Integrating Entrepreneurial Mindset, Bio-design, and Art into a Rapid Prototyping and Reverse Engineering Course

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Integrating Entrepreneurial Mindset, Bio-design, and Art into a Rapid Prototyping and Reverse Engineering Course

Abstract

The study aims to integrate entrepreneurial mindset, bio-design, and art into a rapid prototyping course during the duration of its semester long project. The author has been employing construction toy design as one of his project assignments over the years, including industrial design aspects. However, through a collaborative effort, the project had to be modified to reflect the new aim. Thus, student groups were asked to design a product (possibly a fastener, a light fixture, or a construction toy) with 4-6 components based on the idea of biomimicking climbing plants. The design was expected to have an obvious art component via use of industrial design, also including aesthetics, colors, or movements. Students followed the steps of the product development process with additional assignments being interjected into the regular project workflow. These assignments included a "Business Thesis Template" a document that defines the business idea or the problem being addressed, a "Customer Discovery Interview Planning and Preparations Form" to get feedback on the proposed idea by surveying potential customers, followed by "the Patent Search Assignment Form" to investigate the patentability of the business idea. The students were also tasked to reflect on their effort by completing a "Metacognitive Reflection Assignment" on three distinct aspects: entrepreneurial mindset, bio-design, and art. Three groups were formed and three designs were selected by these groups, a climbing plant shaped decor that diffracts natural sunlight, an LED garden sign used in lighting a garden during nights to mark poison ivy spots, as well as a ground stake with a climbing plant inspired mechanism aiding its anchoring function. Besides the elements mentioned above, students also had to complete an intellectual property (IP) assignment (of copyrights, trademarks, and patents where they studied each IP type, their applications, and durations). They were also given information on the start-up incubators available in the region in addition to the art standards from different educational levels. This study details the development process, also includes student feedback and the authors' reflections for future improvements.

1. Introduction

1.1 Problem Statement

In this engineering department, students are exposed to product and tool design, and development in multiple courses including "Product and Tool Design" and "Rapid Prototyping and Reverse Engineering". The "Rapid Prototyping and Reverse Engineering" course is an elective for most engineering majors including biomedical, industrial, manufacturing, and mechanical. The "Product and Tool Design" course is mandatory for manufacturing students only, but can be an elective for the other majors if they take its pre-requisite "Production Engineering" as another elective. These courses help prepare the students for careers in product design and development and serve as additional capstone experiences before they take their capstone course – "Integrated Engineering Design". The instructor who is the lead author of this paper has had multiple groups of his students earning provisional patents in his capstone course, while he also employed art in his Rapid Prototyping and Reverse Engineering projects as he focused on toy design and their industrial design aspects. Even with these efforts, the authors saw a lack in incorporating entrepreneurial mindset (EM) into the instructor's curriculum along with art concepts. In addition,

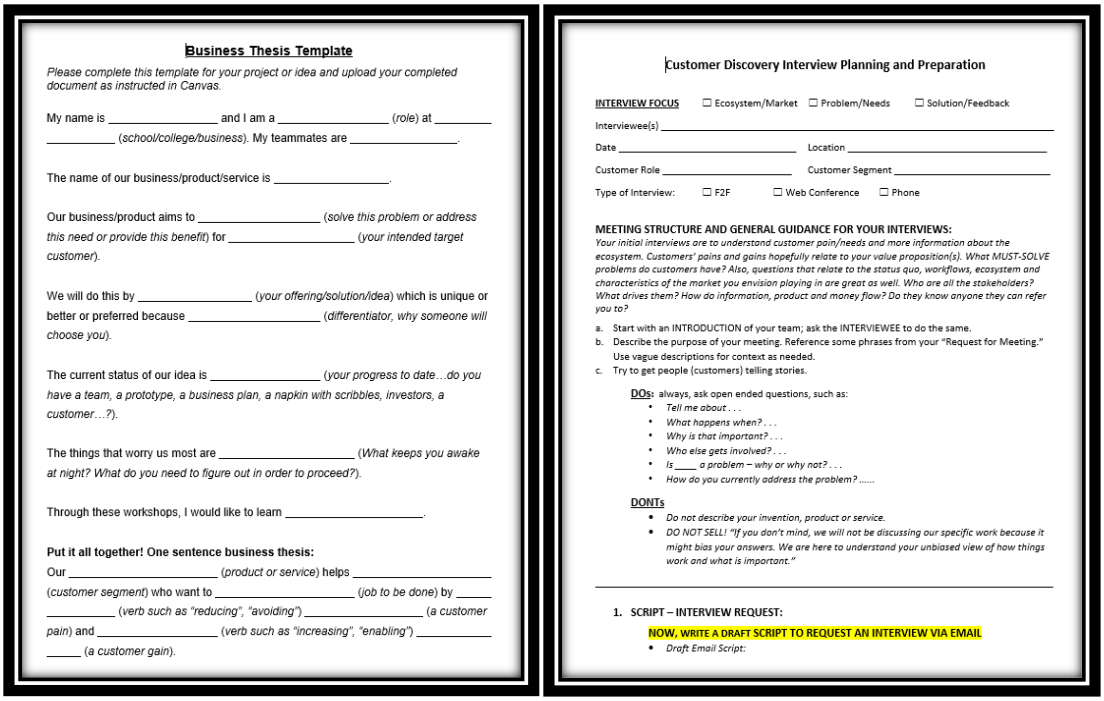
the instructor always wanted introduce bio-inspired design through open-ended design and development exercises in his "Rapid Prototyping and Reverse Engineering" course. Thus, an effort to incorporate EM, art, and bio-inspired design via a semester-long product development project was envisioned within a collaborative and interactive environment facilitated by a Purdue University Polytechnic faculty member with support from the KEEN Institute. The lessons learned from the first design and development cycle will be used in continuous improvements of the course. These lessons will also be applied to the instructor's capstone course projects which often focus on product development. Additional documentation of the work will be also published in the form of "Scholarship and Teaching of Learning (SoTL) in the near future.[1]

1.2 Methods

The student groups were tasked to design a product (possibly a fastener, a light fixture, or a construction toy) with 4-6 components based on the idea of biomimicking climbing plants. The design was expected to have an obvious art component via use of industrial design, also including aesthetics, colors, or movements. Students were to follow the steps of the product development process with additional assignments being interjected into the regular project workflow:

1. Developing a problem statement of the concept with realistic constraints such as physical and socio-economical including age appropriateness if it is a toy. The problem statement was expected to include the following components:

    - A need statement clearly defining the need for that product. A sample **Business Thesis Template (Figure 1a)**[2] and **Customer Discovery Interview Planning and Preparations Form (Figure 1b)**[2] were shared with the students.
        - The students were encouraged to use the former one, but was asked to employ the latter. While the first form is important to formulate the idea/concept before a new company (like a start-up) approaches its possible customers, the latter is especially important to get market's input about the company's designs making them human-centric. The latter form included components such as interview request script, interview introduction script, demographics questions as well as processes and people involved, potential pains and gains of the customer. The latter form was concluded with the value proposition, its testing/validation, and additional opportunity for the potential customers to give more feedback about the proposed product.
    - A goal (or multiple goals to address the need)
    - A set of objectives that support accomplishment of the goal(s) and their corresponding functions of the product
    - A set of constraints or specifications imposed on the functions or overall design



Business Thesis Template

Please complete this template for your project or idea and upload your completed document as instructed in Canvas.

My name is _____ and I am a _____ (*role*) at _____ _____ (*school/college/business*). My teammates are _____.

The name of our business/product/service is _____.

Our business/product aims to _____ (*solve this problem or address this need or provide this benefit*) for _____ (*your intended target customer*).

We will do this by _____ (*your offering/solution/idea*) which is unique or better or preferred because _____ (*differentiator, why someone will choose you*).

The current status of our idea is _____ (*your progress to date…do you have a team, a prototype, a business plan, a napkin with scribbles, investors, a customer…?*).

The things that worry us most are _____ (*What keeps you awake at night? What do you need to figure out in order to proceed?*).

Through these workshops, I would like to learn _____.

Put it all together! One sentence business thesis:

Our _____ (*product or service*) helps _____ (*customer segment*) who want to _____ (*job to be done*) by _____ _____ (*verb such as "reducing", "avoiding"*) _____ (*a customer pain*) and _____ (*verb such as "increasing", "enabling"*) _____ _____ (*a customer gain*).

Customer Discovery Interview Planning and Preparation

INTERVIEW FOCUS ☐ Ecosystem/Market ☐ Problem/Needs ☐ Solution/Feedback

Interviewee(s) _____

Date _____ Location _____

Customer Role _____ Customer Segment _____

Type of Interview: ☐ F2F ☐ Web Conference ☐ Phone

MEETING STRUCTURE AND GENERAL GUIDANCE FOR YOUR INTERVIEWS:

Your initial interviews are to understand customer pain/needs and more information about the ecosystem. Customers' pains and gains hopefully relate to your value proposition(s). What MUST-SOLVE problems do customers have? Also, questions that relate to the status quo, workflows, ecosystem and characteristics of the market you envision playing in are great as well. Who are all the stakeholders? What drives them? How do information, product and money flow? Do they know anyone they can refer you to?

a. Start with an INTRODUCTION of your team; ask the INTERVIEWEE to do the same.
b. Describe the purpose of your meeting. Reference some phrases from your "Request for Meeting." Use vague descriptions for context as needed.
c. Try to get people (customers) telling stories.

DOs: always, ask open ended questions, such as:

- *Tell me about . . .*
- *What happens when? . . .*
- *Why is that important? . . .*
- *Who else gets involved? . . .*
- *Is ____ a problem – why or why not? . . .*
- *How do you currently address the problem? ……*

DONTs

- *Do not describe your invention, product or service.*
- *DO NOT SELL! "If you don't mind, we will not be discussing our specific work because it might bias your answers. We are here to understand your unbiased view of how things work and what is important."*

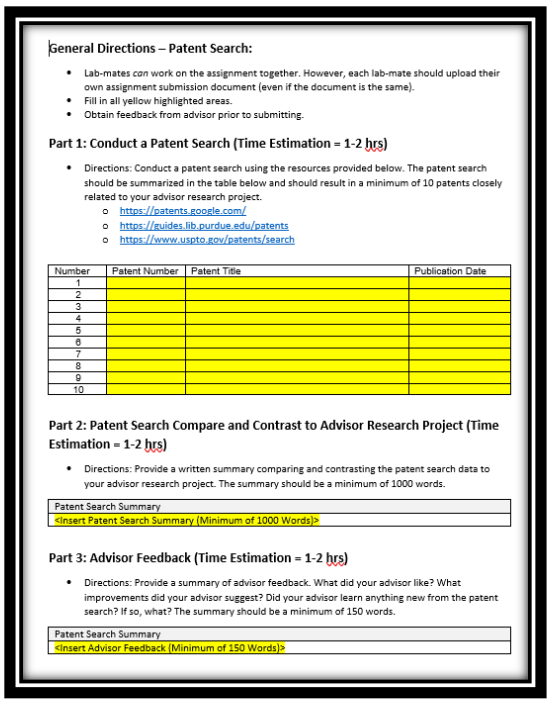
1. **SCRIPT – INTERVIEW REQUEST:**

NOW, WRITE A DRAFT SCRIPT TO REQUEST AN INTERVIEW VIA EMAIL

- *Draft Email Script:*

Figure 1a. Business Thesis Template 1b. Customer Discovery Interview Planning and Preparations Form[2]

2. Completing a patent search (and **the Patent Search Assignment Form – Figure 2**)[2] after completing the problem statement and tweak the design if necessary
3. Brainstorming and producing alternative design solutions
4. Analyzing the alternative designs based on a criterion each group developed and choosing the best alternative
5. Developing the system level design based on the best alternative selected
6. Detail designing each piece – by determining its geometry, dimensions, material and manufacturing process selection etc. and completing the **Metacognitive Reflection Assignment- Figure 3**. This form was to gage student attitude and aptitude against the three components, EM, art, and bio-inspired design. It had both photovoice and open-ended feedback components.
7. Estimating the project and product costs
8. Conducting at least one type of engineering analysis or testing



General Directions – Patent Search:

- Lab-mates *can* work on the assignment together. However, each lab-mate should upload their own assignment submission document (even if the document is the same).
- Fill in all yellow highlighted areas.
- Obtain feedback from advisor prior to submitting.

Part 1: Conduct a Patent Search (Time Estimation = 1-2 hrs)

- Directions: Conduct a patent search using the resources provided below. The patent search should be summarized in the table below and should result in a minimum of 10 patents closely related to your advisor research project.
  - https://patents.google.com/
  - https://guides.lib.purdue.edu/patents
  - https://www.uspto.gov/patents/search

Number	Patent Number	Patent Title	Publication Date
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Part 2: Patent Search Compare and Contrast to Advisor Research Project (Time Estimation = 1-2 hrs)

- Directions: Provide a written summary comparing and contrasting the patent search data to your advisor research project. The summary should be a minimum of 1000 words.

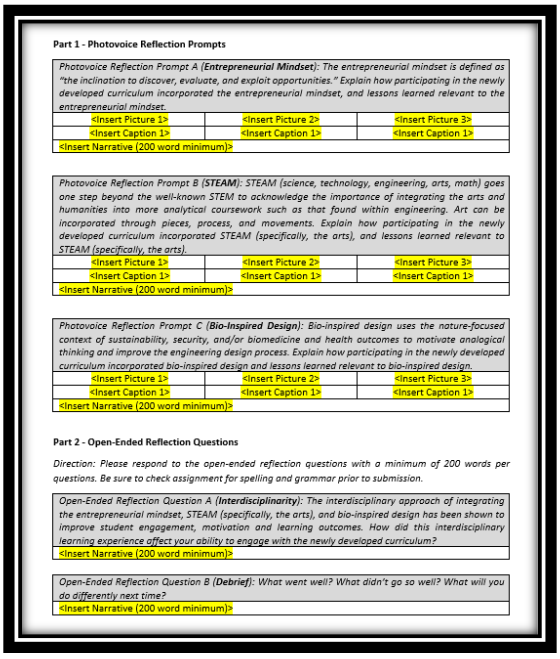
Patent Search Summary
<Insert Patent Search Summary (Minimum of 1000 Words)>

Part 3: Advisor Feedback (Time Estimation = 1-2 hrs)

- Directions: Provide a summary of advisor feedback. What did your advisor like? What improvements did your advisor suggest? Did your advisor learn anything new from the patent search? If so, what? The summary should be a minimum of 150 words.

Patent Search Summary
<Insert Advisor Feedback (Minimum of 150 Words)>

Figure 2. Patent Search Assignment Form[2]



Part 1 - Photovoice Reflection Prompts

*Photovoice Reflection Prompt A (**Entrepreneurial Mindset**): The entrepreneurial mindset is defined as "the inclination to discover, evaluate, and exploit opportunities." Explain how participating in the newly developed curriculum incorporated the entrepreneurial mindset, and lessons learned relevant to the entrepreneurial mindset.*		
<Insert Picture 1>	<Insert Picture 2>	<Insert Picture 3>
<Insert Caption 1>	<Insert Caption 1>	<Insert Caption 1>
<Insert Narrative (200 word minimum)>		

*Photovoice Reflection Prompt B (**STEAM**): STEAM (science, technology, engineering, arts, math) goes one step beyond the well-known STEM to acknowledge the importance of integrating the arts and humanities into more analytical coursework such as that found within engineering. Art can be incorporated through pieces, process, and movements. Explain how participating in the newly developed curriculum incorporated STEAM (specifically, the arts), and lessons learned relevant to STEAM (specifically, the arts).*		
<Insert Picture 1>	<Insert Picture 2>	<Insert Picture 3>
<Insert Caption 1>	<Insert Caption 1>	<Insert Caption 1>
<Insert Narrative (200 word minimum)>		

*Photovoice Reflection Prompt C (**Bio-Inspired Design**): Bio-inspired design uses the nature-focused context of sustainability, security, and/or biomedicine and health outcomes to motivate analogical thinking and improve the engineering design process. Explain how participating in the newly developed curriculum incorporated bio-inspired design and lessons learned relevant to bio-inspired design.*		
<Insert Picture 1>	<Insert Picture 2>	<Insert Picture 3>
<Insert Caption 1>	<Insert Caption 1>	<Insert Caption 1>
<Insert Narrative (200 word minimum)>		

Part 2 - Open-Ended Reflection Questions

Direction: Please respond to the open-ended reflection questions with a minimum of 200 words per questions. Be sure to check assignment for spelling and grammar prior to submission.

*Open-Ended Reflection Question A (**Interdisciplinarity**): The interdisciplinary approach of integrating the entrepreneurial mindset, STEAM (specifically, the arts), and bio-inspired design has been shown to improve student engagement, motivation and learning outcomes. How did this interdisciplinary learning experience affect your ability to engage with the newly developed curriculum?*
<Insert Narrative (200 word minimum)>

*Open-Ended Reflection Question B (**Debrief**): What went well? What didn't go so well? What will you do differently next time?*
<Insert Narrative (200 word minimum)>

Figure 3. Metacognition Reflection Form[2]

9. Evaluating the analysis results and adding safety standards information relevant to the product type or its specs
10. Building a physical prototype through 3D printing or a virtual prototype through animation via SolidWorks Motion Study.

11. Writing the instructions (for use) to be included with the product's prototype as well as provisional patent application as the final report.

2. Development Activity and Feedback

2.1 Development Activity

While introducing the project to his class, the instructor shared the EM forms mentioned above as well as art standards presented to him by an educational consultant[3]:

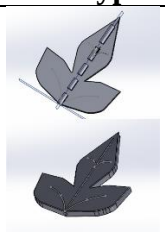
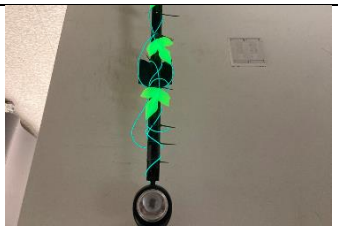
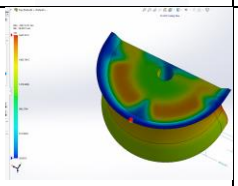
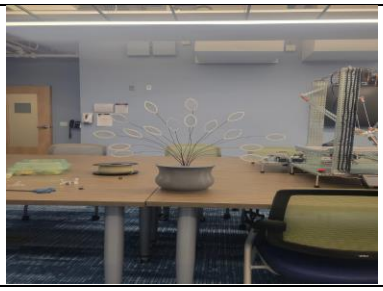
- "Arts and engineering students must demonstrate awareness of practices, issues, and ethics of appropriation, fair use, copyright, open source, and creative commons as they apply to creating works of art and design. [Standard VA:Cr2.2.8a] In this project, the engineering students should demonstrate an understanding and use proper usage rules including citations."[4]
- "Students learn to distinguish different ways art is used to represent, establish, reinforce, and reflect group identity. [Standard VA:Cn11.1.8a] In this project, students might include this level of planning as they design while applying one or more "ART" elements such as lights, color, sound, movement (dance) to represent their group's intentions."[4]

In addition, a biomimicry paper on employing climbing plant concepts in movement (design) of robots[5] was shared with the students. Students were also given a handout on different climbing plants and similar tree species.

Three groups were formed and three designs were selected by these groups, a climbing plant shaped decor that diffracts natural sunlight, an LED garden sign used in lighting a garden during nights to indicate poison ivy, as well as a ground stake with a climbing plant inspired mechanism aiding its anchoring function. Besides the steps given in the section above, students also had to complete an intellectual property (IP) assignment (of copyrights, trademarks, and patents where they studied each IP type, their applications, and durations), and were given additional information on start-up incubators available in the region.

This section of this paper details the development process, also including student feedback and the author's reflections for future improvements. Most of the development activity documentation is based on the "Expanding Root" ground stake. However, Table 1 below summarizes the other two projects, "Poison Ivy Indicator" and "Optical Flower Décor". The table represents the CAD models/virtual prototypes of these designs, their physical prototypes, and the final product while operating. The Poison Ivy indicator employed both 3D printed glow-in-the-dark (climbing vine) leaves and electroluminescent (EL) light wire. The Optical Flower Décor had diffractor sheets placed in 3D printed leaves.

Table 1. Rapid Prototyping and Reverse Engineering projects

Project Name	Virtual Prototypes	Physical Prototypes	Final Product
Poison Ivy Indicator			
Optical Flower Decor			

The Expanding Root design team produced two alternative design ideas as shown in Figure 4a and b. According to the team, they saw "merit in both designs and decided to move forward with CAD designs for both. However, problems risen when attempting to model Design 1 led them to select Design 2, which had significantly fewer problems in creating a functional SolidWorks model. The main criteria shaping their decision process were: ease of design given the time constraints and need for parts outside of what was designed. Design 1 would require a spring to be bought, which they would have to calculate its specifications while Design 2 only required a handful of pins, which were made by the team for the prototype."

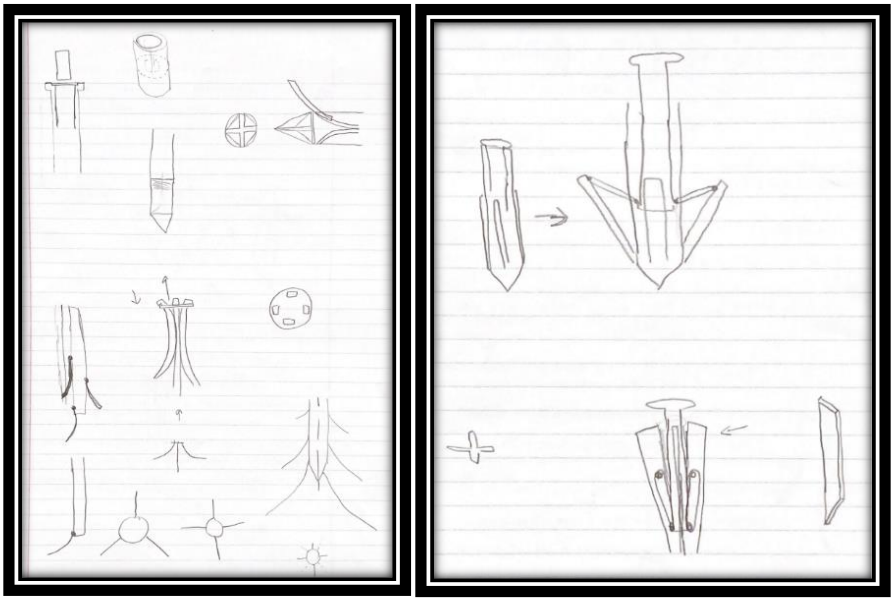


Figure 4a. Alternative Design 1 b. Alternative Design 2

Figure 5a and b illustrate two different forms of system-level design exhibited by the project teams: a hierarchical chart similar to an assembly diagram as well as a CAD assembly model. After the completion of the system-level design given Figure 5a, each component had to be designed (Figure 6) for fabrication or selected for purchase leading to the assembly given in Figure 5b.

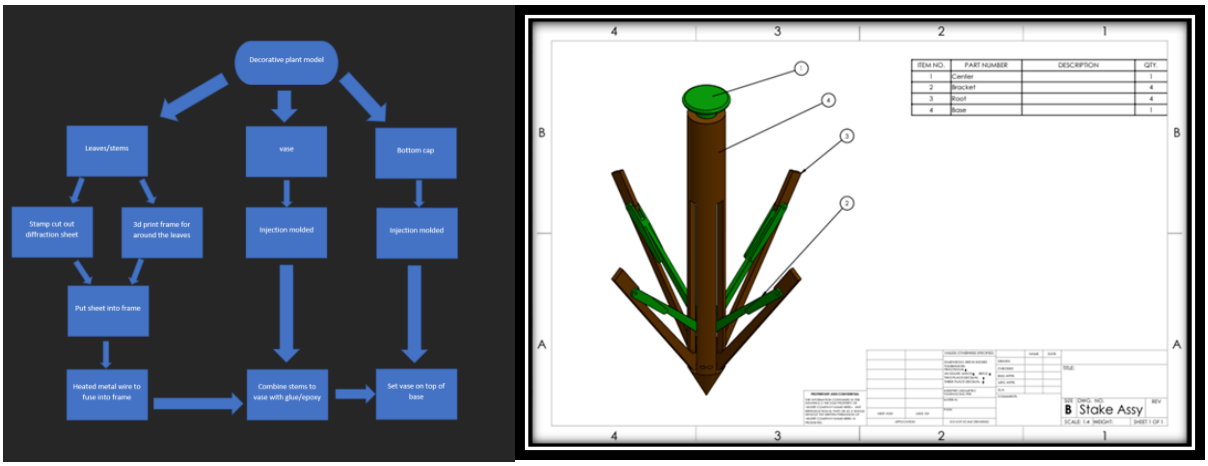


Figure 5a. The Optical Flower Décor b. The Expanding Root assembly

The Expanding Root design had four major elements as follow:

- Expansion Mechanism - Plunger and Brackets
- Expandable Roots - Root affixed to Bracket and Base
- Retraction Mechanism - Plunger and Brackets
- Compact Storage - Base to conceal components

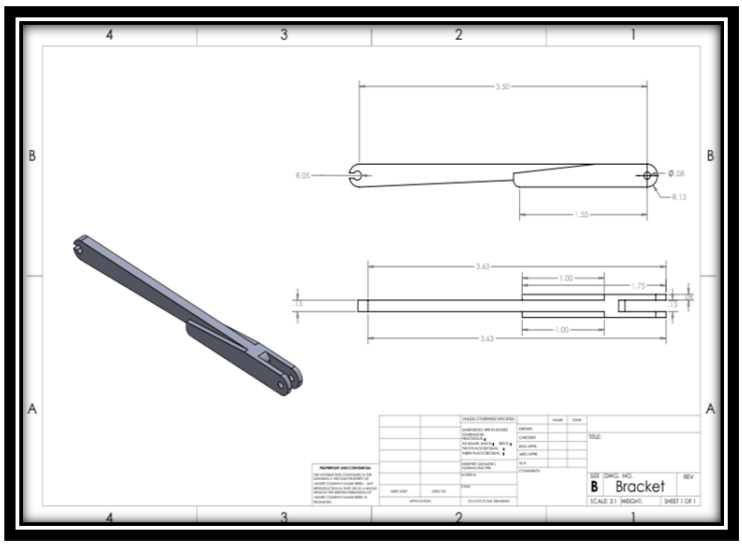


Figure 6. Detail design of a component for the Expanding Root

Customer Discovery Interview Planning and Preparations Form activities were effectively utilized by the Expanding Root Team. The team gaged its potential customers, obtaining their interest towards their possible product, including its price range, and color as evident in the survey results

given in Figure 7a and b. Based on the estimation of costs and the survey results, the team also determined the price of their product – given in Table 2.

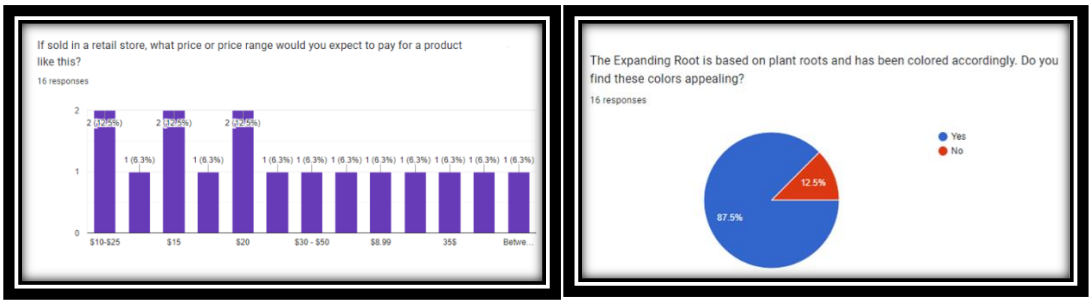


Figure 7a. Price survey for the Expanding Root b. Color survey

Table 2. Cost and price analysis

Cost Analysis	Price Analysis
Material Costs Component: Cost ($) Base: 3.1 Center: 3.2 Root: 4.7 Bracket: 0.68 Sum: 11.68	• "Total Material Costs = $11.68 • Consumer Expected Price = $18.53 (Mean) • Gross Margin (Markup) = 50% • Based on the costs to make, gross margin, consumer expected costs, they will sell our product at $24.99"

A secondary (engineering) analysis were run to see the strength of each component based the extension and anchoring forces. This stage (Figure 8) involved trial of two materials, plastic and steel-based. For the physical prototype, the plastic material was selected due to its lower cost and availability at the university even though the steel alternate considered performed better in the virtual prototyping efforts. The final design of the Expanding Root is given in Figure 9a and b including its color scheme.

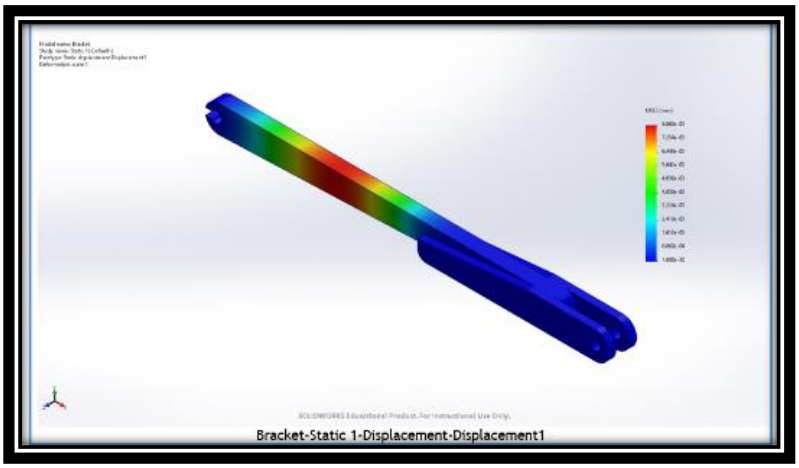


Figure 8. FEA Analysis of a component for the Expanding Root

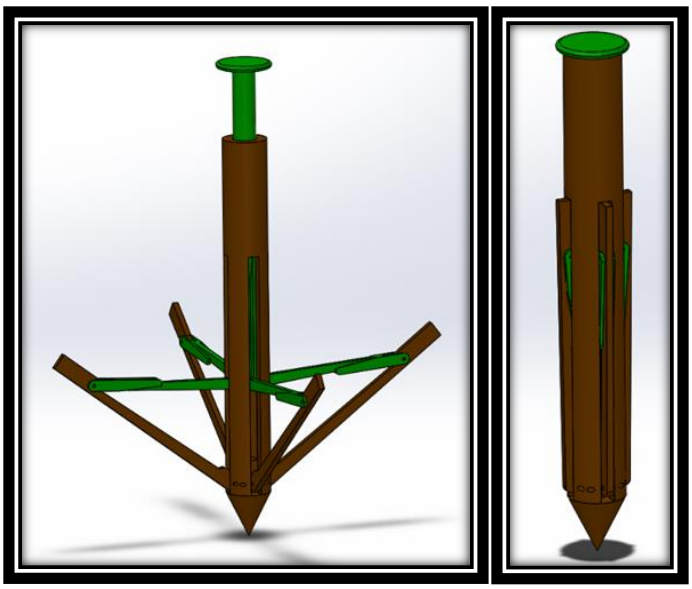


Figure 9a. The final design of the Expanding Root in opened state b. In closed state

After completing the design and physical prototyping process, the Expanding Root team prepared the instructions for use (for different purposes) and the product specifications as illustrated in Table 3 below:

Table 3. Instructions for use and the product specifications

Instructions for Use	Product Specifications
For use in the ground: 1. Insert the pointed end of the stake into the ground. Ensure it goes deep enough that all roots are below ground. 2. Pull up on plunger to expand the roots. 3. Affix what you wish to secure in the ground to the top of the plunger. *For removal:* 1. Detach item from the top of the plunger. 2. Push the plunger down to close the roots. 3. Pull the Expanding Root out of the ground. **For use as a hanging fixture:** 1. Pull the plunger to open the roots. 2. Hang the Expanding Root by its roots (pointed side up) off of what you would like to affix it to. 3. Affix what you wish to hang to the plunger using the lip on the end. *For removal:* 1. Remove the item being hung by the Expanding Root. 2. Detach the roots from where they are hanging. 3. Push on plunger to close the Expanding Root for easy storage.	**Dimensions** Overall Length (in): 13.34 Open Width (in): 8.08 Closed Width (in): 1.25 Base Diameter (in): 1.00 Base Inner Diameter (in): 0.55 **Function** Number of roots: 4 Number of brackets: 4 Extension force (lb): 78.68 Anchor force (lb): 80.00

2.2 Student Feedback and Reflections from the Instructor

Biggest takeaway for the instructor was that some of the students did not think any EM content was included within this course curriculum even though the instructor gave multiple components like Business Thesis Template, Customer Discovery Interview Planning and Preparations Form to the students in advance, also explaining them and their role. The students also had to study IP laws via examples and were given additional information about start-up incubators in the area. Important concepts as "Trade Secrets" and "Non-disclosure" (via Non-Disclosure Agreements - NDAs) were discussed in the class attracting additional student attention. Finally, the students were asked to deliver their final report in a provisional patent write-up including a routing sheet, presented in Appendix A.[6]

However, the overall experience led to three successful and possibly viable product designs including biomimicry and art content. The Poison Ivy Indicator is made in the form of a climbing vine plant, and it is functional. The Expanding Root is inspired by the trees that are trying to survive in wet areas like marshes. The Optical Flower Décor is also a unique product that incorporates lighting as its main feature, as it effectively employs art. During the development process, the students were exposed to new materials like EL lighting wire and diffraction sheets.

Overall experience did not indicate any major issues, since these students were mostly seniors and very capable of engineering design and prototyping including 3D printing, FEA analysis. Since the teams took very different directions, the forms of analysis used varied within the class, i.e. simple visual check of the leaves being printed to select the printing method (i.e. Stereolithography - to introduce phosphorescent powders into clear epoxy resins) or FEA analysis in the case of the Expanding Root.

3. Conclusions and Future Work

The lessons learned from the first design and development cycle will be used in continuous improvements of the course, they will also be applied to the instructor's capstone course projects which often focus on product development. These include but not limited to:

- *Generation of an EM content handout, similar to a handbook including all pertinent tools (forms/assignments) and their roles in EM to get greater attention of the students.* The instructor will refer to this reference early and during the course of the projects when needed. Repetition will be employed to make a stronger impact on the students.
- *Administration of Metacognitive Reflection surveys will also be conducted twice in the semester, during the midpoint and at the end.* Due to the ASEE conference abstract deadlines and recommendation from the professional development workshop staff, this form was administered only once in the semester. Having it administered twice, including once at the end of the semester, will definitely improve student responses, especially on EM.
- *Employment of NVivo software and qualitative analysis of student feedback stemming from the Metacognitive Reflection Forms*. This information will also be made available during the presentation of this paper, before being employed in a follow-up publication.
- *Experimentation with different art components that may include movement.*

The instructor and its collaborators will continue to conduct a similar effort based on similar project assignments to gather more data over time to see the effectiveness of the effort. Additional documentation of the work will be also published in the form of "Scholarship and Teaching of Learning (SoTL) in the very near future.

References

[1] Bosman, L., & Duval-Couetil, N., & Jarr, K. (2022, August), Mentoring Engineering Educators with an Entrepreneurial Mindset – Focused SOTL Professional Development Experience Paper presented at 2022 ASEE Annual Conference & Exposition, Minneapolis, MN. https://peer.asee.org/40430

[2] Communications with Lisa Bosman via Purdue Professional Development Activity, October 2022.

[3] Communications with Katherine Shirey via Purdue Professional Development Activity, October 2022.

[4] National Coalition for Core Arts Standards (2014) National Core Arts Standards. Rights Administered by the State Education Agency Directors of Arts Education. Dover, DE, located at https://www.nationalcoreartsstandards.org, accessed February 28, 2023.

[5] Vidoni, R., Mimmo, T., Pandolfi, C., Tendril-Based Climbing Plants to Model, Simulate and Create Bio-Inspired Robotic Systems Journal of Bionic Engineering, Volume 12, Issue 2, April 2015, Pages 250-262

[6] Provisional Application for Patent – Cover Sheet, located at https://www.uspto.gov/sites/default/files/documents/sb0016.pdf, accessed February 28, 2023.

Appendix A – Provisional Patent Application Cover Sheet[6]

PTO/SB/16 (10-20)
Approved for use through 05/31/2024. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995 no persons are required to respond to a collection of information unless it displays a valid OMB control number

PROVISIONAL APPLICATION FOR PATENT COVER SHEET – Page 1 of 2

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

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INVENTOR(S)		
Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)

Additional inventors are being named on the _____ separately numbered sheets attached hereto.

TITLE OF THE INVENTION (500 characters max):

Direct all correspondence to: **CORRESPONDENCE ADDRESS**

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ENCLOSED APPLICATION PARTS (*check all that apply*)

☐ Application Data Sheet. See 37 CFR 1.76.

☐ Drawing(s) *Number of Sheets* _____

☐ Specification (e.g., description of the invention) *Number of Pages*

☐ CD(s), Number of CDs _____

Other (specify) _____

_____

☐). If the specification and drawings exceed 100 sheets of paper, for micro entity) for each additional 50 sheets or fraction

es Due: Filing Fee of $300 ($150 for small entity) ($75 an lication size fee is also due, which is $420 ($210 for small entity) ($ eof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

METHOD OF PAYMENT OF THE FILING FEE AND APPLICATION SIZE FEE FOR THIS PROVISIONAL APPLICATION FOR PATENT

☐ Applicant asserts small entity status. See 37 CFR 1.27.

☐ Applicant certifies micro entity status. See 37 CFR 1.29.
Applicant must attach form PTO/SB/15A or B or equivalent.

☐ A check or money order made payable to the *Director of the United States Patent and Trademark Office* is enclosed to cover the filing fee and application size fee (if applicable). **TOTAL FEE AMOUNT ($)**

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USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/SB/16 (10-20)
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PROVISIONAL APPLICATION FOR PATENT COVER SHEET – Page 2 of 2

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government. (NOTE: Providing this information on a provisional cover sheet, such as this Provisional Application for Patent Cover Sheet (Form PTO/SB/16), does not satisfy the requirement of 35 U.S.C. 202(c)(6), which requires that the *specification* contain a statement specifying that the invention was made with Government support and that the Government has certain rights in the invention.)

☐ No.

☐ Yes, the invention was made by an agency of the U.S. Government. The U.S. Government agency name is:

☐

_____

Yes, the invention was made under a contract with an agency of the U.S. Government.

The contract number is: _____

The U.S. Government agency name is: _____

_____

In accordance with 35 U.S.C. 202(c)(6) and 37 CFR 401.14(f)(4), the specifications of any United States patent applications and any patent issuing thereon covering the invention, including the enclosed provisional application, must state the following:

''This invention was made with government support under [IDENTIFY THE CONTRACT] awarded by [IDENTIFY THE FEDERAL AGENCY]. The government has certain rights in the invention."

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