

**Abstract: <200 words**

- make people want to read the rest of the paper
- summary of the paper
- write last

**Background:**

*what's the motivation for this project*

Visually impaired individuals face daily challenges in regards to interacting with and navigating through their environments. While some support systems exist in the form of assistive devices, most of these solutions provide audio feedback to the user to alert them of obstacles in their surroundings. However, this solution does not offer support for deaf-blind users or for hard-of-hearing users trying to navigate through noisy environments. The “Smart Cane” designed by this senior design team will be an advanced assistive device that improves a deaf-blind user’s ability to detect obstacles. In contrast to the auditory design, the **Smart Cane** relies on tactile signals to guide the user. At a high level, the cane has sonar sensors that detect objects in front of the device holder and sends back haptic signals to warn the user of upcoming obstacles.

**\*\*Insert starting point for this project with P14043??\*\***

The working prototype integrates existing concepts from a previous iteration of this project. The cane collapses into 8” lengths, have the ability to be collapsed or assembled in one minute by a blind person, and contain a rechargeable battery that lasts at least 8 hours on a charge. In addition, it will possess a 6 ft. detection range and cost at most \$125 to manufacture. Final design and prototype will be consistent with the intellectual property granted to the stakeholders, so as to provide the device with a competitive edge on the current market.

-what was the starting point for this work (using p14043 as some prior work the kick-start our project)

- Early in the senior design process, the design team reviewed a preceding project to better understand the inspiration for this cane, the customer, and to learn from the failures and successes of the previous team. The previous team’s idea of using a roller was well-liked among team members because it was feasible for a one-semester long. Haptic feedback provided by metal rollers in the cane handle was a great foundation, but this team wanted to alter the feedback to improve the user experience. It is critically important for cane users to be able to easily differentiate between left feedback and right feedback when walking.

**Comment [KMC1]:** Are we calling this a Smart Cane still or should we convert the team to using a new name for copyright sake?

**Comment [KMC2]:** Should review these values compared to the engineering requirements and talk to team members to determine what we are aiming to have (all values will need to be checked right before this paper is submitted, too)

**Comment [KMC3]:** This deserves 10-30 minutes at a team meeting to review what aspects of the previous team we used

-could include..... Some background from scientific papers if applicable, **general product benchmarking**

**Comment [KMC4]:** MSD1 information?

-where could an interested person learn more about this project or the overall idea

**Comment [KMC5]:** EDGE!!

<http://edge.rit.edu/edge/P15043/public/Home>

-should we include the URL or a simple reference to the notion that we have this website?

### **Process:**

- what steps and resources were used to do everything we did (assuming mostly MSD 1 stuff summarized and more in depth on the steps done for MSD 2)
- explanation of theory used in the project
- assumptions made
- initial experiments performed
- overview of design process (needs, specs, concepts, evaluation, analysis, building, testing)

### **Results/Discussion:**

- what happened
- what does it mean
  
- what's the final product? (Smart Cane)
  
- how did you evaluate its success?
  
- does it meet your specs? (Convince people)
  
- May need to include enough information for this work to be reproduced

### **Conclusions & Recommendations:**

- critical evaluation of the successes and failures of the project
- if you had to do it all over again, what would you do the same?
  - Use a file-sharing website to allow all team members to have access to current documents
  - Choose a design competition in the first semester of senior design to allow for ample preparation time

- Have an evaluation of the team's progress at every review if not sooner. Having the team members feel comfortable bringing up issues in front of the entire team as soon as the problems are known allows us to take action quickly.
- Communicate progress to all team members in a way that allows everyone to understand whether the project is on-target, behind schedule, or ahead of schedule at any given point in time

What would you do differently? [Failures / things that could have been better]

- Have handle drawing ideas checked by the 3D printing subject matter experts during the initial design phase to ensure feasibility, ease of printing, and low cost overall
- Cross-train team members on general administrative functions early on such as purchasing (could have created standard work and posted it in the team's Dropbox)
- Network with a primary contact in every department we will require help from and have at least one secondary contact for each department. [main idea = plan A does not always work and having plan B should be the minimum a team does as far as preparation is concerned]
- Have team members be exceedingly critical of others during the design phase so that less concerns are unveiled in the build phase – it can be annoying while people are questioning one-another, but it could be advantageous in the long-run

-What future work needs to be done?

NEED TO COMMENT ON THIS CLOSER TO THE END OF OUR PROJECT

- Making the cane waterproof (requires a larger budget)

**Reference and Acknowledges:**

-cite all papers/technical reports, books, prior teams, personal discussion, websites (no wiki), software

-acknowledge the sponsor and others who made significant contributions to the project (Iglesias, joe, Nikki, ABVI, 3D printing helpers, DeBartolo, Charlie, Tom Oh, and Gary Behm)