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| Deliverable #6 |
| Updated Project Plan |
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| **1/17/2014** |

**Team 19: Self-Stabilizing Pool Table**

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# Problem Statement

The problem that was recognized is the amount of space that is required to own a traditional billiards table. The project is to have a table that has the ability to automatically store itself in a space with the footprint of a large bookshelf. The mechanisms in mind will be a mechatronic system that will require no user input more complicated than pushing a button. This device will allow users to own a billiards table without the sacrifice to the space that owning one consumes. The total floor footprint will be decrease by more than 75%.

# Background

This Project is sponsored by Beyond Innovation LLC. Founded by inventors and engineers who have a passion for life and love to build, create, invent, and innovate. Either it be a new revolutionary idea needed to be produced or a product which needs improvement or upgrades for commercialization, Beyond Innovation LLC provides sophisticated solutions to the challenges that human kind may face during the ever changing fast-pace and highly technological environment.

For this project Beyond Innovations has decided to create a billiards table. The design for this billiards table is a new venture with amazing feats. The table will be capable of vertically stowing itself in a discrete housing whenever additional space is needed in the area the table is kept. Along with its amazing storage ability this table will also be capable of self-stabilization. After it has been removed from its housing, the table will level the slate to be perfectly horizontal to its respective location.

# Objective

For this project the expected objective is to have a fully functional pool table that will have vertical stowing capabilities, and will have the ability to level itself. This objective will be completed by the end of the spring semester of 2014.

The goals for completion for the spring 2014 semester are the following:

1. Create the final design of the entire system
2. Construct a scaled prototype to act as a test bed for various vertical stowing mechanisms
3. Develop a control algorithm for the self-leveling element
4. Structural Design Analysis

# Expected Results

The expected outcome from this project is to have a fully functional prototype. The prototype will be able to store itself into some type of housing in order to reduce occupied space with the implementation of some simple mechanical system. The storing process will be automated and will cause the table to be stowed vertically, not horizontally, and out of sight. The storing process is to be fluent and controlled with a built in safety feature since the weight of the table can cause catastrophic damage in a sudden system failure.

Also the table will have to be able to stabilize itself after being deployed from the housing. This is a very important part of the project because an uneven slate for the pool table would cause major disturbances in the game. Therefore the product will use some mechatronic system comprised of sensors, microcontrollers and motors etc. to accomplish this goal every time the table is deployed, and will lock once completed.

# Methodology

In order to assist in the development of this project, the system was broken down into discrete sections. Focusing on the main objectives, there are two main components of the system: The vertical stowing capability and the self-leveling features.

**Self-leveling**

The self-leveling capabilities include all mechanical and electrical components related to the standalone pool table. These capabilities are separated into two major focuses. First focus will reside with the mechanisms that will be used to level the table top. With these mechanisms we will be able to raise, lower, and level the slate top. The electronic control system and control algorithms will be developed a part of the second focus within the self-leveling capabilities.

**Vertical stowing**

The vertical stowing capability will be partitioned into two sub-sections in order to focus our efforts. The first section will be the transition from horizontal to vertical positions. Once this stage is completed, then the next phase begins to emerge. The second section, categorized within the vertical stowing, is the vertical lifting mechanism. Once this mechanism is completed the entire system will be ready for testing under various conditions.

# Project Updates

Since beginning this project, there were a number of unforeseen circumstances that had to be resolved. The first of which is introduced in the section above, the transition from vertical to horizontal needed a device to prevent the table from touching the ground. The second change to the design that was made is related to the vertical lifting component. The design of this system has slightly changed; two winches will be attached to each side of the hooking platform to provide a steady pull. Using this new design it is possible to maximize the height the table is lifted.

**Procurement**

All of the components of the system have been specified and many of which are in the process of being ordered. The supplier for each component has been identified as well. The purchase orders are being made according to the progress of our developments.

**Development**

The prototyping of this project has begun since the start of the semester. We are currently in the process of modifying the electric tongue jacks to meet our specifications. We plan on replacing the existing DC motor with a stepper motor so we can have precise control. Integrating this stepper motor with a the inclinometers is the next step of the process.

# Gantt Chart

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| --- | --- |
| Project Phase | Spring 2014 Semester |
|  | January | February | March | April |
| Week | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Ordering Material |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Receiving Products |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Table Construction |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Algorithm Construction |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Component Integration |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| System signal Conditioning |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Housing Frame |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Housing Aesthetics |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Testing  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |