

# Needs Assessment

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## **Team Number: 6 – Stow-Away Pool Table**

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## Abstract

Throughout the existence of the game of pool, there have been two reoccurring issues that have caused pool table owners to have get rid of their table: the room is needed for another purpose and the playing surface must be leveled for proper play every time the table is moved. This pool table will feature both stow-away and self-leveling capabilities to solve these issues. The design process for this revolutionary product will be demanding so we will ensure that we remain as organized and detail-oriented as possible. This starts with laying out a needs assessment plan to determine what will be required of us during production. Our sponsor, Alexander York, has and will continue to provide us with insight into this design. Our goal for Senior Design is to design and produce a system to stow away and level a fully functional pool table for immediate use. We have a few concrete objectives to meet this semester: finalize CAD drawings for the mechanisms and structural elements, analyze the system for failure, select appropriate materials, and source long-lead items in preparation for the Spring semester. We will utilize a Gantt chart to keep us on schedule with production, which begins with cleaning and organizing our workspace.

# 1 Introduction

It was recognized that there is always a lot of space required in order to place a traditional billiards table into one's own home. The purpose of our project is to reinvent last year's self-stabilizing and stow-away pool table design into a more economical and easily manufactured design. Alexander York, the entrepreneur/engineer who started this project last year, is sponsoring this project. The funding for our design project will be provided by our sponsor Alexander York and the FSU-FAMU College of Engineering.

## 2 Project Definition

### 2.1 Background research

The inspiration behind the design idea comes from two mechanical engineering students Alexander York and Norman Gross who graduated from the FSU/FAMU College of Engineering in 2013. Their Group 19 Senior Design project, led by Alexander York, was sponsored by Beyond Innovation LLC to design a self-leveling pool table that was also “*capable of vertically stowing itself in a discrete housing whenever additional space is needed in the area the table is kept.*”<sup>i</sup> The team utilized stepper motors located on each of the four legs and a control system programmed with a stabilizing algorithm to stabilize the pool table with just the push of a button. The group was very successful with their design, and ended up winning the senior design project competition. We will be creating a pool table with similar functions by using improved methods of storing and leveling as well as a more marketable look. We plan on rotating the table about its longitudinal axis rather than its latitudinal axis as in the original design. We plan on focusing more on the stow-away capabilities of the pool table and less on the stabilizing capabilities, however we will be looking at improving the leveling function for opportunities to improve its overall time to level. The main difference between our goal and the goal last year is to improve the design of the pool table to be more production friendly and marketable going beyond building the first prototype which proved the design was practical. This practicality is evidenced in the budget report from last year’s team shown in Table 1<sup>ii</sup>.

Table 1. Last Year's Budget Report Final Outcome

<b>Total spent</b>	\$2,723
<b>Budget</b>	\$3,000
<b>Funds remaining</b>	\$277

This stow-away pool table is the first of its kind so there is no opposition to our design. There are, however other applications for leveling mechanisms such as for water vessels (Fig. 1) and space saving furniture like wall beds. Figure 2 is Group 19's original "Self-Stabilizing Pool Table" during the stow-away process; this process lifts the pool table vertically until the playing surface is perpendicular to the ground and the table is fully in the housing.

This design has the potential to be revolutionary because of its wide range of possibilities. It could be of great use to sports bars, hotels and homes. Basically, anywhere that can't afford to permanently sacrifice the large amount of room needed to comfortably house a pool table can benefit greatly from this design. Perhaps in the future, a more robust model with real time active leveling could be marketable to seafaring vessels but since that is a smaller market, it will not be included in the scope of the current model.



Figure 1. David Hall's self-leveling boat platform<sup>iii</sup>



Figure 2. Group 19's original prototype<sup>iv</sup>

## 2.2 Need Statement

The sponsor for our project is Alexander York, with additional funds managed by Dr. Michael Devine, Professor at the College of Engineering. This project is a continuation of Alexander's

2013-2014 Senior Design, which needs higher esthetic value and improved functionality. The proof of concept was successful, but the product cannot be sold until the quality and aesthetics are enhanced. Additionally, the nature of the vertically stowed design posed a higher risk of serious injury to the common user, while also requiring vertical space that may not be available in households.

Pool tables take up too much space and require professional leveling.

## 2.3 Goal Statement & Objectives

Our goal for this project is to design and produce a system to stow away a fully functional pool table, and to level it automatically when ready to use. This goal will be reached by the end of the spring 2015 semester.

### **Objectives for the fall semester:**

- Finalize CAD model of the structural elements and translating mechanism.
- Select materials for the translating mechanism considering its structural design analysis.
- Source long-lead items.

## 2.4 Constraints

- The pool table must be movable by one person on a hard surface.
- The total cost must not exceed \$11,000.
- The system must self-level in less than 5 minutes.

## 2.5 Methodology

Our strategy for the completion of this project begins with team brainstorming and organization. It is necessary to then plan out our financial situation and determine a budget. We will prepare our workspace, located at TCC's campus by cleaning up and acquiring all needed tools, supplies, etc. From there we will begin our selection process for ideas and start creating designs for our table. After our designs are complete, the building process will commence and we will work together through the issues and obstacles to a final product. Throughout all of these steps we will be meeting up as a team regularly and constantly be updating our strategy, plans, and goals.





### 3 Conclusion

With abundant information from last year's project, and with a team member who had direct involvement in its development, our Senior Design project has the potential to greatly improve on specific features developed previously. While researching the end purpose of this project, we found that there is a strong desire to take the product to market, which further motivates the team to create a product that is both functional and visually appealing to potential buyers.

The objectives and Gantt chart for the Fall semester were laid out to function as a guide that the team must adhere to. We will work to finalize CAD drawings for an ideal system, along with the selection of structural materials that satisfy a Finite Element Analysis for an appropriate factor of safety. Materials that have a long lead-time will be procured before the beginning of the Spring semester. Some of the key strategies we will implement are clear communication between members and sponsor (for which we have set up rules in our Code of Conduct), clean workspace and organized meetings, and frequent reviews of our progress toward our goals. This document will serve to set up expectations for our Project Plans and Project Specs report.

## 4 References

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<sup>i</sup>Gross, Norman, and Alexander York. "Deliverables 2014 Final Report." *2013/2014 Senior Design Team19*. Beyond Innovation, LLC, n.d. Web. 26 Sept. 2014.

<[http://eng.fsu.edu/me/senior\\_design/2014/team19/deliverable.html](http://eng.fsu.edu/me/senior_design/2014/team19/deliverable.html)>.

<sup>ii</sup>Gross, Norman, and Alexander York. "Deliverables 2014 Final Report." *2013/2014 Senior Design Team19*. Beyond Innovation, LLC, n.d. Web. 26 Sept. 2014.

<[http://eng.fsu.edu/me/senior\\_design/2014/team19/deliverable.html](http://eng.fsu.edu/me/senior_design/2014/team19/deliverable.html)>.

<sup>iii</sup>Vescia, Paolo. "Velodyne Inventor Builds Self-leveling Boats." *Widgets RSS*. San Francisco Business Times, 15 Apr. 2014. Web. 26 Sept. 2014.

<<http://www.bizjournals.com/sanfrancisco/gallery/22511>>.

<sup>iv</sup>Gross, Norman, and Alexander York. "Deliverables 2014 Fall Midterm Report." *2013/2014 Senior Design Team19*. Beyond Innovation, LLC, n.d. Web. 26 Sept. 2014.

<[http://eng.fsu.edu/me/senior\\_design/2014/team19/image\\_21.html](http://eng.fsu.edu/me/senior_design/2014/team19/image_21.html)>.