Karl's Rules for Designing a Great Poster

If you find yourself explaining your poster's basic concept, or if people are avoiding you and your poster like the plague, then it's not doing it's job of being interesting, inviting and drawing people to it.

TEXT

Keep the simple and elegant:

• Don't write too much! Be consise. Edit! This is a poster, not a manuscript. A lot of posters are too wordy and NO ONE wants to dive into something that looks like homework. Use visuals more. A rule is 2/3 visuals to 1/3 text. This will be more inviting. A block of text should be no more than about six sentences.
• Use phrases with bullet points when possible, rather than full sentences.
• Don't use more than two different fonts. Personally, I would use only one san-serif font. A sans-serif font has none of the little tails on the letters, like the font "Helvetica". A serif font, like ". "Times"or "Palatino", has little tails. But it's okay to use a san-serif for the headlines and a serif for the smaller copy.
• Make your main headline large, short and to the point. It should be the first thing a person reads on your poster. Look at newspaper headlines for an example of a good size.
• Use a logical type heirarchy. Don't use more than three or four type sizes in your poster. One will be your large headline and a second will be your smaller text. That leaves two more sizes. One could be for three or four larger "chapter headings" to separate the main sections of your poster and the fourth a sub-headline size to introduce the elements within each chapter.
• Keep your headlines and subheads short and to the point. Describe detail in the body copy, not headline.
• Use black or white text. Use color text sparingly and with reason, like to organize. Don't do it just to be fun and attention getting, wheeeeee. The attention you get won't be good.
• Don't outline your text with a line.. Looks really cheesy.
• Don't use gimmicks in your headline, like rainbow blends and shadows. Looks cheap and ugly.
• Don't "squeeze" text to condense it. Reduce the point size or use a condensed font
• Don't mix a whole bunch of sizes, fonts, styles (bold, italic, regular, caps…)
• Never underline text, and aviod italics, too. Yuk.
• Left-justify text; avoid centering and right-justifying text.
• Type should be large enough to be read from a short distance. SPARE the reader the work of squinching their face up to your poster to read tiny, dense, wordy textblocks. • Spacing between lines (called "leading") in copy blocks should be point-size plus 1 ½ points. So a 14 point type size would have a leading of 15.5, (or +1.5 as some software programs do it.
• Break long textblocks into two or three smaller columns. Wiiiiiiiiiiide textblocks look like homework to read.
• Don't end your paragraph with a widow
(only one or two words on the last line, like I just did above)

DESIGN

Elegant, simple, open (white space, not dense), not wordy.

• Sketch out your idea on paper.
• Organize your information using a grid, a column format to make your poster easier to read. It doesn't have to be a three-colum poster, it might work better as a four or five column.
• Plan your poster like you're telling a story, in a narrative form with a beginning, middle and end. Make it logical, with the most important information at top left and going down to the bottom. Many posters use photos of the team that did the project right at the top. Sorry, but that is the LEAST important fact about the project. Put them at the bottom, and make them small! Use your space to sell your idea.
• Have a dominant image that anchors your poster and grabs attention. It doesn't have to be in a box. Better if it is cropped around the shape. A huge cutout of a robotic arm anchoring the poster will look cool.
• Mix up the sizes of images based on importance. A poster with everything the same, small size is boring and the eye doesn't know where to start. Think of the poster as a symphony, with loud big drums mixed with small-sounding flutes. If everthing's the same size, squeezed perfectly inside their columns, it becomes gray and bland.
• Don't pack everything in like a sausage! Edit your content to leave open areas of white space that give the reader a clear separation of sections as well as places to rest the eyes. Let it "breathe!"
• Don't use fancy backgrounds like blends or whoosh lines or whatever on your poster. It's cheesy, and it looks like you thought your information and design were boring so you decided to "entertain" the viewer.
• Use color sparingly. This isn't a beachball. Grab attention with a dominant image, not with gross uses of color.
• Align things. If you have two photos side-by-side, make them the same size (crop if needed) and make sure their captions align.
• Boxes, boxes, boxes!! Yaaaaagh! Don't put everthing into a box. Your poster will look, well, really boxy. But if you do use a box with type in it, leave plenty of breathing room around the type so that it can breathe.
• Don't use really fat lines! Thin is elegant.
• Don't mix chart/graph/table styles. They should all match and live together. Replot handout graphics to conform to your poster style.

Terrain Mapping for Robotic Exploration

Team 2: Timothy Wall, Renaldo Ferguson, Nathan Furtwangler, James Pita, Daniel Merritt

Sponsor: Michael Comberiate Facilitator: Dr. Hayder Radha

Technical Advisors: Dr. George Stockman and Dr. Dirk Colbry

Michigan State University

Abstract

NASA Goddard Space Flight Center (GSFC) developed a robot with three dimensional image scanning capabilities and requested that Team 2 further develop it with terrain mapping and sampling capabilities. This required correlating images to form an internal representation of the surrounding terrain as well as communicating this information to a remote user. Utilizing this information the remote user should also be capable of issuing commands back to the robot.

Introduction

Problem

- Implement a terrain mapping and navigation system capable of mapping a 50 by 50 foot area
- Maintain the location of the robotic platform with respect to the mapped area

User/Use

- Operable by any trained individual
- Used to remotely explore any potentially dangerous or insurmountably distant environment

Limitations

- Required to be on a relatively flat surface
- Terrain must contain distinguishing features above ground level
- Current robotic platform designed for navigation of more open areas

Design Requirements

Objective	Constraints	Importance (0-2)
Accuracy	Working with a low end depth scanner	2
Scalability	Solution must not be system dependent	1
Reliability	Current robot has no method for precise motor control	1.5
Range	Accuracy of the depth scanner decreases with range	1.25
Usability	Must be easily managed by future teams	1.5

Technical Approach

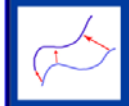
System Level Network Overview

This diagram provides a system level overview of component connections and data communication

Software Level Network Connections

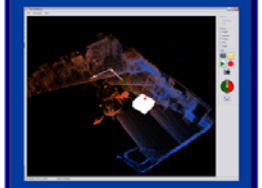
This diagram provides a look at the software classes that interact across the network causing data to be transmitted between the user interface and robot

Iterative Closest Point Algorithm



Iterative Closest Point is a point matching algorithm that attempts to transform all points from one image into another. If two images are not identical it eventually converges on what it believes to be the closest match.

Graphical User Interface



The robot can be controlled remotely through a graphical user interface. A user can lay waypoints to direct the robot's movement and view three dimensional point data. Shown here is the back end of a conference room. Five images were stitched together using an iterative closest point algorithm to produce this view.

Testing

Hardware

- Utilized multimeters and scopes to test voltages and troubleshoot motor control problems

Software

- Mapped out a 50x50 foot test area to compare against the robot's accuracy
- Mapped multiple test locations to test iterative closest point algorithm
- Developed virtual robot for testing network communication

Budget Analysis

Description	Quantity	Price Per Unit	Total Cost
Wireless Routers	2	$49.99	$99.98
Ultrasonic Sensors	4	$27.50	$110.00
Sensor Housing Unit	4	$4.95	$19.80
Total Expenses			$229.78

Results

Model of Conference Room

3D model created using dead reckoning

The same model after the iterative closest point calculation

Future Work

- Add Proximity Sensors
- Upgrade Hardware Components
- Enhance Feature Detection for Iterative Closest Point Algorithm

End-Product Description

The final product is a software system capable of sending and receiving data communications between a remote user and a robotic platform. Information retrieved by the robot is communicated to the user through a simple, but detailed, graphical user interface. The interface displays a three dimensional representation of the world as the robot currently knows it. The user can issue commands back to the robot in order to interact with the world through the graphical user interface. Commands include scanning new locations, moving the robot and viewing the world in numerous color schemes.

Terrain Mapping for Robotic Exploration

MICHIGAN STATE UNIVERSITY

Team 2: John Doe, Sally Struthers, John Doe, Sally Struthers, John Doe, Sally Struthers, Santa Clause

Sponsor: John Doe **Facilitator:** John Doe **Technical Advisors:** John Doe and Jerry Garcia

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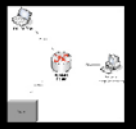

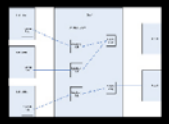

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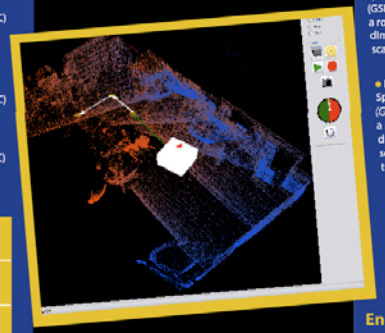

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Testing

Hardware:

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Software:

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Budget Analysis

Results

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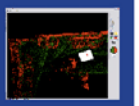

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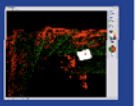

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ME 189 — SUPERMILEAGE — 6/8/07

Josh Carter (Team Leader) - Josh Greeson - Walson Lawi - Greg Toland - Mike Williams

ABSTRACT

This project aimed to create a highly fuel efficient vehicle to demonstrate a solution to the rising public concerns for environmental pollution, fuel prices, and the depletion of natural resources. By reducing the vehicle weight, rolling resistance, and aerodynamic drag, less strain will be placed on the motor leading to enhanced fuel economy.

BENCHMARKING

Identify areas for improvement:

- Weight of existing vehicle components
- Driver orientation & ease of entry/exit
- Wheel size & rolling efficiency
- Frontal area & overall aerodynamics

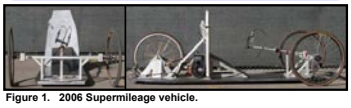

Figure 1. 2006 Supermileage vehicle.

DESIGN EVOLUTION

Design Process:

- Review 2007 SAE competition rules
- Four vehicle configurations were considered & analyzed in a decision matrix
- All internal components were optimized for aerodynamics, weight, size, & strength
- Design aerodynamic fairing

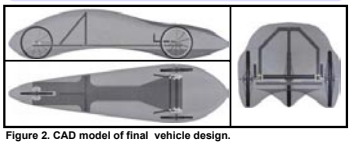

Figure 2. CAD model of final vehicle design.

TEST & ANALYSIS

The iterative design process included:

- Hand calculations
- MATLAB optimization
- SolidWorks modeling
- FEA analysis

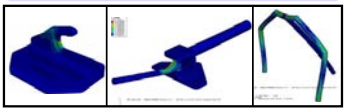

Figure 3. FEA design validation of load bearing components.

PROTOTYPING & FABRICATION

Every component of the vehicle was designed, prototyped, optimized, and fabricated to meet the design objectives.

Figure 4. Final vehicle assembly of optimized components.

PHYSICAL EVALUATION

Compliance with competition requirements:

A) 20° roll stability
B) 50' turning radius
C) 250lb roll bar load capacity

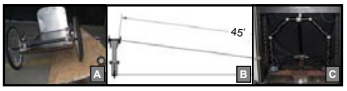

Figure 5. Physical validation of competition requirements.

PERFORMANCE IMPROVEMENTS

Weight Reduction:

55% Weight Reduction!

	New (lbs)	Old (lbs)
Baseboard	5.5	18.5
Rear Wheel Supports	0.66	7.5
Roll Bar	1.9	10.5
Wheels	6.4	10.8
Steering System	3.3	18.3
Motor	25	25
Sprocket	1.8	4.4
Other	7.1	19.8
Totals	51.66	114.8

Table 1. Weight comparison.

Aerodynamic Enhancements:

- Frontal area reduced by 42.5%
- Maximum cross sectional area reduced by 40%
- Full body fairing designed and implemented

Figure 6. Prototype/mold of aerodynamic fairing.

Rolling Resistance:

- 55% relative reduction achieved by:
  - High performance racing hubs
  - 27% reduction in wheel dia. & increased tire pressure which cause a smaller contact area

Acknowledgments

We would like to acknowledge the following people and recognize their contributions to our project:

Steve Laguette	Project Coordinator
Kirk Fields	Design Advisor
Dr. Keith Kedward	Composites Advisor
Dr. James Leslie	Composite Material Supplier
Nelson Bednersh	Fabrication Advisor
Andy Weinburg	Fabrication Advisor

SuperMileage

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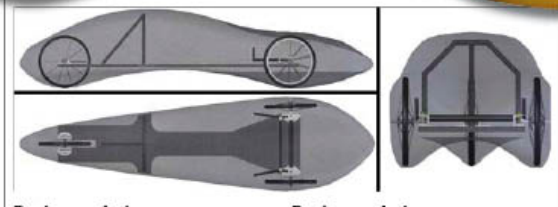

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TESTING

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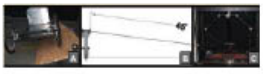

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