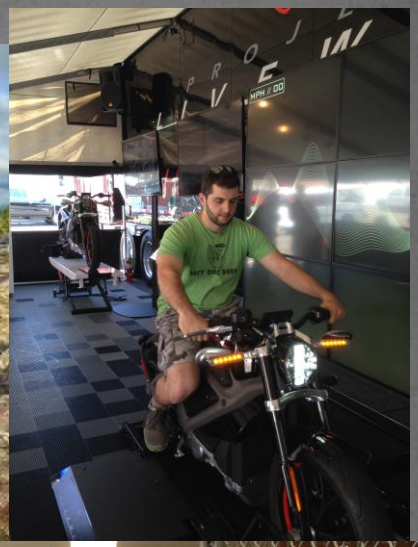
Design Portfolio

Alban Cobi

About me

Hey there! My name is Alban and I am a mechanical engineer by training and a designer at heart. I love immersing myself in interdisciplinary projects. I graduated from MIT in 2012 and started working for the MIT Edgerton Center teaching engineering and design. I recently started work as a Mechanical Engineer at Optimus Ride, an MIT start-up designing and fabricating autonomous electric vehicles. My professional interests lie in design of electro-mechanical systems, machines, and products with a focus on both form and function. In my free time I like to take out my motorcycle, go fishing, go on a New England trail run or take up a fun design project.



Multidisciplinary Projects (2007 – present)

1 – Nixie Tube Equalizer
2 – “Tech Life” Exhibit
3 – ROVs
4 – Growing Spheres Lamp
5 – Cyber Camera Platform
6 – Frankenbike w/ Side Car
7 – DIY Desktop Lathe
8 – DIY Segway
9 – FSAE
10 – Laser Seal
11 – Mancave
12 – EDW & EAS Courses
13 – Magnetic Picture Frame
14 – ThermAssist
15 – Greener Better Binder
16 – “Think Like Einstein, Design Like Da Vinci” Dress

1 - Nixie Tube Equalizer, 2013

Class Project (Individual)

This was a class D speaker amplifier that took a stereo audio input and through filter circuitry converted the low, mid, and high range frequencies to current control of three separate nixie tubes.

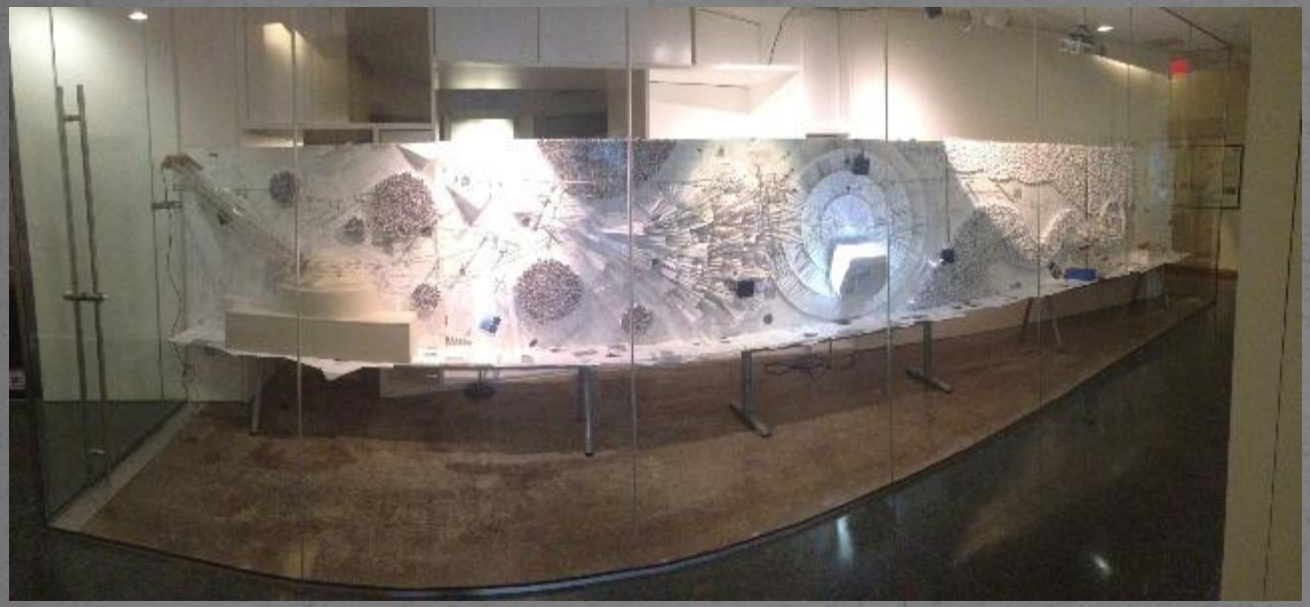
Concepts learned:

- Analog Circuitry
- Speaker Driver Design
- Flyback Converter Design
- Nixie Tube Control

Video

2 - “Tech Life” Exhibit, 2015

Work-related



Concepts learned:

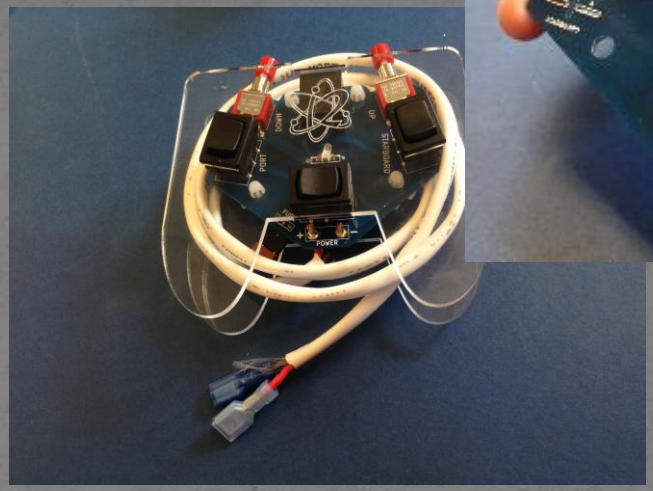
- Large-scope project planning
- Designing for exhibit
- Mechanical Design of lift mechanisms
- Controlling WS2812 LEDs

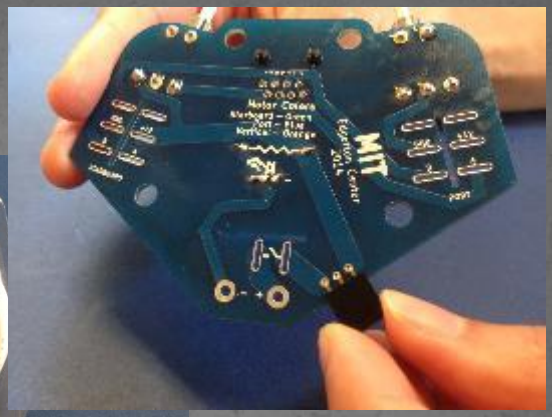
This was a 30 foot dynamic rollercoaster display with up to 10 steel balls traveling on a steel track. I worked on the two lift mechanisms, an archimedes screw and fork lift that lifted steel balls to provide energy for them to travel through the roller coaster. I also put together the LED Matrix on a model of the green building. The purpose was to portray life as a student at MIT, appropriately titled “Tech Life”. You can see a video of the roller coaster in action at this link:

3 – ROVs, 2013

Work-related

This an underwater Remotely Operated Vehicle (ROV) that is controlled with a 50 ft tether. The control system is a controller with a custom PCB that can control up to 4 motors on-board the ROV. It can be powered via a 12V battery or power supply and intended for teaching middle, high, and college students design, electronics and mechanical fabrication techniques.





Link to video of ROVs: https://youtu.be/UYDgANL85DE

Concepts learned:

- Electrical system wiring
- PCB Layout/Hacking
- PVC Fabrication
- Technical writing

4 – Growing Spheres Lamp, 2015

Recreational

This was a mother's day gift for my mother that I designed from scratch. It has a ring of LED's at the bottom which illuminates a pile of "growing spheres" inside the vase. Thin film filters scatter the light and create multicolored ovals. At the very top sits a peace lily, with its roots immersed in fresh water and the entire vase sits on a base of birch plywood that was laser etched.

Concepts learned:

- Integrated product design
- Wood working

5 – Cyber Camera Platform, 2015

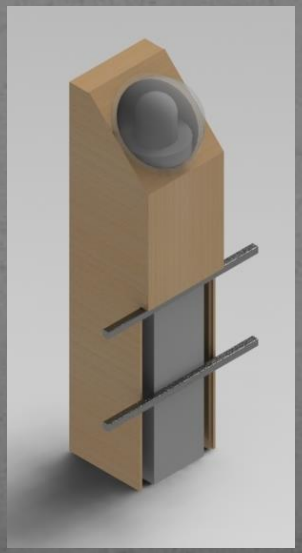
Recreational

This was a camera stand and housing designed to sit in one of the MIT lecture halls (34-101) to record lectures and stream them online. I designed and machined the stand and the housing, and designed it to be tamperproof. It still stands in the MIT lecture hall as of February 2015.

Concepts learned:

Integrated product design

Machining



6 – Frankenbike w/ Side Car, 2015

Class Project (Group)

This was part of an MIT class I took for fun. My partner and I modified a mountain bicycle to have a side-car. We designed and welded the bicycle ourselves. The bicycle is currently used as an example in the classroom.

Concepts learned:

MIG Welding

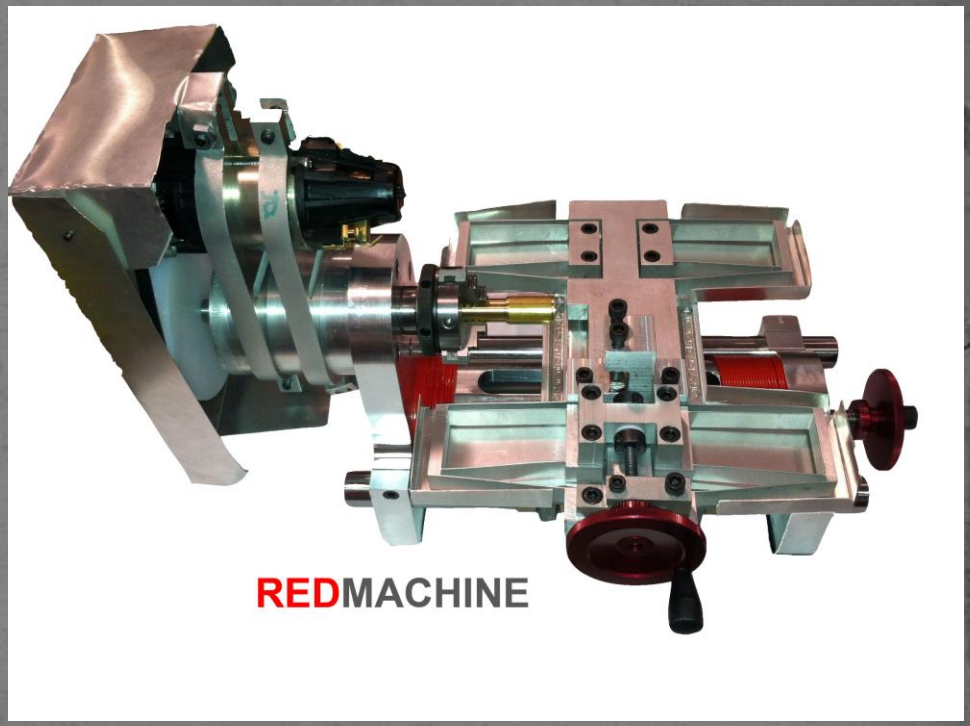
Working with steel tubes

Bicycle dynamics

7 – DIY Desktop Lathe, 2012

Class Project (Group)

For “Elements of Mechanical Design” a group of 5 others and I designed and built a desktop lathe. I specifically worked on the CAD and FEA for the flexures that allowed for the axial and radial movement of the lathe’s axes.



Concepts learned:

Mechanical Design

CAD Techniques (Solidworks)

FEA

8 – DIY Segway, 2007, 2010

Summer Program Project

When I was a high school student I helped build the DIY Segway (in the image on the left). I worked on the CAD/Mechanical design of the Segway and helped assemble it at the end. I later worked on the Segway again as an MIT student, changing the frame material to clear polycarbonate and adding “under-glow”.

Concepts learned:

Mechanical Design

CAD (Solidworks)

System Controls

Electric Vehicle design

9 – FSAE, 2011-2012

Student Group Project

For my last 3 semesters at MIT I joined the Formula racecar team and worked on the clutch and the suspension system. I designed and machined the clutch mechanism during my first year. During my second year I researched, and tested carbon fiber tubes for application in the suspension system of the vehicle and wrote a 40 page thesis on it.

Concepts learned:

Mechanical Design

FEA

Vehicle Design

10 – Laser Seal, 2014

Work-related/Student Project

Imagine strumming the strings on a harp. Now, imagine strumming laser beams on a “laser harp”. Hard to imagine right? This was a project that went through multiple iterations and culminating with a laser harp in the shape of the MIT seal. I advised students in my seminar and summer program with design and manufacturing of this project. It was displayed at the MIT Museum for 2 years.

Concepts learned:

Integrated product design

Basic Electronics

11 – Mancave, 2012-2014

Recreational

During the summer of 2012 I got an urge to learn how to do home construction. I transformed a 500 sq. foot open space in my basement to a closed off Mancave. I worked on all design and construction aspects of the project including the plumbing, electrical, tiling, painting, trims, and walls.

Concepts learned:

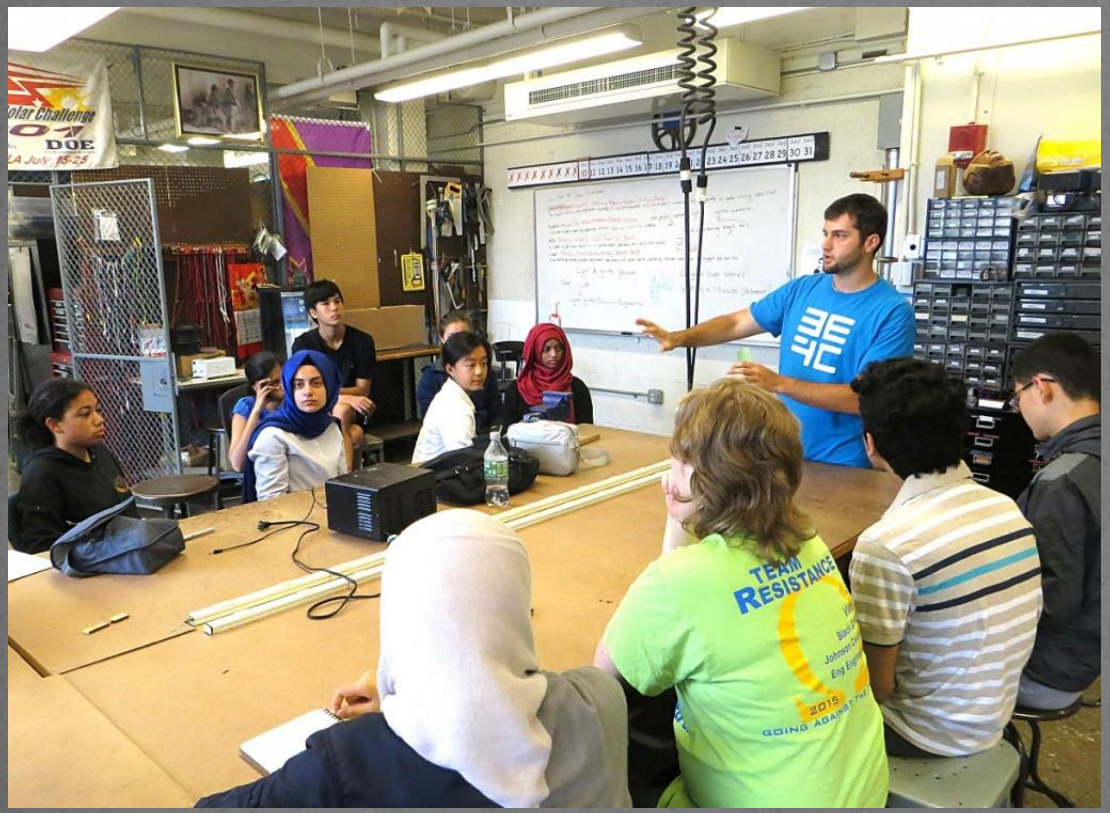
Woodworking

Home Construction

Electrical work

12 – EDW & EAS Courses, 2012-2015

Work-related



The Engineering Design Workshop (EDW) and Engineering, Art & Science (EAS) Seminar are courses I co-taught at MIT for 4 years. 20-25 students got into self-selected teams and took an idea to fruition. Projects have included the laser seal, electric vehicles, light displays, and museum exhibits. I designed parts of the curriculum and workshops taught in the course.

Concepts learned:

General Engineering

Leadership

Course Design

13 – Magnetic Picture Frame, 2015

Recreational

"семья"means "family" in Russian.

This is a 4-photo picture frame I designed as a gift for someone special. Underneath the maroon heart, is another heart with a bolt through it that clamps down on 4 pieces of glass. The maroon heart has magnets inside that attract to the heart underneath to hide the bolt and add a meaningful touch.

Concepts learned:

Woodworking

Glass cutting

14 – ThermAssist, 2011

Class Project (Group)

ThermAssist is a thermal pad that heats and cools people with spinal cord injuries. It is designed to fit in a backpack on the back of a wheelchair. I worked with a group of 12 other students in the MIT Capstone MechE course, 2.009 to conceive and fabricate this product. I specifically worked on the heat transfer design of the cooling pad. For the final presentation I put together an animation to show the features of our product.

Concepts learned:

Heat Transfer

Product Presentation Skills

Product Design Process

15 – Greener Better Binder, 2012

Class Project (Group)

Concepts learned:

- Product Design
- Locking mechanism design
- Green Design
- Website Design (HTML)

This is a binder a group of 4 others and I created for STAPLES, the company, in the MIT Class 2.744 – Product Design. It was designed to be eco-friendly by making the spine reusable and the "skin" of 100% recycled materials. I specifically designed, CAD modeled and CNC fabricated the interchangeable 3-ring mechanism.

16 – "Think Like Einstein, Design Like Da Vinci" Dress, 2015

Recreational

This is a dress I helped design and fabricate with a friend of mine for a fundraiser competition thrown by ARCK, an organization making art accessible to people in Boston. I designed and fabricated the translucent section of the dress (in the front on the photo on the right).

Concepts learned:

Working with fabric

Clothing Design

Alban Cobi

For more information please contact me at
cobiac08@gmail.com
OR
857.222.6704