyssey series at the John F. Kennedy Center for the Performing Arts in Washington and Dance Africa and 651 Arts, both associated with the Brooklyn Academy of Music. But this mini survey suggests that New York, at least, could be enriched by a more concentrated showcase of contemporary African dance.

Although most of the dancers have been trained in the distinct and different styles of traditional dance idioms, it is clear that the American dances taught to young Africans are not for them. Secure in their heritage, these choreographers use it as a springboard to try something new.

As Ms. Kombé is quoted at the festival, the concern is "African dance with contemporary expression."

Her company, Tchétché (meaning eagle), featured herself and three other women, Nina R. Zorohonon, Nadia Gbahihonon Beugre and Flavienne Biale Lago, in "Dimi" (pain). **Like Ms. Maboungou, with whom she once studied, Ms. Kombé gives emotion a powerful abstracted treatment: the qualities associated with African dances such as rhythm and energy, are channeled here into a geometrically clear style.**

Ms. Kombé's opening solo, in silence, distills the astounding physical daring that the other dancers will pick up as they enter. She jumps straight up and lands in a split, cartwheels, erupts into barrel jumps or drops flat on her back. The textured sound of flute and drum is integrated into the swift tumbling and leaps of all four women who appear in different units.

Power and tenderness fuse in a duet, and the group work makes Western modern-dance look tame. Subtitled "A hymn to female solidarity," the piece evokes the universal through the particular.

Tchétché: Dimi

Ms. Maboungou's solo, enhanced by the drummers Paul Miller and Dominic Donkor in her company Nyata Nyata, starts with feet stamping close to the ground, body bent over, and erupts in a highly contained form of energy: a diamond that is anything but in the rough.

If all movement has an emotional connotation in African dances, there is no literal storytelling in "Figninto" (blind man), danced by the choreographers Seydou Boro, Salia Sanou and another dancer, Souleymane Badolo.

Yet African storytelling is the obvious tradition behind the images of blind men pulling invisible tears out of their eyes in a setting (along with two musicians) that evokes an inhospitable clime.

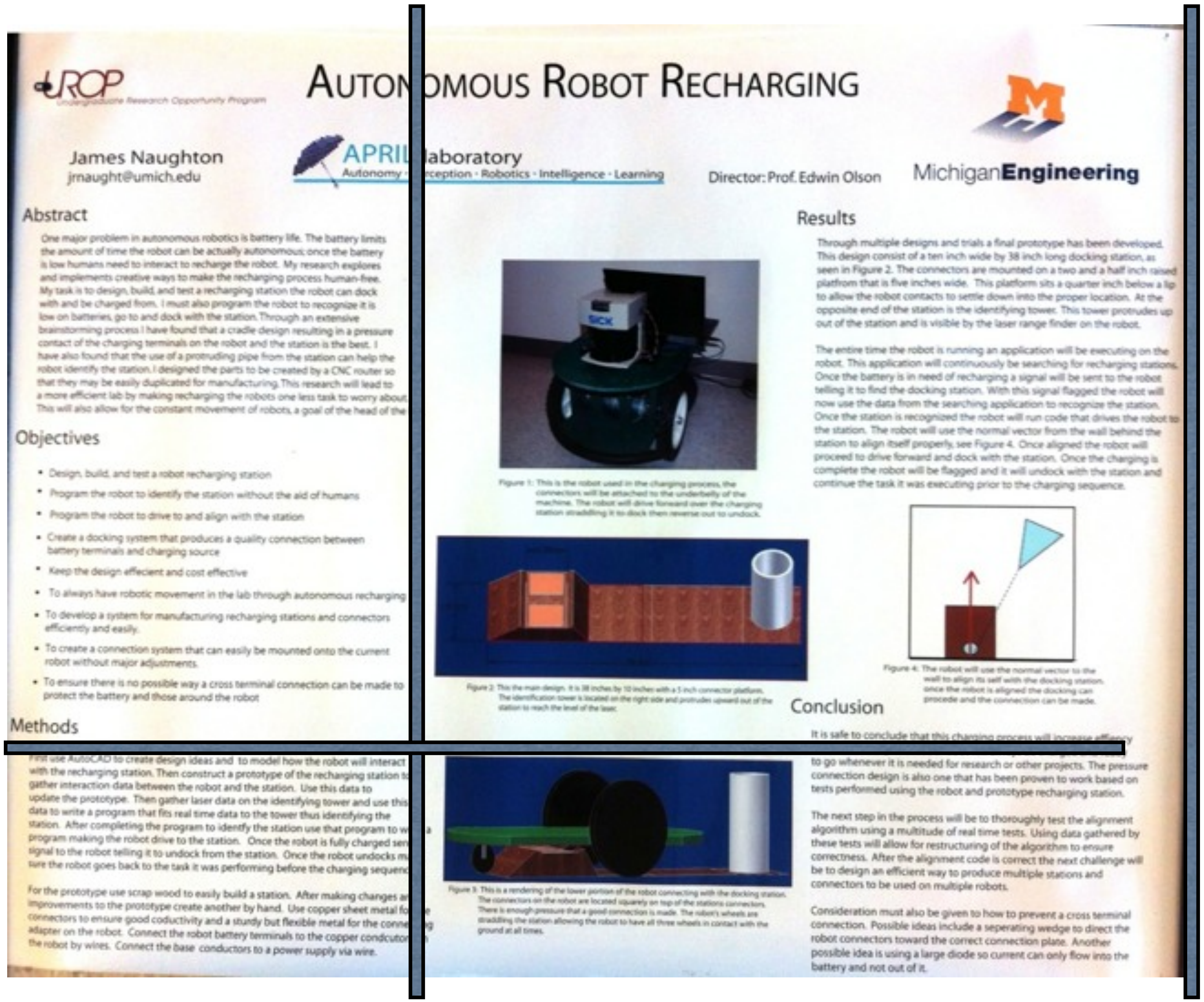
Scheduling conflicts allowed me to see only a rehearsal of "Heritage" with Mr. Zabli's company, which features a sole woman, Edith Klonouon, who holds her own outstandingly among Mr. Zabli and the other men. Ivory Coast hip-hop like mapouka and loubar dances are absorbed into a stylized whole that the dancers render with precision and stamina, both amazing..

- Newspaper columns
  - ~8 words
  - 1.83” (target 16” reading distance.)
- Poster columns?
  - ~8 words
  - 5.5”-9.5” (target 5’-7’ reading distance.)

Near Misses


UROP
Undergraduate Research Opportunity Program
Autonomous Robot Recharging
James Naughton
jrnaught@umich.edu
APRIL laboratory
Autonomy · Perception · Robotics · Intelligence · Learning
Director: Prof. Edwin Olson
MichiganEngineering
Abstract
One major problem in autonomous robotics is battery life. The battery limits the amount of time the robot can be actually autonomous; once the battery is low humans need to interact to recharge the robot. My research explores and implements creative ways to make the recharging process human-free. My task is to design, build, and test a recharging station the robot can dock with and be charged from. I must also program the robot to recognize it is low on batteries, go to and dock with the station. Through an extensive brainstorming process I have found that a cradle design resulting in a pressure contact of the charging terminals on the robot and the station is the best. I have also found that the use of a protruding pipe from the station can help the robot identify the station. I designed the parts to be created by a CNC router so that they may be easily duplicated for manufacturing. This research will lead to a more efficient lab by making recharging the robots one less task to worry about. This will also allow for the constant movement of robots, a goal of the head of the lab.
Objectives
• Design, build, and test a robot recharging station
• Program the robot to identify the station without the aid of humans
• Program the robot to drive to and align with the station
• Create a docking system that produces a quality connection between battery terminals and charging source
• Keep the design effecient and cost effective
• To always have robotic movement in the lab through autonomous recharging
• To develop a system for manufacturing recharging stations and connectors efficiently and easily.
• To create a connection system that can easily be mounted onto the current robot without major adjustments.
• To ensure there is no possible way a cross terminal connection can be made to protect the battery and those around the robot
Methods
First use AutoCAD to create design ideas and to model how the robot will interact with the recharging station. Then construct a prototype of the recharging station to gather interaction data between the robot and the station. Use this data to update the prototype. Then gather laser data on the identifying tower and use this data to write a program that fits real time data to the tower thus identifying the station. After completing the program to identfy the station use that program to write a program making the robot drive to the station. Once the robot is fully charged send a signal to the robot telling it to undock from the station. Once the robot undocks make sure the robot goes back to the task it was performing before the charging sequence.
For the prototype use scrap wood to easily build a station. After making changes and improvements to the prototype create another by hand. Use copper sheet metal for the connectors to ensure good coductivity and a sturdy but flexible metal for the connecting adapter on the robot. Connect the robot battery terminals to the copper condcutors on the robot by wires. Connect the base conductors to a power supply via wire.
SICK
Figure 1: This is the robot used in the charging process, the connectors will be attached to the underbelly of the machine. The robot will drive forward over the charging station straddling it to dock then reverse out to undock.
Figure 2: This the main design. It is 38 inches by 10 inches with a 5 inch connector platform. The identification tower is located on the right side and protrudes upward out of the station to reach the level of the laser.
Figure 3: This is a rendering of the lower portion of the robot connecting with the docking station. The connectors on the robot are located squarely on top of the stations connectors. There is enough pressure that a good connection is made. The robot's wheels are straddling the station allowing the robot to have all three wheels in contact with the ground at all times.
Results
Through multiple designs and trials a final prototype has been developed. This design consist of a ten inch wide by 38 inch long docking station, as seen in Figure 2. The connectors are mounted on a two and a half inch raised platfrom that is five inches wide. This platform sits a quarter inch below a lip to allow the robot contacts to settle down into the proper location. At the opposite end of the station is the identifying tower. This tower protrudes up out of the station and is visible by the laser range finder on the robot.
The entire time the robot is running an application will be executing on the robot. This application will continuously be searching for recharging stations. Once the battery is in need of recharging a signal will be sent to the robot telling it to find the docking station. With this signal flagged the robot will now use the data from the searching application to recognize the station. Once the station is recognized the robot will run code that drives the robot to the station. The robot will use the normal vector from the wall behind the station to align itself properly, see Figure 4. Once aligned the robot will proceed to drive forward and dock with the station. Once the charging is complete the robot will be flagged and it will undock with the station and continue the task it was executing prior to the charging sequence.
Figure 4: The robot will use the normal vector to the wall to align its self with the docking station. once the robot is aligned the docking can procede and the connection can be made.
Conclusion
It is safe to conclude that this charging process will increase effiency in the laboratory because a robot will always be charged and ready to go whenever it is needed for research or other projects. The pressure connection design is also one that has been proven to work based on tests performed using the robot and prototype recharging station.
The next step in the process will be to thoroughly test the alignment algorithm using a multitude of real time tests. Using data gathered by these tests will allow for restructuring of the algorithm to ensure correctness. After the alignment code is correct the next challenge will be to design an efficient way to produce multiple stations and connectors to be used on multiple robots.
Consideration must also be given to how to prevent a cross terminal connection. Possible ideas include a seperating wedge to direct the robot connectors toward the correct connection plane. Another possible idea is using a large diode so current can only flow into the battery and not out of it.

Near Misses



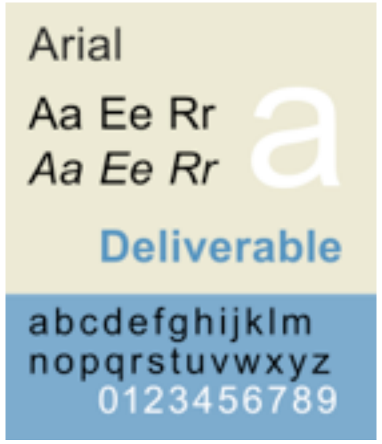
UROP
Undergraduate Research Opportunity Program
AUTON OMOUS ROBOT RECHARGING
James Naughton
jrnaught@umich.edu
APRIL laboratory
Autonomy · ception · Robotics · Intelligence · Learning
Director: Prof. Edwin Olson
MichiganEngineering
Abstract
Objectives
Methods
Results
Conclusion

Fonts

- Use a tasteful, simple font.
  - Your poster's *font* shouldn't be making a statement.
- Maximize readability
  - Serifs, Mixed Case are good
- Avoid "controversial" fonts: Arial, Comic Sans.
- Minimize font variation
  - Count how many combinations of different styles / sizes you use... aim for three or less.
- Nobody gets fired for using Helvetica.

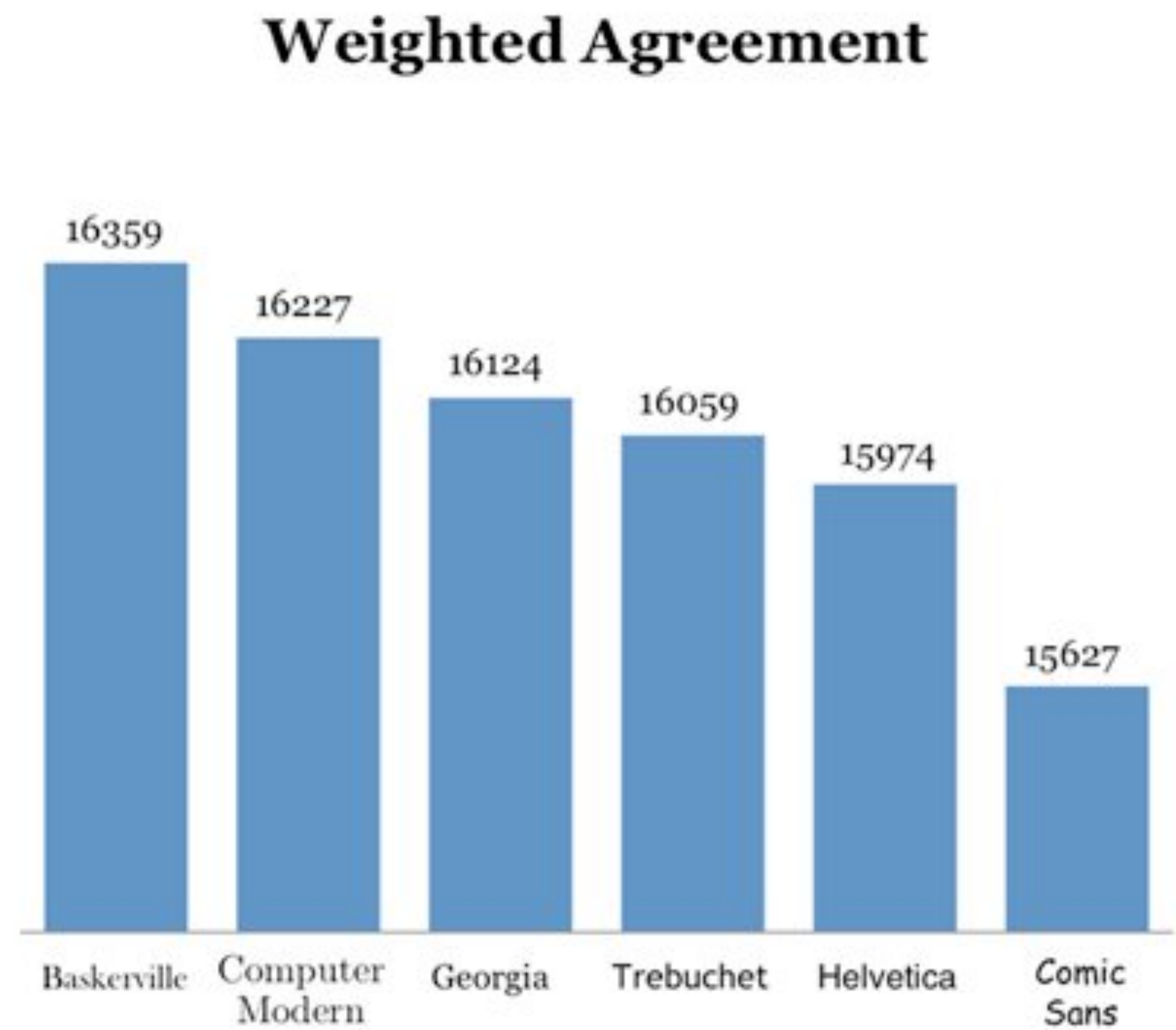
AaBbCc sans-serif

AaBbCc serif



Font choice and credibility

- Article presented to different users in one of N fonts
  - Users asked to agree/ disagree with a claim and express their confidence.
- Font seems to have affected reader's ratings.



http://opinionator.blogs.nytimes.com/2012/08/08/hear-all-ye-people-hearken-o-earth/

Equation Type Setting

- Those who know recognize LaTex-typeset math
  - An easy way to look more sophisticated
  - Note: equations on posters should be used sparingly.

$$G(f) = \int_{-\infty}^{\infty} g(t)\,\exp(-j2\pi f t)\,\mathrm{dt}$$

$$G(f) = \frac{-e^{j\pi f} + e^{j\pi f}}{j2\pi f}$$

$$G(f) = \frac{\sin(\pi f)}{\pi f}$$

Microsoft Equation Editor

$$G(f) = \int_{-\infty}^{\infty} g(t)\exp(-2j\pi f t)dt$$

$$G(f) = \frac{-e^{j\pi f} + e^{j\pi f}}{j2\pi f}$$

$$G(f) = \frac{\sin(\pi f)}{\pi f}$$

LaTex

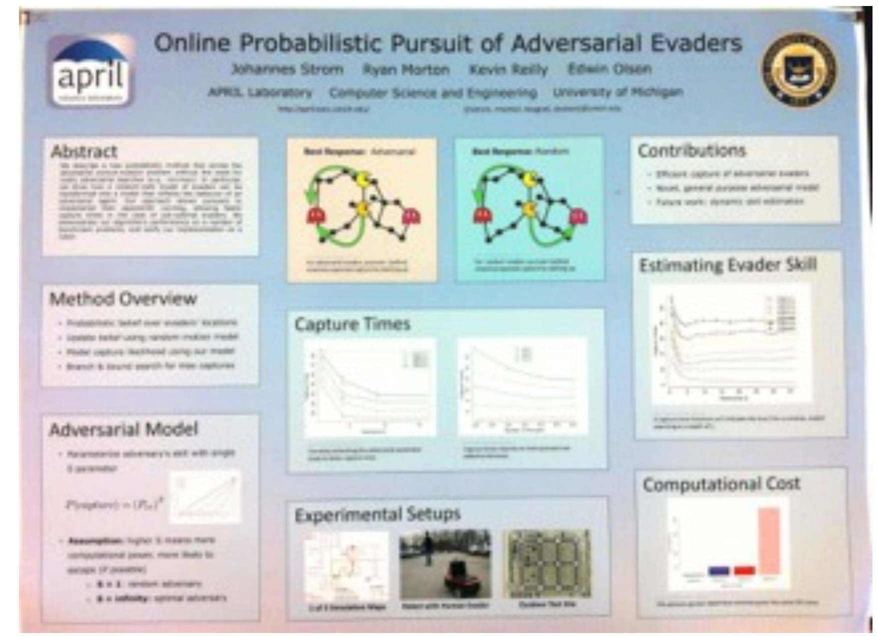
Production

- Double check the size and aspect ratio requirements.
- Paper
  - Avoid glossy stock. Glare can be horrific; poster is ruined by a single kink/wrinkle.
  - Use heavy-weight acid-free paper.
- Full-bleed
  - Before using a full-bleed design, make sure you can print it!
  - Or add a margin and TRIM it.

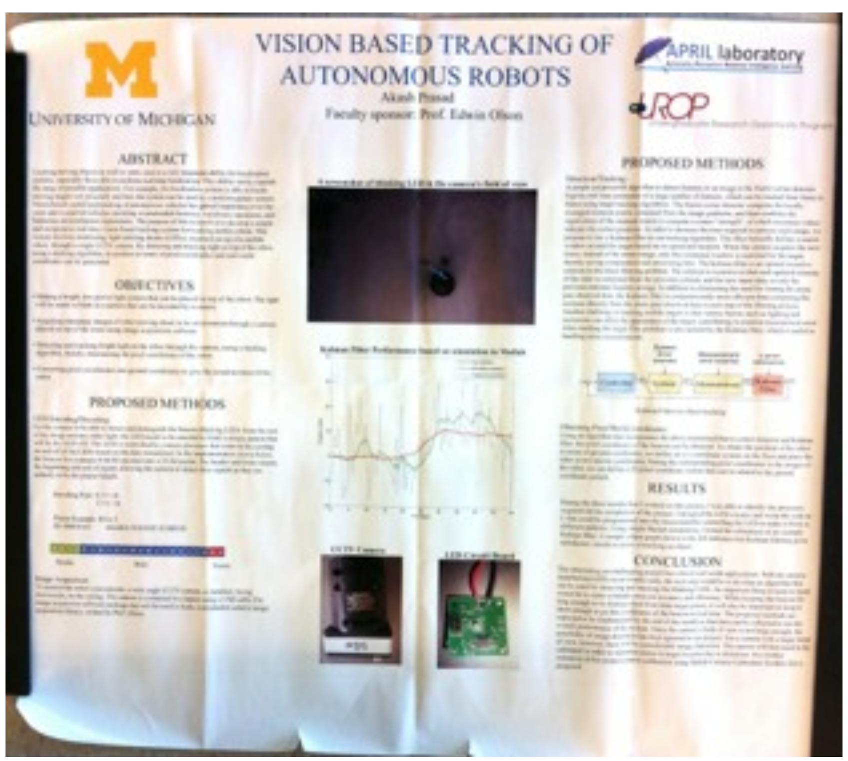
Critique (1/3)

Intelligent Mesh Networking for Multiple Robotic Agents
Presentation by Joshua Alberts
Abstract
Results
Objectives
Methods
Conclusions

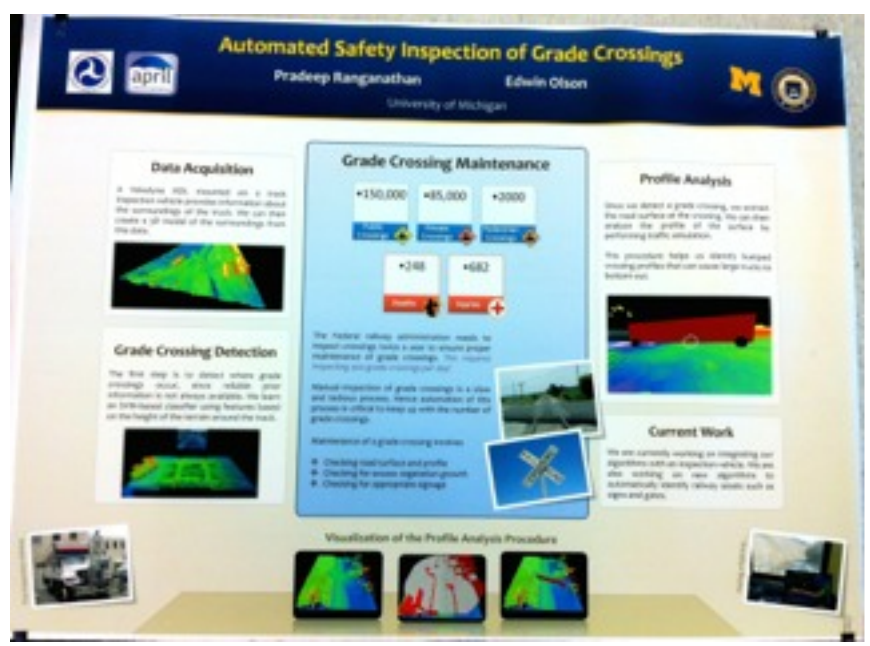
AUTONOMOUS ROBOT RECHARGING
James Naughton
APRIL laboratory
Michigan Engineering
Abstract
Objectives
Methods
Results
Conclusion



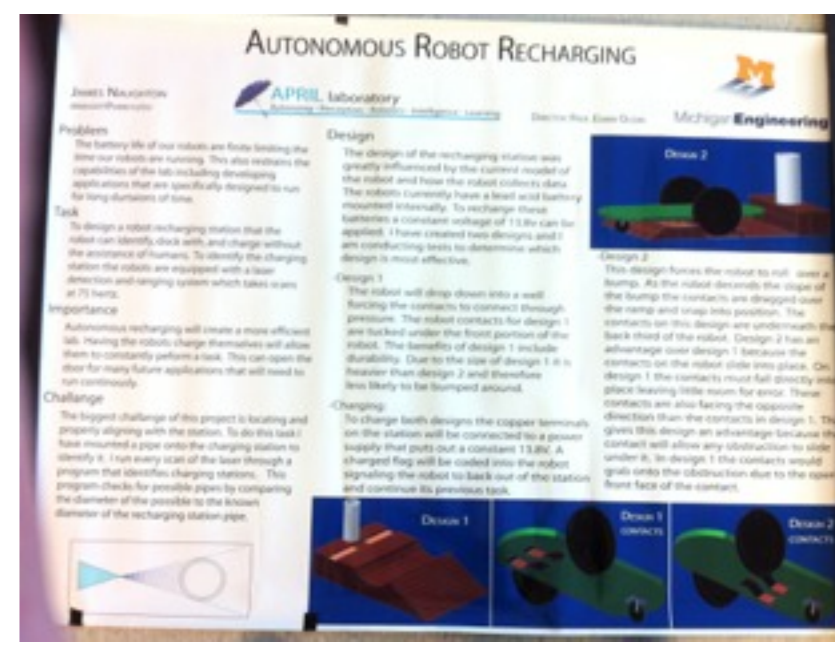
Online Probabilistic Pursuit of Adversarial Evaders
Johannes Strom Ryan Morton Kevin Reilly Edwin Olson
APRIL Laboratory Computer Science and Engineering University of Michigan
Abstract
Method Overview
Adversarial Model
Capture Times
Experimental Setups
Contributions
Estimating Evader Skill
Computational Cost



VISION BASED TRACKING OF AUTONOMOUS ROBOTS
Akash Prasad
Faculty sponsor: Prof. Edwin Olson
UNIVERSITY OF MICHIGAN
APRIL laboratory
ABSTRACT
OBJECTIVES
PROPOSED METHODS
RESULTS
CONCLUSION



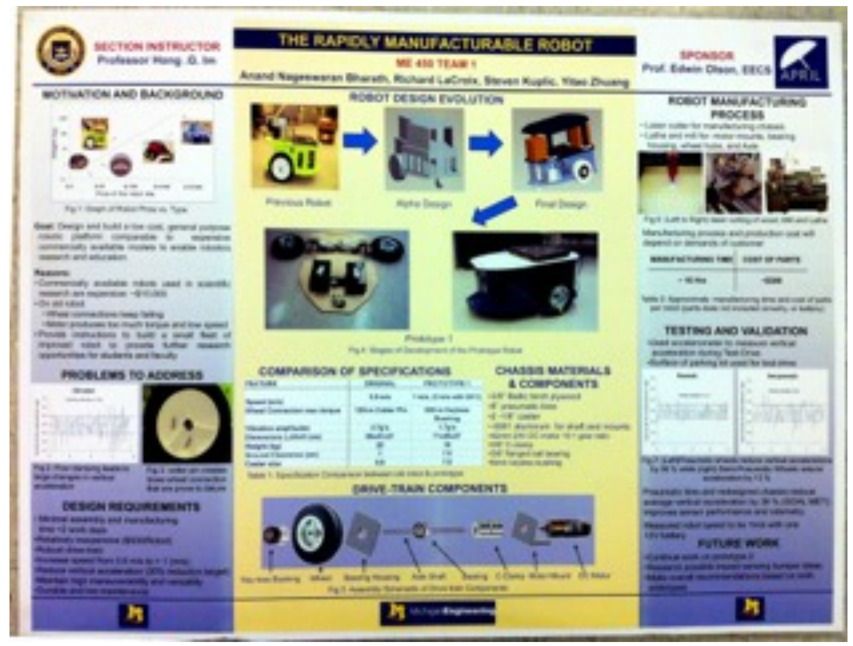
Automated Safety Inspection of Grade Crossings
Pradeep Ranganathan
Edwin Olson
Data Acquisition
Grade Crossing Maintenance
Profile Analysis
Grade Crossing Detection
Current Work
Visualization of the Profile Analysis Procedure



AUTONOMOUS ROBOT RECHARGING
APRIL laboratory
Michigan Engineering
Problem
Task
Importance
Challenge
Design
Design 2
Design 1

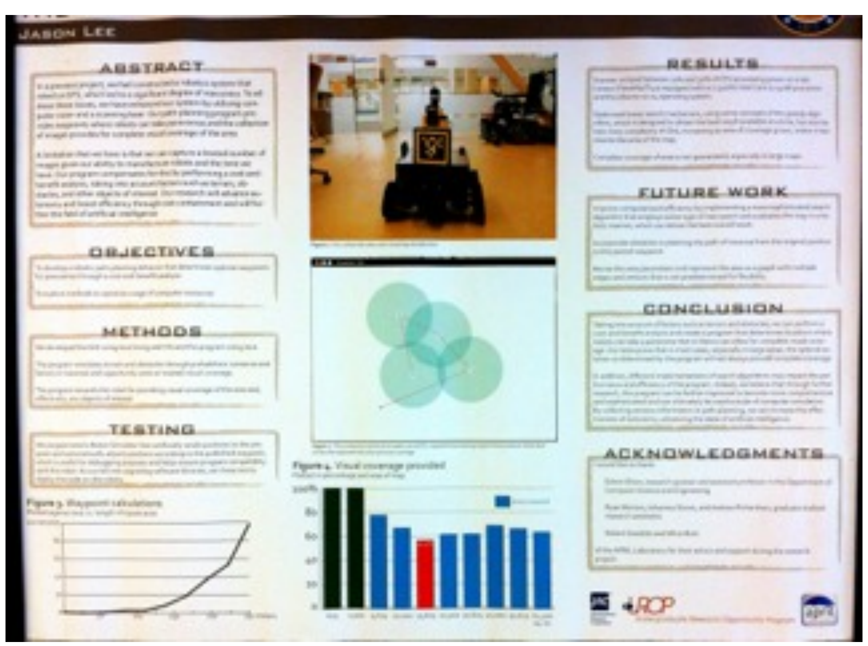
Critique (2/3)

Obstacle Avoidance and Mapping in Robotics
april
Objective
Finding Objects
Results
Method
Avoiding Objects
Conclusion

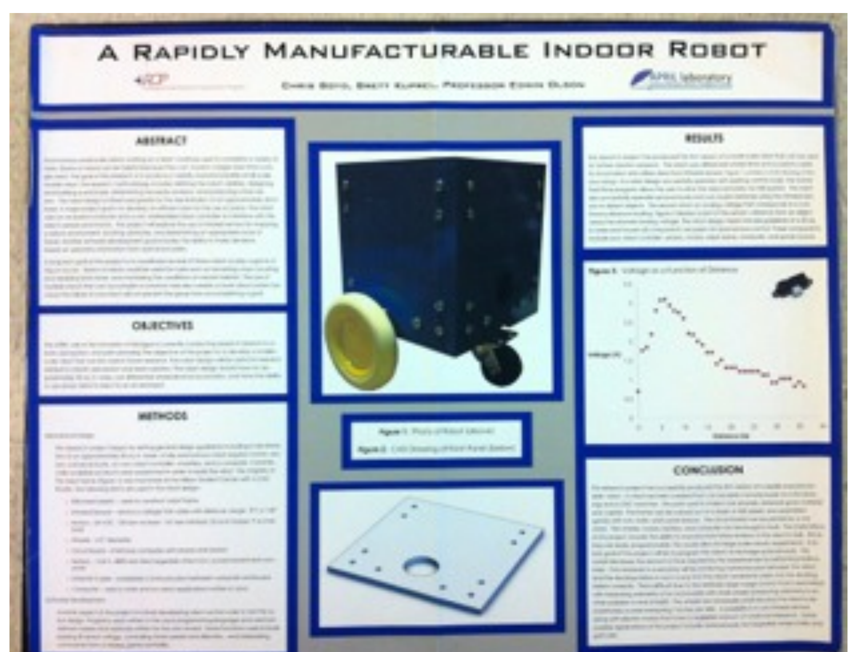


SECTION INSTRUCTOR
THE RAPIDLY MANUFACTURABLE ROBOT
SPONSOR
MOTIVATION AND BACKGROUND
ROBOT DESIGN EVOLUTION
PROBLEMS TO ADDRESS
COMPARISON OF SPECIFICATIONS
DESIGN REQUIREMENTS
DRIVE-TRAIN COMPONENTS
TESTING AND VALIDATION
FUTURE WORK

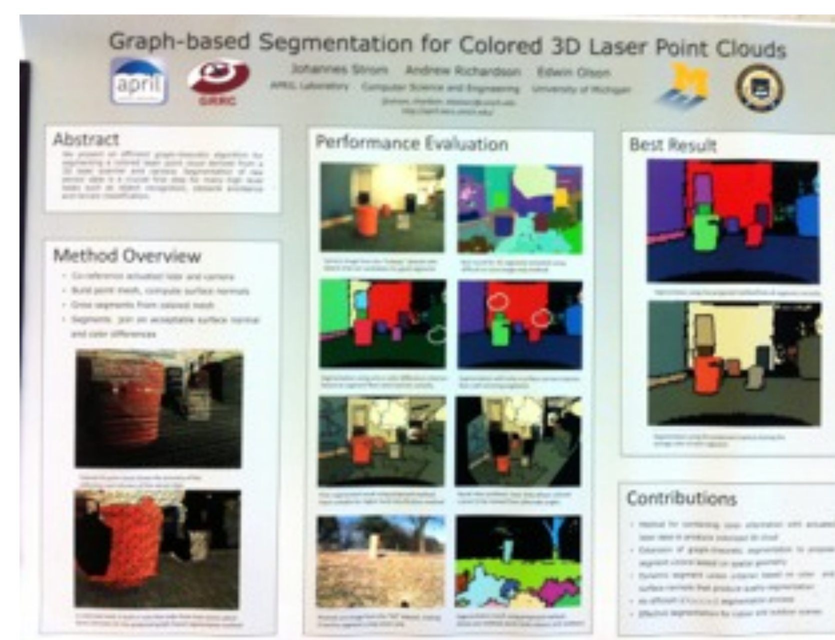
Image Segmentation and Three Dimensional Tracking
Mihai Bulic
Alex Butzier
Will Cunningham
Advisors:
Johannes Strom
Andrew Richardson
april
Objective
Image Segmentation
Results



ABSTRACT
RESULTS
FUTURE WORK
OBJECTIVES
METHODS
CONCLUSION
TESTING
ACKNOWLEDGMENTS



A Rapidly Manufacturable Indoor Robot
ABSTRACT
RESULTS
OBJECTIVES
METHODS
CONCLUSION



Graph-based Segmentation for Colored 3D Laser Point Clouds
april
Abstract
Performance Evaluation
Best Result
Method Overview
Contributions

Critique (3/3)

ROBOTIC PATH-PLANNING BEHAVIORS: LIFE SAVERS ON THE BATTLEFIELD
JASON LEE

3D Robot Interface on the Apple iPod Touch
APRIL laboratory
Abstract
Objectives
Methods
Results
Conclusions

Creation Tools

- Presentation tools work pretty well
  - PowerPoint/Keynote
    - Especially with “snap-to” enabled
    - Use temporary design guides or rectangles to get alignment right.

- Page layout tools can work even better

- Iterate, iterate, iterate.