SPATIUM MECHANICUS

An original game by
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In the beginning I set out to create a strategic table top board game that would teach basic microelectronics, set in space. This game would be rooted in learning and enhanced by technology, narrative, and hands-on interaction.
Backstory:

Set sometime in the future, a group of astronauts crash land on a moon of a nearby planet. Unable to mend their primary ship, they must salvage parts from the wreckage to fix their surface lander and attempt to escape the moon's gravity to re-enter space. Thus begins the process of resource collection, cooperative strategy, and technical construction.

This all brings us to the name of the game:

---SPATIUM MECHANICUS---

or loosely translated in Latin:

SPACE MECHANIC
Making it all a Reality (well, sort of)

Skills I had starting out:
• Basic use of microcontroller Arduino units
• Woodworking and experimental fabrication
• Creative mind with lots of ideas
• Experience with Google Sketch Up and some AutoCAD

Things I knew I wanted:
• To build the game myself
• To have a working prototype by the end of the Spring semester
• To eventually put the project on Kickstarter and go into actual commercial production
• A game that would be both fun and educational
Early Design Iterations

First Layout
- Basic Rectangle
- The green colored track represents the intended game board.
- The blue squares are where the Arduino microcontrollers will be positioned.
- The pink is an outer rim that would be filled with some kind of terrain.
- I designed the board in a free program called Inkscape.
Early Design Iterations

Second Layout
• More critical features are added.
• The green track takes on a more winding shape.
• Light blue component boxes are added for resource collection.
• Red areas are designated zones for interactivity
• The complexity of shape increases.
Early Design Iterations

Third Layout
- Game board gets set to a 1” square scale.
- Pink areas are to be filled with expanding foam to hold in containers
- Yellow switching stations were added
- Game track gets more turns and a shortcut path
- A player starting point at the top is added in.
1st attempt at 3D rendering

- Both Arduino boards in place at either side
- A crashed shuttle in the corner
- A moon lander dead center
- A winding game path leading around the objects on the board
- Multiple stations for component collection
- Drawn to intended scale
Gameplay Development
Establishing a set of basic rules

- The game would have 3 potential play modes
  - 1 Player: Score as many points as you can and practice building circuits on a time limit
  - 2 Player VS: Head to head competition of highest score wins
  - 3-4 Player Co-Op: Up to four players cooperating together to strategically activate game ending triggers. Players add total points to initiate narrative based in game scenarios.
- Each player would receive:
  - A breadboard with 4 jumper wires
  - A battery source
  - Set of tweezers
  - A player card detailing quick rule facts
  - A set of initial circuit diagrams to build
- The game would last between 60-90 minutes depending on game mode
- It would follow a structured turn based setup rotating clockwise amongst players. Player turns would be limited by a 2 minute timer.
Makerspace: Laser Cutting

Most of the game board and pathways were cut on a laser cutter at the UGA Makerspace, located in the Science Library on campus. Free to use, this space encourages students to create, and provides instruction on how to use the tools.
3D Printed Player Pieces

2 Female and 2 Male Astronauts were printed, each in a different color plastic filament. The source file was downloaded for free on the 3d file database known as “thingiverse”. The original artist listed this model as “could be used for any purpose (even commercial)” with the simple request that their work be acknowledged with the QR code to the right.
Overall game board layout

Initially I laid out the game board design using blue painters tape and a table on the 4th floor of the library. I have posted screen shots of me making mock ups of the wooden pieces to be cut on the laser. It is always a challenge to fit everything as efficiently as possible.
Game Construction
The foaming process: How to build terrain

Steps:
1. Raise game board and tape down pathways
2. Start spraying aerosol foam (SLOWLY)
3. Continue building up foam layer by layer
4. Wait for foam to dry (several hours)
5. Trim off excess for desired shape
6. Prep for paint
Game Board Progression

Layout and Measurements
Elevation cuts and glue for base
Tape job and full foam layering
Full paint job
Component Addition and tape removal
On the 20\textsuperscript{th} of March, 2017 I had the privilege of presenting to an audience on my game. I had an almost functioning prototype ready and received overwhelmingly positive feedback. The presentation attendees were able to get hands on with the game and I was able to explain in great detail the game making process during my 1.5 hour session. This public exposure was great for my confidence and the project as a whole.
VIDEO GAME PLAY