**Proposal for the Design of a Concrete Inspecting Robot for the Tunnels of Boston.**

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# Abstract (Joe, Everyone)

# Introduction (Joe, Everyone)

# Problem Formation

THE CONCERN FOR UNSAFE, UNRESOURCEFUL, INEFFICIENCIES… danger to inspectors (traffic, fans, dust, environment, health)… From here until next section, be critically objective. In other words, enforce the problem and importance of deriving a solution.

## The Current Method (Everyone, Matt and Josh)

Address the cost inefficiencies, as subcontractors are being paid tax payers’ dollars around the clock.

The effects inspections on traffic [lane closures and what not] and the ”legacy” of the Big Dig (do we really need to have to be an everlasting expense).

The redundant nature of the inspection and magnitude of manual labor needed.

Money well spent on moving forward (building) rather than going over (moving backwards)

## The Tunnel Structure (Matt and Rob)

The structural layout and support system (rows and hangers).

Emphasis on the feasibility to automate process (make once, run many times).

## Areas of Concern

### Mobilizing/Accessing (Rob)

Obstacles and spatial understanding (knowing where to inspect)

### Detections (Josh, Joe)

Potentials of DSP needed being from hell

### Interface and Networking (Sam)

Connection and communicating; data storage and alert mechanism.

### Scalability Factors (Matt)

Not all sides of the tunnel are the same, not spatially or structurally.

# Technical Approach

LEAVE SECTION INTRO BLANK FOR NOW!

## Mobile Platform (Rob until next section, Everyone)

### The Robot

Here you would place paragraphs that explain how you identified the needs of the customer or how you will identify the needs of the customer. Please indent all paragraphs and do not skip a line between paragraphs in the same section or subsection.

### Power Factors

### Limitations

## Data Collection and Processing (Josh and Joe)

Brief reminder regarding method for sensing is variable to change.

### Signal Detection

DSP… shuffling CCD and haptic device

Description: Macintosh HD:Users:jrob:Downloads:System Block Diagram.pdf

Figure System Overview

### Signal Interpretation

What is a threat, and when to throw a flag.

### Threat Classification

e.g. scale 1-5 that provides a measure of concern; ‘warning, concrete needs work in near future’…’alert, concrete need fixing now!’

### Simulation and Post-Processing

MATLAB tools, along with other methods we may implement for testing and advancing the signal processing algorithms.

## Software Integration (Sam until next section, Joe)

### Tracking Robot

If I were the robot, about where would I be?

### Data Passing and Storing

Memory? Different layers (e.g. local vs global; robot on hand vs back at the office)? Combination of both? Is all data needed? If not, when and why is it no longer useful.

### Human Interface

Get data and review

Method for developing GUI

### Version Control, Source and Reference Repository

# Project Management (Matt until next section, Josh)

This section presents the plan for managing the project. This plan should follow a logical sequence. Please make sure that you have a transition paragraph between the heading “Project Management” and the subheading “Deliverables.” That paragraph should introduce and explain your Gantt chart for the project. An example of such a chart appears in Figure 1.



**Figure 1:** Gantt chart for the project. The solid bars indicate the portions of the tasks that we have accomplished.

## Deliverables

Here you would place a paragraph or paragraphs that present the deliverables that you will provide.

## Time Factors

Here you would place a paragraph or paragraphs that present the deliverables that you will provide the customer.

## Time Line

|  |  |  |  |
| --- | --- | --- | --- |
| TASKS | START | END | NOTES |
| Milestone 1 | 07/25/13 | 08/05/13 | Proposal (draft) submit to Professor Shafai. |
| Milestone 2 | 07/25/13 | 08/15/13 | Reach out for ideas and support to all resources available: NU COE faculty from various department, Colleagues, etc., |
| Milestone 3 | 08/01/13 | 08/15/13 | Develop Presentation. |
| Milestone 4 |  |  | Compile list of resources, keep record of Works Cited. |
| Milestone 5 |  |  |  |
| Milestone 6 |  |  |  |
| Milestone 7 |  |  |  |
| Milestone 8 |  |  |  |
| Milestone 9 |  |  |  |
| Milestone 10 | --- | 04/15/14 | Present Final Capstone Project. |
| Milestone 11 | --- | 04/30/14 | Submit Final Report. |

## Budget

Here you would place a paragraph or paragraphs that explain the budget for the project. Include a table such as Table 1. Please indent all paragraphs and do not skip a line between paragraphs in the same section or subsection.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table 1:** Requested items and funds for initial design. | | | | | |
| **Item** | **Supplier** | **Catalog No#** | **Quantity** | **Unit Price** | **Total** |
| Vacuum Pump | McMaster Carr | IJ-60825 | 1 | $183.47 | **$188.72** |
| Flow Pump | Northern Tool | CJX-689 | 1 | $139.99 | **$156.62** |
| Water Filter Whirlpool | Lowe's Hardware | WHER25 | 1 | $33.73 | **$33.73** |
| 23/32" Plywood 4'x8' | Lowe's Hardware | none | 1 | $24.95 | **$24.95** |
| 4" Ondine Rainmaker | Smartbargain.com | 129808 | 1 | $19.99 | **$37.86** |
| Acrylic Sheet 12"x24" | McMaster Carr | 8680K22 | 1 | $45.40 | **$51.65** |
| Acrylic Tubing 5' (OD 8") | McMaster Carr | 8486K626 | 1 | $236.70 | **$250.95** |
| "8" Flange (13" OD) | McMaster Carr | KD-ERW | 1 | $44.24 | **$44.24** |
| ¾-10 x 10" Hex Bolt | Hout's & Son's Inc. | 3456 | 5 | $5.40 | **$27.00** |
|  |  |  |  | **TOTAL** | **$$$$** |

## Communication and Coordination with Sponsor

Here you would place paragraphs that explain how you will communicate and coordinate with your sponsor. How us as a group shall meet… Meeting agendas, meeting leaders (alternate, or one of us assumes position, ) Shafai, DiMarzio

## Division of Tasks

### Team Qualifications (We’ll do this together)

### Individual Responsibilities (Matt)

# Appendix A (Everyone): Key Terms

|  |  |
| --- | --- |
| e.g. DSP | Digital Signal Processing |
| Reasoning | Here if we need it, if empty or useless later easy to erase |
|  |  |

# Appendix B (): Structural Notes

## **Pictures**

## **Schematics**

# Bibliography (overkill is best: add to before you forget, indicate where in proposal that used reference)

The Pennsylvania State University. (2012, July 1). *Guidelines for Project Proposals*. Retrieved July 1, 2012, from Penn State Learning Factory: http://www.writing.engr.psu.edu/workbooks/proposal\_guidelines.pdf

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# Acknowledgements (Bob Bobbington and the Peanut Gallery)