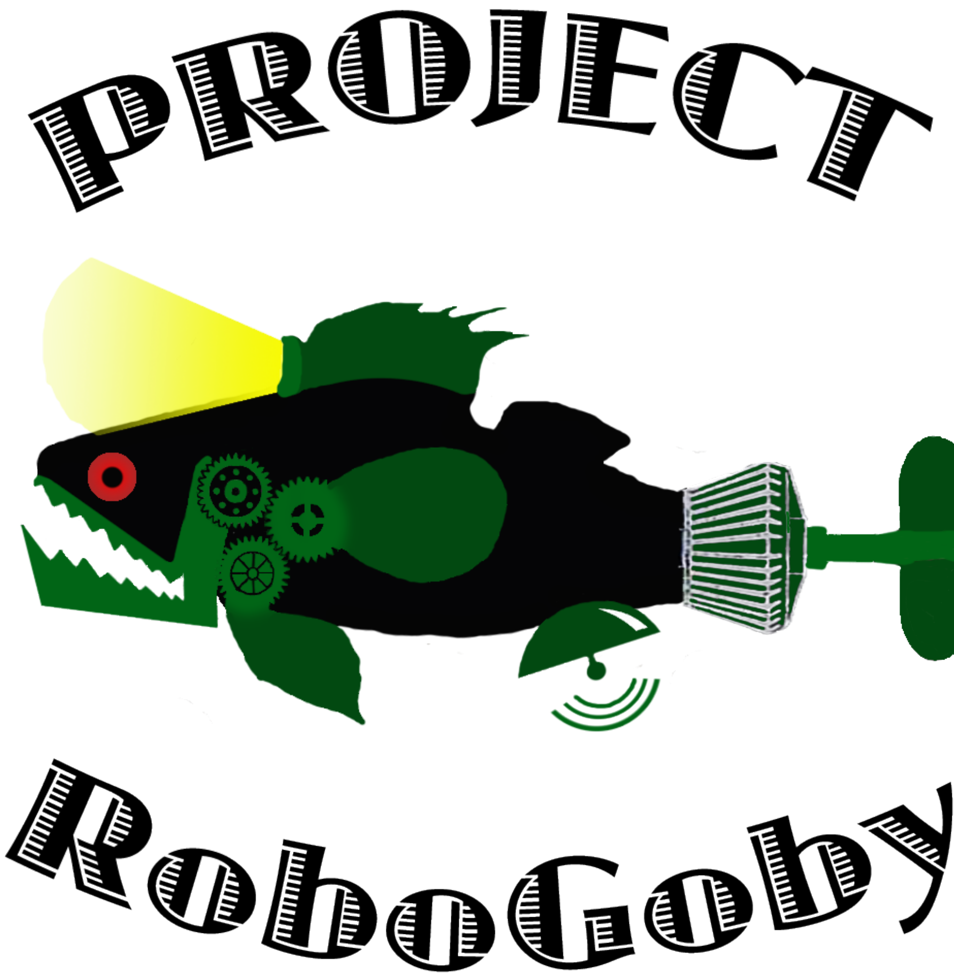
RoboGoby Business Plan



Limbeck Engineering LLC

J. Biberstein, T. Libsack, N. Nelsonwood & L. Wade

Introduction

Limbeck Engineering LLC is an engineering company run by four college students. Limbeck was started with the goal creating an Unmanned Underwater Vehicle (UUV) – this endeavor was called Project RoboGoby.

This document outlines our research into the UUV market in 2016. It also outlines the potential of the up-and-coming UUV market, RoboGoby's competitive strengths and our business strategy for bringing RoboGoby to market.

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1. Executive Summary

RoboGoby will be a small, portable, submersible robot – also referred to as an Unmanned Underwater Vehicle, or UUV – designed by Limbeck Engineering. The first design iteration of the RoboGoby submersible will be a capable and reliable platform optimized for use in the classroom. Uses include the teaching of autonomous control theory and the development of oceanographic sensors. Leveraging software and hardware solutions developed in the classroom, the second version of the RoboGoby platform will be more robust. Specifically, it will be a more accessible solution, in terms of both usability and price, for near-shore oceanographic research, making such research more streamlined.

Limbeck Engineering will focus initially on two main markets for the RoboGoboy platform – academic institutions and research organizations. Limbeck's own preliminary research indicated that UUVs have been underutilized in educational settings. We found in our own research and from professional educators, that educational institutions, especially at the university level, are willing to experiment with products such as ours. The second market we will focus on is marine research. We found that there is significant room for innovation in the field of small-scale, research UUVs. Through further market research, including a professional analysis of the market (see Appendix A), as well as the opinion of several UUV experts and university professors, we confirmed that these markets have the most room for both innovation and growth.

RoboGoby will have a number of competitors in the UUV space. The greatest by far is OpenROV, a UUV marketed primarily to makers and secondarily to educational institutions. OpenROV has run two very successful KickStarter campaigns and has been effective in drawing attention to UUV products in general. There are also larger players in the UUV market, such as Bluefin Robotics, which we do not view as direct competition. A more detailed description can be found in *Analysis of Competition*.

With the advent of the maker movement, the UUV market is projected to grow. According to the IBISWorld report on the Autonomous Underwater Vehicle industry (AUV – a type of UUV), the industry is in the growth stage of its life cycle, with an annual growth of 12.7% from 2009-2014 to a net revenue of $174.2 million. The industry is projected to continue to grow in the future with an estimated annual growth of 20.7% from 2014-2019 to a net revenue of $446.0 million in 2019.

We will be asking for $8,500 from MTI's Seed grant in April to help us in the research and development phase of our project. This phase will take place over the summer of 2016 (May to August) with the goal of creating a marketable alpha prototype. With this alpha prototype, the Limbeck team will begin to market RoboGoby in the fall of 2016 via our contacts at various universities including: The University of Maine, The Massachusetts Institute of Technology, Princeton University, and NYU. This will allow us to begin testing our product in an academic setting. For more information on our request for funding please see *Sources of Funding* and the budget form on our Seed Grant application.

2. Description of Business

Limbeck Engineering is a LLC located in Freeport, Maine and was incorporated in 2013. Limbeck Engineering was formed to bring the RoboGoby UUV platform to market. Currently the company is managed and staffed by three of the principle owners – Josef Biberstein, Travis Libsack, and Nick Nelsonwood – with the fourth principal, Liam Wade, working off-site. During this phase of RoboGoby's development our prototyping will be done in-house – we will use our own equipment and several new acquisitions (e.g. a 3D printer) to accomplish this. Materials will be purchased primarily through online suppliers, such as McMaster Carr and SparkFun Electronics, and from off-site manufacturing facilities. Manufacturing too complicated to be done in-house will be done off-site using facilities such as those of the University of Maine at Orono. Future plans include finding an office or shop space in Portland, ME or in the greater Portland area.

Besides being the place of residence of all of Limbeck's principals, Freeport is a good location for an up-and-coming business of our nature. Being less than 30 minutes away from Portland, ME, which is the center of the maker culture in the state, we are located close to several Maine universities, including University of Southern Maine and the University of Maine at Orono. Freeport is also close to the ocean and therefore is well populated by marine businesses that may be interested in our platform.

Limbeck Engineering will exist initially to develop and market the RoboGoby platform. RoboGoby will be a submersible useful in academia – it will have the features necessary for teaching autonomous control theory (see *Analysis of Competition*) at the graduate level and for developing marine sensors. These features will also allow RoboGoby to act as a low-priced solution for near-shore oceanographic research. RoboGoby will be a small and cost effective UUV combining capabilities of both the ROV (Remotely Operated Vehicle) and the AUV (Autonomous Underwater Vehicle). First and foremost, RoboGoby will be a reliable system, featuring a sturdy construction and a robust software platform. RoboGoby will also feature all six degrees of freedom, making it ideal for teaching controls and will include a stereoscopic camera for computational visual analysis as well as a powerful onboard computer for quick decision-making. Finally, the RoboGoby platform will have the capability to include modular features, allowing for the addition and replacement of certain components on the fly. These features will comprise the barebones model. We will market this model first to universities and improve the design for research organizations.

Motivated by our research of the UUV market, we decided to propose RoboGoby to both researchers and educators. In order to implement this plan, we are deploying RoboGoby in two separate phases (Figure 1) – first in academia as an educational tool and then to marine scientists as a research tool. By marketing RoboGoby first in academia, our product will gain initial exposure in the classroom. Additionally, we will use the code and sensor platforms developed in academia to help us create a more robust software platform as well as include a variety of tested sensors in the research version of RoboGoby. This development plan allows us to fast track RoboGoby for research purposes while still maintaining a high-quality product. After breaking into these markets, success in both academia and marine research will allow us to move into fringe markets that may, nevertheless, hold significant potential (see Appendix A). These markets include aquaculture, hull inspection, and underwater photography.

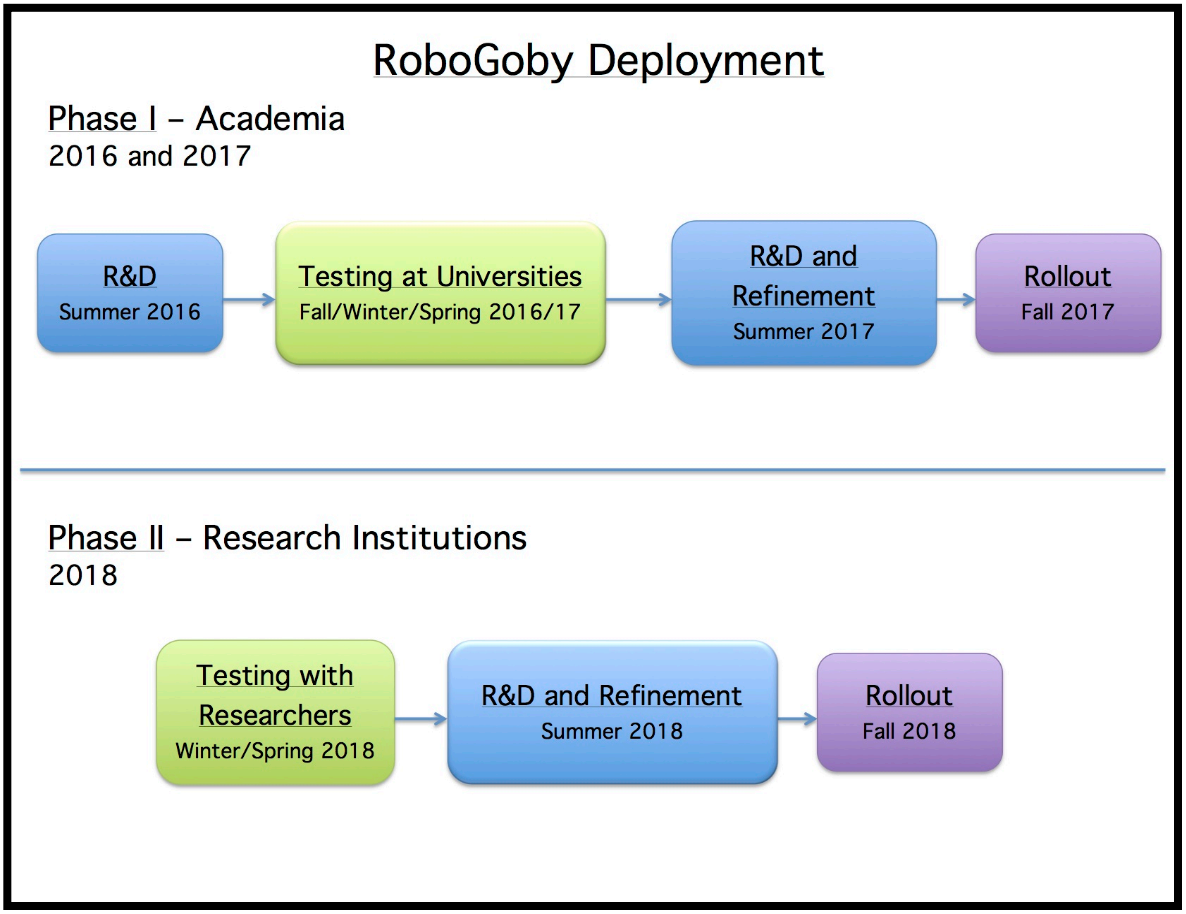
RoboGoby Deployment
Phase I – Academia
2016 and 2017
R&D
Summer 2016
Testing at Universities
Fall/Winter/Spring 2016/17
R&D and Refinement
Summer 2017
Rollout
Fall 2017
Phase II – Research Institutions
2018
Testing with Researchers
Winter/Spring 2018
R&D and Refinement
Summer 2018
Rollout
Fall 2018

Figure 1

3. Market Analysis

In terms of capital, the largest market for UUVs focuses on development for government contracts – specifically defense – as well as inspection of underwater structures, including underwater cables and pipes, ship hulls, and oil wells. There are already a few very large players established in this space, including Kongsberg and Bluefin Robotics. According to the IBISWorld AUV report these companies take up almost 50% of the AUV market. The remaining 50%, based on our own research, is occupied by smaller UUV manufacturers which service small businesses and individuals. These companies make UUVs for use in small-scale inspection, scientific research, education, and recreation. Limbeck Engineering will become competitive in this half of the market by offering a UUV that is innovative, reliable, and tailored for use in both educational and scientific settings.

As described in the previous section, we have identified academia and research to be the most promising markets for RoboGoby. We were initially pointed to the academic market by one of our most influential mentors, Jon Amory, a retired professional from Boston Dynamics. He suggested RoboGoby might have comparable success to LittleDog, a robot Boston Dynamics sold for research at universities such as MIT. There have been numerous papers written on LittleDog by graduate students that act as a testament to its success. This initial notion that academia and research would be viable markets for RoboGoby was backed-up by research commissioned by Limbeck Engineering and completed by Anand Yadav, an alumnus of MIT's Sloan School of Business (see Appendix A). We have also talked with others involved in the academic and research spheres. For instance, we spoke to Professor Emmanuel Boss from the University of Maine at Orono about using RoboGoby to help students develop marine sensors. We also spoke with Lisa Pugh, the education coordinator at the University of Maine's Darling Marine Center who uses UUVs for teaching students about the marine environment. Both Lisa and Prof. Boss have used UUVs in the past (respectively OpenROV and Sea Perch) and expressed interest in seeing a more capable and modular submersible developed. We've also spoken with a number of professionals in the ROV world including: Mike Sacarny from MIT's Sea Grant Laboratory; Joe Harbour, a professor of Ocean Engineering at MIT; Micheal Benjamin, an engineer at Woods Hole Oceanographic Institution; and Joe Lassitar, the father of Bluefin Robotics, one of the first UUV companies in the world. Each of these professionals gave us valuable insight into the UUV market and have helped us solidify our plans for RoboGoby moving forward (see *Analysis of Competition*). In the research sphere, we've also spoken with representatives from the Gulf of Maine Research Institute and Bigelow Labs who have suggested use cases in which a small, capable submersible such as RoboGoby would be helpful.

Currently, there are over 350 engineering colleges and 24,000 high schools across the United States. By selling our submersible as a tool at both universities and high schools we believe we can sell to over 600 customers. By estimating sales at 5% of all universities and selling RoboGoby to roughly 575 high schools at $1,200, we would expect a net income of $720,000. For large-scale production, we project a net initial investment of $50,000 reaching $100,000 by the end of year one (Figure 2). This estimate might be ambitious considering only the academic market. However, we anticipate being able to branch out beyond academia after our first wave of sales, as discussed below and in *Marketing Strategy*.

The second focus of RoboGoby, and the second phase in our business plan, is to sell RoboGoby to researchers. While this market is smaller than the education market, we believe it is extremely promising because of the possibility of selling a more expensive and developed product. With a total market of over 90 research institutions, we predict a larger market saturation, selling to over 10% of all research institutions. We would sell roughly 10 finished submersibles at a price-point of $6000 for a net revenue of $60,000.

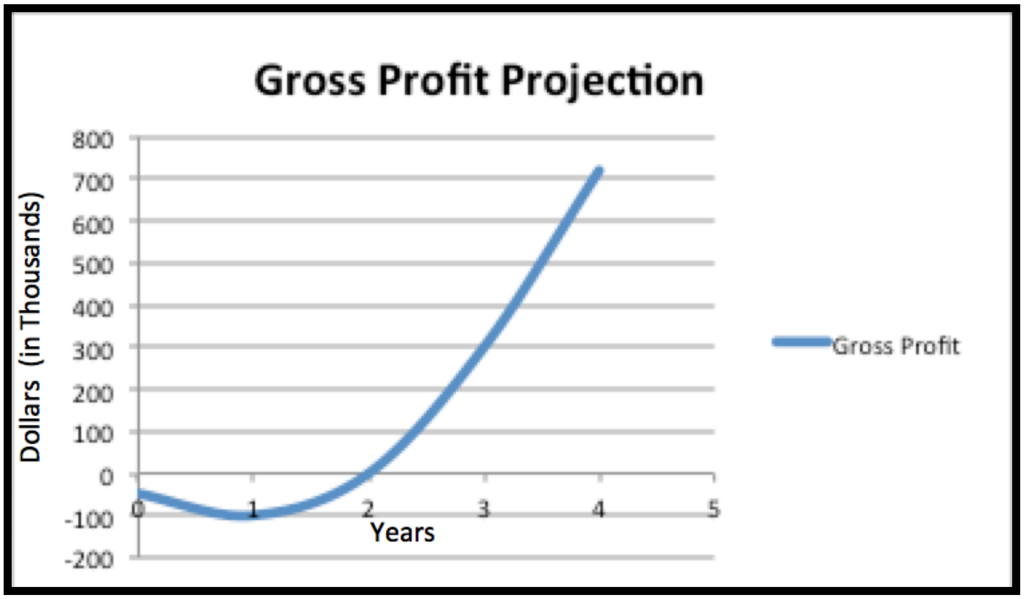

Figure 2

While Education and Research currently seem the most viable based on our research they are not the only markets that have the need for a UUV platform like RoboGoby. Our professional market report indicated a number of fringe applications for our product. One of the most promising of these applications is as a diving aid. Early on in our development as a business, we spoke to Mauricio Handler, a marine photographer and contractor with national geographic, about the use of a UUV as a tool for underwater filming. He expressed great interest in using a UUV for his photography, going as far as to say he would purchase one. More recently, we spoke to Michael Benjamin, and Kyle Woerner (Kyle Woerner is doctoral candidate in MIT's mechanical engineering program specializing in Multi-Vehicle Collision Avoidance for Autonomous Marine Vehicles. He is also special assistant to the US Chief of Naval Operations). Both expressed great interest in testing and possibly using our platform as a diving aid – specifically, as a way to monitor dives, guide divers, record video, and even carry tools for dive operations. Finally, several responses to a survey we issued to the MIT Department of Ocean Engineering students indicated a similar interest in a new UUV diving-aid platform. After exploring the education and research markets, we plan to make the possibility of tapping into such fringe markets part of our long-term development plan.

The UUV market is projected to grow significantly in the near future (Figure 3). According to the IBISWorld report on the Autonomous Underwater Vehicle industry (AUV – a type of UUV) is projected to grow significantly in the near future. Its annual growth rate was 12.7% between 2009 and 2014 with a net revenue of $174.2 million in 2014. The industry is projected to continue to grow in the future with an estimated annual growth of 20.7% in the next five years to a net revenue of $446.0 million in 2019. Furthermore, as the technology required to produce UUVs becomes more accessible, IBISWorld predicts that the market will be ready for new players to enter, with a projected 7.6% increase in the number of industry players between 2015 and 2019. Therefore, the years between 2016 and 2019 will be an excellent time for a new player to enter the UUV industry.

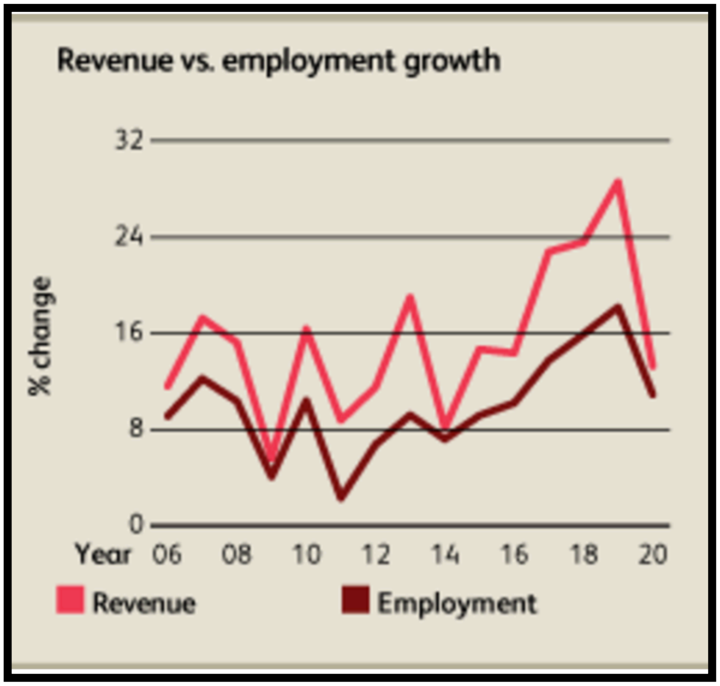

Figure 3

According to the comparison done in our professional market report (Appendix A), there is significant room for UUVs in the less-than $3,000 range. Based on our spending records for our last two prototypes, we believe that we can achieve this price point with a high profit margin and without sacrificing any functionality. This will allow us to undercut our competition and offer a price that is attractive to educational institutions.

The RoboGoby platform offers many options for Limbeck Engineering to remain competitive after the initial exposure of our product. First, there is a strong possibility that we will develop proprietary software or hardware configurations in order to allow our robot to interface with students and which may be applied to other robots. We may also be able to patent various other aspects of our design, such as novel methods of tethering our robot for remote control. Finally, our plan for releasing RoboGoby in two waves – first as an educational tool and second as a research tool – will ensure that our product receives a steady amount of exposure. OpenROV has already proved this method successful by releasing an open source ROV first and then releasing a more polished product several years later.

4. Competitive Analysis

In our initial research, we found a number of UUV companies that sell small submersibles ranging from $999-$3000 in price. Such companies include OpenROV and Aquabotix. Each of these companies are different in their own respect and reflect on the diversity of the UUV market. The following chart was prepared as part of the professional business report we've included (Appendix A). It offers a surface comparison of RoboGoby against many of the currently available commercial UUVs.

Competitors by Price

Player	Fathom	Open ROV	Limbeck	Open ROV	Deep Trekker	Deep Trekker	Aquabotix	VideoRay
Product	Drone	v2.8	RoboGoby	Trident	DTG2 Starter	DTG2 Smart	HydroView Max	Explorer
Price	$450 (est.)*	$849	$1,200	$1,199	$3,899	$8,299	$9,000	$9,995
Max Depth (m)	-	100	50	100	75	125	45	76
Battery Life (hrs)	-	2-3	-	3	4-8	4-8	2	-
In Market	-	Now	Sep 2016	Nov 2016	Now	Now	Now	Now
Weight (kg)	-	2.6	** 5	2.9	8.5	8.5	4.3	3.6
Top Speed (knots)	-	2	5	4.27	2.5	2.5	2	1.9
Size LxWxH (cm)	-	30 x 20 x 15	** 50 x 20 x 15	40 x 20 x 8	32.5 x 25.8 x 27.9	32.5 x 25.8 x 27.9	48 x 37 x 18	30.5 x 23 x 21
Camera FOV (deg)	-	120	120	120	270	270	130	160
Sensors	-	-	Heading, Depth, Temperature, Pitch, Roll, Camera Angle,	-	-	Heading, Depth, Temperature, Pitch, Roll, Camera Angle, and Battery	Orientation, Depth, and Temperature	Heading, and Depth
Degrees of Freedom	-	3	6	4	3	3	5 or 6	3
Other	Can operate using app	-	Stereoscopic, AC Power	-	-	Patented Pitching System	-	-

**Estimated using secondary sources*
***Estimated based on design projections*

Below, we have included an analysis of the UUVs that we believe to be our closest competitors:

- **OpenROV:** OpenROV is an open source ROV made by a group in California. It has garnered a significant following through two very successful KickStarter campaigns. Currently, OpenROV only sells one version of their submersible, but this will change in November 2016, when they release Trident, their new model of ROV. We view OpenROV as our most significant competitor as their product is closest in both intent and pricing to our own. Their primary focus is on makers and explorers, with uses in formal education as a close second. As such, their product relies on the buyer not only having the time and interest to assemble the ROV, but, according to professor Emanuel Boss of the University of Maine at Orono, the expertise to troubleshoot various problems that may arise while assembling it. We believe that our product, while possibly appealing to makers, will out-compete OpenROV in terms of ease-of-use and reliability, and will therefore be more appealing to educators.

- **Aquabotix:** Aquabotix offers several products for both recreation and professional use. These products have many robust features, including a blend of ROV and AUV capabilities – a feature which we plan to include in our own design. However, their products seem to be geared primarily toward use in inspection. Therefore, we do not expect that this product will compete significantly in the education market. Furthermore, we intend to offer our submersible for significantly less than the HydroView Max. Based on the list of features above, we believe that our submersible offers capabilities that Aquabotix does not, such as stereoscopic camera systems and six degrees of freedom.

- **Deep Trekker:** Deep Trekker sells for slightly more than we plan on selling RoboGoby for. It benefits from an integrated user interface and portable design. However, it lacks six degrees of freedom, which gives RoboGoby advantages in maneuverability. Furthermore, Deep Trekker's ROVs lacks support for control through devices other than their proprietary control unit. This would certainly limit the usefulness of the Deep Trekker in the educational and maker markets. RoboGoby will include an easy-to-use interface that will work from both computers and mobile devices.

One of the players that dominates in the UUV market is Bluefin Robotics, formed by some of the pioneers of UUV technology. However, companies like Bluefin are mostly concerned with government contracts and produce products too expensive for civilian or casual educational use. Therefore, we do not view these companies as competitors, but rather indicators of the strength of the market.

RoboGoby will have a number of features that set it apart from other submersibles in its class. To start, RoboGoby will have 6 degrees of freedom – this will allow RoboGoby to move and rotate in three-dimensional space using its thrusters. This feature was requested several times in our survey we distributed to the MIT Department of Ocean Engineering and will allow RoboGoby to have a higher degree of autonomy than its competitors. Particularly, this will make RoboGoby the clear choice for use in teaching controls. In controls classes, students learn to use software to implement algorithms that allow robots to operate effectively on their own. A good example of this is LittleDog, a quadruped robot used at MIT and other universities to teach control theory to graduate students. The control of a UUV submersible represents a very interesting controls problem for advanced students, and 6 degrees of freedom gives students the tools they need to fully implement their solutions. Another feature that sets us apart from our competition is a stereoscopic vision system. Stereoscopic vision allows robots to perceive depth through vision. This is invaluable input to have while, for example, programming the UUV to autonomously navigate obstacles. It also allows the robot to construct and export a 3D representation of its surroundings. Jim Bellingham of Woods Hole Oceanographic Institute, a veteran of the MIT Sea Grant Lab and one of the pioneers of the modern UUV industry, expressed interest in such a system – he indicated that one of the challenges facing the UUV space today was transferring vision from a qualitative to a quantitative tool. RoboGoby will also be a highly modular system. This encompasses features such as a detachable tether, allowing the system to operate both as an autonomous vehicle and under remote control. RoboGoby will also include a modular sensor bay making it easy to replace and develop new sensors for the robot.

Due to problems of waterproofing, a modular sensor bay has been a little-explored feature and we believe there is a possibility for a lot of innovation. This modular section will not only be very useful in the research space, but also for educators. For instance, Prof. Emanuel Boss (see *Market Analysis*) expressed interest in having such a feature to easily test new oceanographic sensors without having to completely redesign the UUV. Finally, we have tailored the scope of our product to be viable in the $1,000 to $2,000 price range. We believe that this low price point will make us attractive in both the research and education spaces. Jim Bellingham reinforced this choice by informing us that the trend in today's UUV market is toward lower priced UUVs.

5. Marketing Strategy

Due to the small size of our business and staff, we plan initially to sell the RoboGoby platform directly to buyers. This includes assembling each unit and responding to any servicing requests we might receive from customers. We will reach out to universities and other educational institutions directly to market our product, focusing on those with strong oceanographic or robotics programs. We have cultivated several contacts in this sphere, as described below. We will also attend conferences to promote our product, having previously attended conferences such as the Envision Maine business conference and the MLTI conference at the University of Maine at Orono. If sales volume grows sufficiently, we will take one of two actions to deal with the increased workload – either outsource production to a larger manufacturer or hire more employees. If sales volume increases dramatically, we will most likely choose the former option while if there is a slow, steady increase, we will keep production in-house.

As previously stated, our deployment will occur in three stages – first to educational institutions, then to research organizations, and finally to fringe cases. As such, after we have built a prototype in the summer of 2016, we will spend the fall of that year sharing our submersible with local universities and high schools in order to build recognition. This effort might also include a KickStarter campaign, which will build off of the excitement surrounding campaigns like OpenROV's. We estimate that the cost for this portion of the venture will be mostly due to travel and should be relatively low. We will also create a dedicated website during this period from which we can market our product and answer customer questions. We also plan to reach out to oceanographic education programs, such as those held at the University of Maine's Darling Marine Center, in the hope that we might promote RoboGoby as a tool to teach students about the oceanographic process and the role UUVs play in it.

Having built our brand recognition, we would like to target our first sales in the summer of 2017. We believe that this will give us sufficient time to build on RoboGoby and to ensure the quality and reliability in our design (Figure 1).

6. Management Plan

**Please see Appendix B for résumés

Up to this point, each member of Limbeck Engineering has shared a portion of responsibility for completing each task required to run the company. This includes both technical and administrative tasks. During the next phase of RoboGoby, we plan on specializing the roles of each member of Limbeck. Each full-time principal will be in charge of a specific aspect of the project – mechanical, electrical, or software – and will be chiefly responsible for the completion of tasks within that sphere. However, the team will still meet as a group to discuss progress and brainstorm ideas while developing RoboGoby. Full team meetings will be held on a biweekly basis to discuss administrative duties and progress toward the general goals of the project.

Three of the Limbeck principals will be working on RoboGoby full time this summer, with the fourth working part time off-site. Each member of Limbeck is fully trained for shop work and for the use of various shop tools, such as a 3-axis routers. Therefore, no extra certification should need to be sought for work on RoboGoby to proceed. The salary of the full time employees will be set at about $3000 for the summer – this is based of what we might make for a summer job working at our respective universities. Our off-site member will be paid an hourly rate of $10, again equivalent to a university rate.

We have a number of mentors who we will stay in contact with as we work over the summer. We are in steady contact with Jon Amory, who is an old high school teacher of ours and is an invaluable resource for both technical advice and general advice regarding the robotics industry. Furthermore, we will continue speaking with with some of our recent contacts, including Jim Bellingham, Michael Benjamin, and Kyle Woerner. Finally, for technical advice, Limbeck's principles will make full use of the services provided by their respective universities, including connections with various professors and researchers. On the business and administrative side, Limbeck will continue leveraging its contacts at the Maine Technology Institute, the Maine Center for Entrepreneurial Development, and at the University of Maine as we continue to develop our business plan.

Over the long term, we would like to continue to develop our product for use in cases outside of education and research. This includes the possibility of a recreational model, which will most likely be reduced in both scope and price. However, given the fact that Limbeck's principles are still in school, we will most likely pursue acquisition by a larger company.

7. Sources of Funding

Name	Amount	Type
Direct Cash Injection	$3,500	Cash
Libra Future Fund	$5,000	Grant
MTI Seed Grant Match	$8,500	Grant
MTI Fournier Prize Match	$5,000	Manufacturing at UMaine (does not count as matching)
Total	**$22,000**	

Use of Funding (Tentative)

Name	Amount
Salary of Limbeck Members	$10,000
Manufacturing	$5,000
Prototyping	$4,000
Shop Equipment	$3,000
Total	**$22,000**

In order to maximize the potential of the MTI Seed Grant, we plan to secure as many sources of matching funds before applying as possible. We will start with a direct cash injection from Limbeck itself. Next, we will apply for the Libra Future Fund grant in the amount of $5,000. Libra Future Fund offers a fast track to those who are applying in order to match an MTI grant. Both the Libra Future Fund and Limbeck's funds will be used as match for the MTI Seed Grant. Finally, we will also be utilizing MTIs $5,000 matching prize for manufacturing at the University of Maine which we won in the 2015 UMaine Business Challenge.

The standing $5,000 prize from MTI will be used for manufacturing and prototyping using the facilities at the University of Maine Orono. Likely activities include the use of injection molding to prototype casing designs for the RoboGoby platform. $4,000 will be allocated for the purchasing of the components required to produce our prototypes. These include microcontrollers, motors, cameras, and various other items. Finally, $3,000 will be allocated to the acquisition of tools to use on-site for prototyping, the most operative one being a 3D printer. The remaining $10,000 will be used to compensate Limbeck for their time spent working on the project.

Appendix A

Affordable AUV/ROV Market Research and Analysis

Prepared By: Anand Yadav
Date: Jan 04, 2016

Shailendra "Anand" Yadav

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AREAS OF EXPERTISE INCLUDE

- Market Research and Analysis
- Technology Transfer
- Financial Modeling
- Product Management
- Entrepreneurship and Innovation
- Biosensing Technologies, Wearables, 3D Printing, Microfluidics, Genomic Technologies
- Partnerships
- Technology Strategy
- New Product Development
- Device Manufacturing
- Program Management
- Mindfulness-Based Stress Reduction (MBSR)

SKILLS HIGHLIGHTS

Business Development and Product Marketing

- Conducted business diligence for novel physiological monitoring technology that led to identification of Anxiety Disorders as a potential market
- Co-built an advisory board comprising of leading psychiatry and psychophysiology thought leaders and a medical device executive
- Interviewed psychiatrists and psychologists to asses user needs; interviewed psychophysiology researchers to gather feedback on existing solutions and used information to define new product features
- Managed booth at a national anxiety disorder conference attended by clinicians, conducted wearable biosensor prototype demos and gathered feedback on product features, usability and potential applications
- Designed and conducted in-person survey at national conference to listen to the voice of customers (VOC)
- Gathered input from professionals (including executives, academics, technology developers, vendors) in microfluidics industry, using web-based survey, to study technology diffusion and adoption. Recommended strategies to drive value capture in microfluidics market in a graduate level thesis
- Developed financial models in Excel and created sales forecast scenarios

Product Management and Product Development

- Gathered customer requirements; developed Product Requirements Documents (PRD); created product roadmap for brain health product
- Directed hardware (mechanical and electrical) product design, product development (prototyping through production) of wearable biosensor *neuma*; led Design for Manufacturing and Assembly (DFMA) review; conducted Cost of Goods Sold (COGS) and breakeven analysis; managed supply chain; developed Quality Assurance (QA), testing protocols and documentations, along with customer ordering, product distribution and customer support workflows
- Created and managed project schedule and budget for design, development and delivery for wearable biosensor product
- Managed cross-functional teams

PROFESSIONAL EXPERIENCE

NEUMITRA, Inc, Boston, MA 2010-2015

Co-founder, Product Lead, Board Member

Led product development, manufacturing, and operations for wearable technology for brain health; co-led product design; co-led business development

- Co-invented wearable monitoring and treatment technology for psychological disorders at a MIT Media Lab course; co-founded start-up with 2 co-founders; wrote business plan; developed founders' agreement; conducted market research and surveyed potential customers
- Co-built a small team of scientist and engineers and an advisory board. This led to successful alpha prototype and research collaboration opportunities with clinicians at leading hospitals in Boston area
- Designed and developed mechanical components in alpha prototypes. Collaborated with industrial design company to significantly improve the look and feel of product that won the demo god award at 2012 DEMO conference
- Developed manufacturing plan for alpha, beta and production units for US and China manufacturing.
- Built strong relationships with manufacturing partners; negotiated pricing and terms

- Developed budgets, financial projections and financial statements to support successful seed and follow-on funding from top angel investors in US

ROCKHEALTH, Boston, MA 2012
Fellow

MASSCHALLENGE, Boston, MA 2012
Fellow

MIT SYSTEM DESIGN AND MANAGEMENT, Cambridge, MA 2008-2010
Fellow

BROAD INSTITUTE OF MIT AND HARVARD, Cambridge, MA 2006-2011
Bio-Automation Manager (2007-2011)
Led and managed a small bio-automation group in genome sequencing platform to support genome sequencing process improvement efforts. Supervised technology development and advised maintenance group on technical issues

- Co-invented disposable shearing device (DSD) for DNA shearing; collaborated with in-house business development office for patent filing, device testing and potential licensing by two life science companies. Led design and development of DSD device, which offered significant performance improvement over conventional solution. The device was adopted by multiple groups at Broad into their production process.
- Created collaboration with external institute to conduct proof-of-concept for microfluidics DNA shearing. Led in-house prototype development of microfluidic disposable shearing device which resulted in optimized design for larger fragment size. Developed shearing model, designed microfluidic chip, managed chip fabrication with external vendor and conducted design of experiments (DOE)
- Created and led the partnership with the instrumentation company for co-development of benchtop microfluidic instrument. Led the early phase of joint-development– including user needs analysis, engineering specifications, product concept development, project plan development and joint-development agreement drafting

Bio-Automation Engineer II (2006-2007)
Led efforts to gather user needs and developed technical solutions for multiple scientific groups at Broad Institute

- Directed collaborative effort with platform director to implement successful prototype of microfluidic platform based on droplet microfluidics for improving performance of emulsion-based Polymerase Chain Reaction (PCR) in next generation sequencing process
- Developed a high-throughput automated platform for RNAi libraries production and screening that significantly improved throughput, ease of operation and minimized failure rate
- Conducted user needs analysis; developed engineering specifications; performed market research; negotiated discounted pricing; and customized hardware and software in collaboration with vendor, which led to technical and financial benefits that exceeded user expectations
- Trained users on instrument operation, troubleshooting and maintenance, helped developed SOPs and co-coordinated with vendor to advise users on maintenance issues

WHITEHEAD INSTITUTE FOR BIOMEDICAL RESEARCH, Cambridge, MA 2001-2006
Bio-Automation Engineer I
Designed and implemented laboratory automation based technology solutions for Human Genome Project (HGP), which for continuous process improvement of data quality, cost and cycle time reduction

- Co-developed control and scheduling software in Visual Basic to control up to 3 liquid handling and plate stacking instruments Custom software reduced process cycle time and improved ease of operation compared to standard vendor software
- Designed and fabricated novel wash station for 96 channel automated pipette head that significantly reduced sample cross contamination on two liquid handling robots
- Programmed commercial automated systems using respective GUI and text based programming languages to implement a variety of SPRI based sequencing protocols
- Provided technical support to users for instrument operation, troubleshooting and co-coordinated with vendor and in-house maintenance group on maintenance issues

MASSACHUSETTS GENERAL HOSPITAL, Boston, MA 2005-2006
Engineering Consultant

EDUCATION

Massachusetts Institute of Technology, Cambridge, MA 2010
Master of Science, Engineering and Management
Thesis: Analysis of Value Creation and Value Capture in Microfluidics Market

Tufts University, Medford, MA 2001
Master of Science, Mechanical Engineering
Thesis: Thermomechanical Analysis of an Ultrasonic Rapid Manufacturing (URM) System

Punjab Engineering College, Chandigarh, India 1999
Bachelor of Engineering, Mechanical Engineering

HONORS

- Breakout Labs Grant Recipient, Peter Thiel Foundation, 2015 *(Neumitra)*
- Invited guest speaker at MIT Systems Design and Management Systems Thinking Webinar Series, 2013
- MassChallenge Silver Winner, 2012 *(Neumitra)*
- Rock Health Grant Recipient, 2012 *(Neumitra)*
- Invited guest speaker at Emmanuel College, 2012
- Mass High Tech Start-up to watch, 2011 *(Neumitra)*
- Invited guest speaker at MIT Systems Design and Management Systems Thinking Webinar Series, 2010
- 1st place in Product Design and Development (Dental needle-stick safety device), MIT, 2009
- Outstanding Thesis, System Design and Management, MIT, 2011
- Outstanding Teaching Assistant, Mechanical Engineering, Tufts University, 2001
- Full-tuition scholarship, Tufts University, 1999
- Government of India Nominee, Indian Embassy, Nepal, 1995

PUBLICATIONS/PATENTS

- Patent application on wearable electronics *(Submitted on May 1, 2015)*
- Devices and Methods for Treating Psychological Disorders, United States Patent Application: 20110245633
- Nucleic Acid Shearing Device with Disposable Cartridge, United States Patent Application: 20110201797
- Thermomechanical Analysis of an Ultrasonic Rapid Manufacturing (URM) System, Journal of Manufacturing Processes, SME, Vol. 7/No. 2, 2005

CERTIFICATION

- Six Sigma Green Belt, 2011

OTHERS

- Designed physiological data-driven meditation tool for *neuma* app
- Completed 8week Mindfulness-Based Stress Reduction (MBSR) 8 course and a 10 day silent mindfulness retreat; Practicing mindfulness for over 10+ years
- Wrote blog on meditation on *coach.me*: http://blog.coach.me/how-i-meditate-neumitra/
- Speak 4 languages: English (fluent), Nepali (fluent), Hindi (fluent), Maithali (conversational)
- Lived, studied and worked in 3 countries (Nepal, India and USA)
- Traveled to 14 countries and 3 continents
- LinkedIn: https://www.linkedin.com/in/anandyadav
- Twitter handle: @saybos

Table of Contents

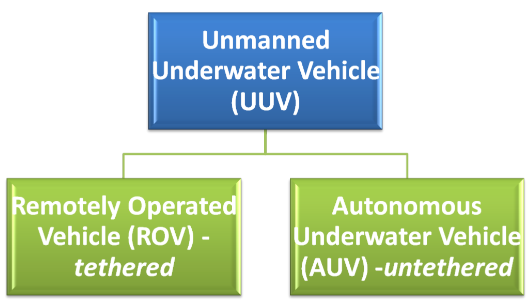
1. Executive Summary

The time for affordable Unmanned Underwater Vehicles (UUV) has never been right. The availability of cheap and enabling technologies, coupled with the lack of affordable UUVs are primarily driving the current demand. The competitive landscape provides insight into several emerging players with ROV products already being sold to users in various application areas - *business, scientific research, education, recreation* and *connected exploration*. While the price of such products range from $849 to $9,995, there seems to be at least one product under development with reported price of $450. Based on Limbeck's strength and current market opportunities, *scientific research* and *education* seem to be important application areas for Limbeck. It seems the potential niche applications for Limbeck's technology may emerge from these two areas. However, the space will likely grow rapidly in the next year or two with increasing competition and Limbeck is advised to develop a commercialization plan for 2016.

2. Background & Technology Evolution

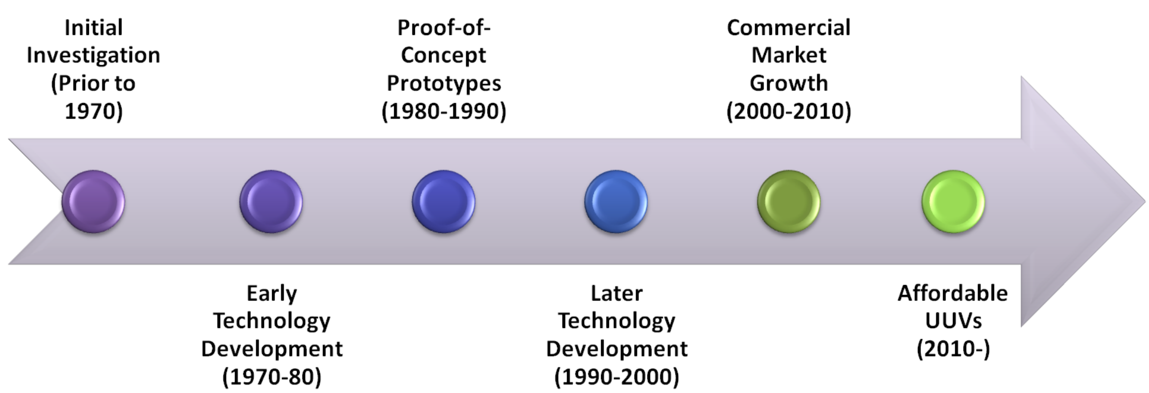
Limbeck Engineering was launched in 2013 to commercialize the Project RoboGoby, which has been under R&D prior to launch. According to Limbeck, *"Project RoboGoby is an extensive design project that involves many different aspects of engineering, but is centered around how humans interact with the ocean. Limbeck is hoping to create an ROV with autonomous capabilities which is affordable, easy to use, and, most importantly, innovative. We chose the name RoboGoby because goby, a type of fish, complements the abbreviation "robo.""*

As Limbeck is nearing completion of its alpha prototype, the company has begun conducting market research. The primary interest for such research is to determine the viability of a mid-range, mid-priced ($1K-$10K) unmanned underwater vehicle (UUV) in a coastal New England. As a part of this research, the company wants to identify the potential use cases for its product; it also wants to understand the competitive landscape for product positioning. Limbeck's Project RoboGoby fits under the category of UUV.



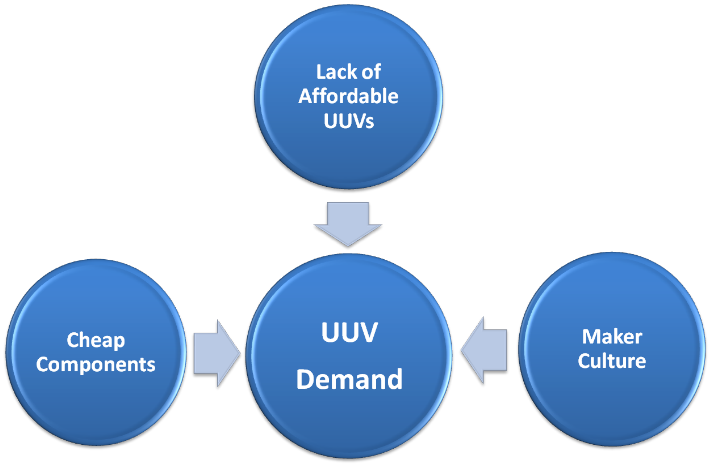
There are generally two types of UUV - Remotely Operated Vehicle (ROV) and Autonomous Underwater Vehicle (AUV). An ROV is an underwater vehicle with no human occupant and is connected to a ship by a series of cables for communication or power or both. On the other hand, AUV doesn't communicate with the ship and can conduct underwater mission on its own. Once the mission is complete, the AUV will return to a pre-programmed location for data transfer.

AUV development began in 1960s with a few prototypes for data gathering. During 1970s, examples of further technology development include University of Washington's prototypes to gather data from Arctic regions. Further experimentation in proof-of-concept in 1980s led to development of more capable prototypes with advancement in low-power computer, memory and software engineering. During 1990s, the world saw commercialization of prototypes into operational systems. The commercial products started to become available in 2000s with further work in technology refinement, market development and scaling of the offerings. As the incumbent technology continues to mature, it seems there is now an opportunity for affordable UUV starting open to meet the low-end of markets comprising of: small businesses; individual researchers; recreationalists; and citizens scientists/explorers.



Source: The Development of Autonomous Underwater Vehicles (AUV);A Brief Summary, D. Richard Blidberg

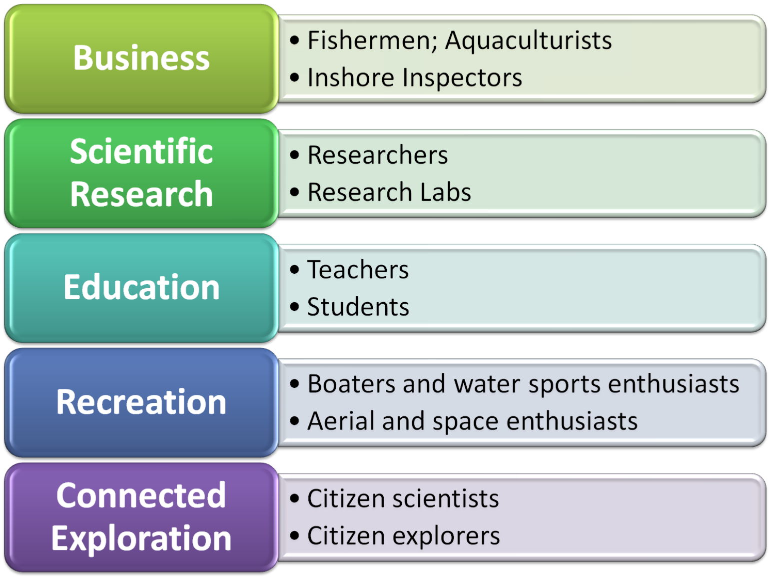
3. Demand Opportunity



There appears to be three major sources of demand for UUVs.

1. **Cheap components:** The costs of components have been dropping while at the same time there are proliferations of new enabling technologies (e.g. 3D printed mechanical parts, Arduino microcontroller, Raspberry Pi embedded controller)
2. **Maker culture:** Since around 2008 or so, there has been rise in maker movement - one led by a DIY community of hobbyists, artists, engineers and laypersons to build simple components to increasingly complex systems - in some cases even fashion accessories - to help translate their creativity into objects that will improve and enhance lives.
3. **Lack of affordable UUVs:** Based on the competitive analysis, it seems that until the arrival of OpenROV and Deep Trekker solutions, UUV price ranged from around $5K and above. In the age of consumer electronics devices, which cost only several hundred dollars, $5K is too high.

4. Applications and Users



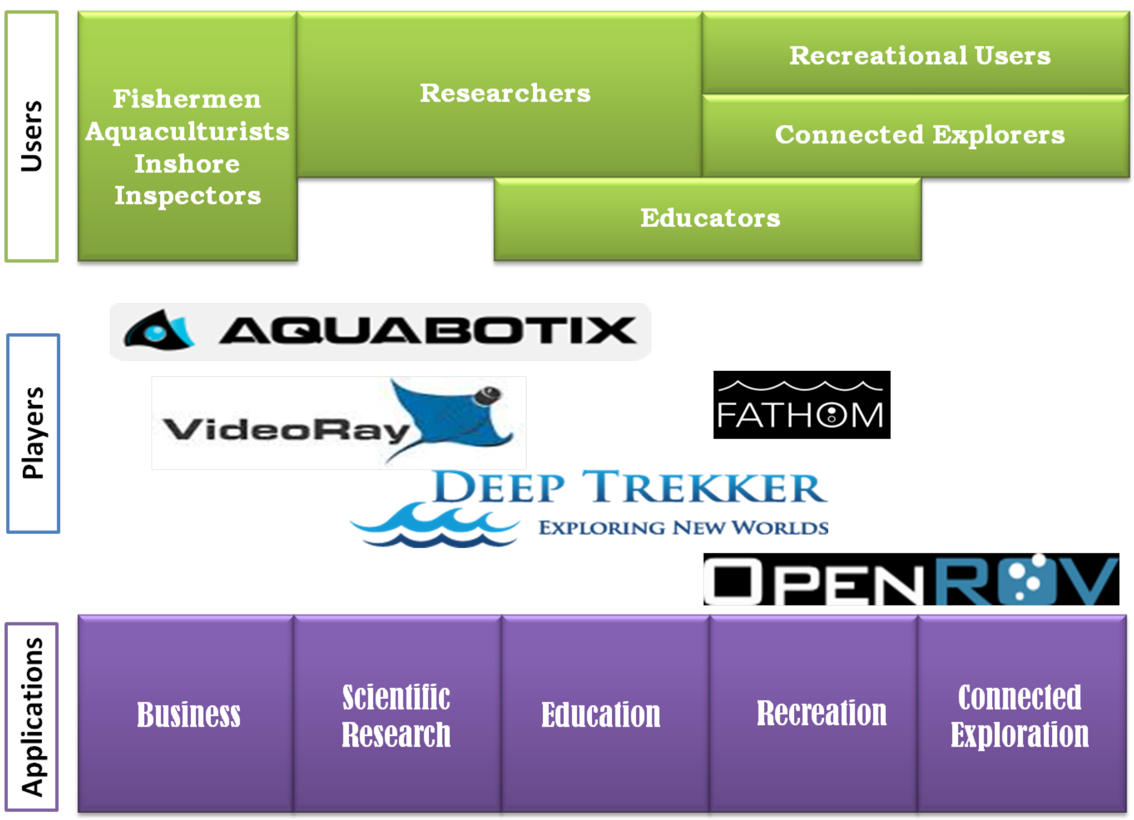
There seems to be five broad areas of applications with distinct users in each area.

1. **Business**: Primarily, there are two types of users in this area.
    a. Fishermen and Aquaculturists: Fish farming is a key application in New England coastal area. The need to cost-effectively monitor fish stock is important. So is the need to protect stock from any predator and keep it safe from dead fish.
    b. Inshore inspectors: There are several types of routine inspections of infrastructure currently performed in shallow or protected waters: bridge inspection; under waterline inspection; and potable water tank inspection
2. **Scientific Research**: Scientific community has been using UUVs since they became available. They are used for: a range of discoveries including ancient ships, sunken artifacts; monitoring waterbeds and underwater sea lives.
3. **Education**: Existing marine science education for high school and college students include "marine science camps" or at-sea explorer programs.
4. **Recreation**: Boat owners and scuba divers may be interested in expanded underwater exploration activities. Also, there are other recreationists – including current aerial drone and space enthusiasts - who would be able to use complementary technologies (e.g. head mounted displays like Oculus Rift) to virtually experience such exploration.
5. **Connected Exploration**: This type of exploration enable a group of individuals – ranging from amateurs, hobbyists and professionals – to collectively explore, interact with each other and even drive ROV via internet.

5. Business Ecosystem

The UUV ecosystem includes different players and users covering five applications described previously. Among the players – as captured in *Competitive Analysis* – include established players like VideoRay; new players like Deep Trekker, OpenROV and Aquabotix; and potential new entrant like Fathom, which still has its product under development.

As visually captured below, it seems that each of the players and the user groups seem to cover more than one application area. The exceptions are: Fathom, which may be initially targeting recreation application only; fishermen, aquaculturists and inshore inspectors may primarily be interested in business applications.



6. Competitive Analysis

The following table captures the competitive landscape of current players with products ranging from $849 to $9,995. The price for Fathom product, which is still under development, is based information reported in the media. As of this report date, there seems to be only two products on the market in <$3000 category. In this category, the primary focus applications seem to be *Recreation* and *Connected Exploration*.

Player	Fathom	Open ROV	Open ROV	Deep Trekker	VideoRay	Aquabotix	Aquabotix	Deep Trekker	Aquabotix	VideoRay
Product	Drone	v2.8	Trident	DTG2 Starter	Scout	HydroView Sport	HydroView Plus	DTG2 Smart	HydroView Max	Explorer
Price	$450 (est.)*	$849	$1,199	$3,899	$5,995	$5,500	$7,000	$8,299	$9,000	$9,995
Max Depth (m)	-	100	100	75	76	45	45	125	45	76
Battery Life (hrs)	-	2-3	3	4-8	-	2	2	4-8	2	-
In Market	-	Now	Nov 2016	Now	Now	Now	Now	Now	Now	Now
Weight (kg)	-	2.6	2.9	8.5	3.6	4.3	4.3	8.5	4.3	3.6
Top Speed (knots)	-	2	4.27	2.5	1.9	2	2	2.5	2	1.9
Size LxWxH (cm)	-	30 x 20 x 15	40 x 20 x 8	32.5 x 25.8 x 27.9	30.5 x 23 x 21	48 x 37 x 18	48 x 37 x 18	32.5 x 25.8 x 27.9	48 x 37 x 18	30.5 x 23 x 21
Camera FOV (deg)	-	120	120	270	160	130	130	270	130	160
Sensors	-	-	-	-	-		Orientation	Heading, Depth, Temperature, Pitch, Roll, Camera Angle, and, Battery	Orientation, Depth, and Temperature	Heading, and Depth
Other	Can operate using app	-	-	-	-	Can operate using app	Can operate using app	Patented Pitching System	-	-

**Estimated using secondary sources*

7. SWOT Analysis

In light of the competitive landscape for affordable UUVs, Limbeck's current situation can be analyzed using SWOT framework.

1. **Strengths**:
    a. Limbeck team members are passionate about engineering and possess love for building things.
    b. Because of Limbeck's team members technical background and maker expertise, team has an ability to create significant technical value in terms of UUV capabilities and performance.
    c. Because of Limbeck's existing connections with Gulf of Maine Research Institute and Bigelow Laboratories, it is well positioned to build partnerships to identify early adopters among researchers and businesses. Some of team members are also currently students at MIT, where they can tap into AUV Lab resources and connections.
2. **Weaknesses**:
    a. As their first venture, Limbeck team members may be excellent at research and development but may be not at commercialization.
    b. Limbeck team members are also college students and the demands on their time may be high.
3. **Opportunities**:
    a. UUV ecosystem is still developing and is far from reaching maturity. There is a potential for significant value creation for new players.
    b. The new players have validated some of the users in the ecosystem, who seem excited about the possibility of affordable UUVs.
4. **Threats**:
    a. Among the players in the ecosystem are both established player (with somewhat mature but expensive products) and new players (with new but inexpensive products). Established player may develop inexpensive products while the new players may see their products getting adopted.
    b. There is also an emerging player with lowest reported cost and high ease of use. This may appeal initially to users among recreation but potentially to other categories as well.

8. Recommendations

Based on this market research and analysis, this report makes the following recommendations:

1. Prioritize application areas, where Limbeck's strengths will be asset. Those areas in the order of priority are:
    a. *Scientific Research:* Research users generally can pay more but they also demand quality. Education users may be willing to trade off price with slightly less quality. Limbeck should build new relationships with MIT AUV Laboratory and Woods Hole Oceanographic Institution. MIT AUV laboratory's resources will be worth tapping into even though they have commercialized their research into BlueFin Robotics (and don't seem to have active programs at the moment).
    b. *Education:* As for education, Limbeck should build relationships with educators with active future marine science programs in their high-school or college. A good place to start would be to contact Marine Science Institute (CA) and Ocean Exploration Trust (CT).
    c. *Business:* This is an application area, where a good user research will be necessary to prioritize use cases. Based on the current market research, there seems to be potentially lucrative use cases in this application area.

   Both *Scientific Research* and *Education* can benefit from a product under $3000 category, where there is less competition.

2. To minimize Limbeck's current weaknesses, the team may consider working with someone experienced to develop a commercialization plan, identify early challenges and help develop strategies to address those.

3. Limbeck should fully take advantage of the fact that the ecosystem is developing with room for new players. It would be wise for Limbeck to start thinking about niche applications keeping Limbeck's strengths in mind. It seems the potential niche areas may emerge from research applications. Such applications can also be funded through grant, minimizing the need to seek other funding.

4. Finally, Limbeck should be fully aware that there are emerging players in this space. Early presence generally have lasting influence in the market and among user groups. It would be in Limbeck's interest to put a product in the market this year or by 2017 in order to be a competitive player.

Appendix B

Résumés

Josef X. Biberstein
43 Byram Avenue
Freeport, ME 04032
jxb@mit.edu

Education:

Attended Freeport High School in Freeport, Maine. Graduated 2015 summa cum laude with distinction. Currently attending the Massachusetts Institute of Technology and studying Aerospace Engineering and Physics.

Previous Work:

Charter Crew – Maine Maritime Museum summer cruises: responsible for general crew duties around the vessel as well as historical narration on the Kennebec River.
Contact: Jason Morin – Director of Public Programs
Email - morin@maritimeme.org Phone - (207) 443-1316 ext. 333

Experience:

Gained significant experience in engineering and project management during high school. Accomplishments include: third and first place in the Maine Wind Blade Challenge (hosted by the University of Maine, Orno) for the design of the most efficient wind turbine system; design and construction of a 3D printer system; construction and presentation of a "laser harp" synthesized musical instrument for high school capstone project; and work on several successful prototypes of the RoboGoby remotely operated submersible robot.

Expertise include: coding, including in-depth knowledge of C++, Java, C++/CLI, and .NET; software design including networking, user interface design, computer vison and image manipulation, control of physical systems (motors, lasers, and sensors); familiarity with a wide range of Linux based microcomputers and controllers, including the BeagleBone, Raspberry Pi, and Odroid families, as well as working knowledge of Arduino and basic circuit design; and significant knowledge of flow dynamics and the process of optimization for systems moving through fluids.

Awards:
- Nominated for U.S. Presidential Scholar 2015
- Poetry Out Loud, Maine 2014 and 2015 Regional Finalist, competed in state championships
- Recipient of 2014 Silver Key Scholastic Writing Award for Maine,
- Phi Beta Kappa of Maine Outstanding Achievement Award 2014
- Recipient of two Diplomacy Award's and Best Delegation award at the Maine Model United Nations Conference '13, '14 and '15
- Winner of Freeport High School academic achievement awards in Math, English, Social Studies and Latin over freshman to junior years

Travis C. Libsack

207-891-9133 | libsackt@mit.edu

Education

Massachusetts Institute of Technology
Candidate for Bachelor of Engineering in Mechanical Engineering

Cambridge, MA
June 2018

Experience

MIT Computer Science and Artificial Intelligence Laboratory
Undergraduate Researcher, Perceptual Science Group

Cambridge, MA
Sep. - Dec. 2015

- Tested different lenses and light sources to create a small source of parallel light for GelSight, a robotic touch sensor
- Tested various cameras and camera lenses in order to find he best match for GelSight
- Designed and built a robust version of the sensor for the lab.

Text

Project RoboGoby
CoFounder and Engineer

Freeport, ME
2013-2015

- Launched with friends the development and design of an ROV and an LLC
- Engineering two different submersible models, the Alpha and Beta designs
- Documentation: https://robogoby.blogspot.com

Port Builders LLC
Employee/Carpenter's Assistant

Freeport, ME
Summers, 2014/15

- Built houses in a team of four while learning about building techniques and reading plans

MIT Toy Design Class
Student

Cambridge, MA
Spring 2015

- Ideated and built "Bubble Tunes", a toy that can hook up to any music device and visually show notes using bubbles.

MASLAB Competition
Student Participant

Cambridge, MA
January 2015

- Designed and build an autonomous robot used in MIT's Mobile-Autonomous-Systems LABoratory class.
- Earned second place in the competition

Leadership

Boy Scouts of America: Eagle Scout

Cumberland, ME
2012

Skills

Software: Solid Works, Eagle, MATLAB, python, linux
Prototyping Experience: 3D printing, laser cutter, CNC router, CNC mill, lathe, shop tools

Nicholas J. Nelsonwood

43 Lambert Rd
Freeport, ME 04032

Cell: (207)-798-9689
E-Mail: nn2@princeton.edu

Education

Princeton University, Princeton, NJ — **2014-Present**

- Studying Mechanical and Aerospace Engineering
- Candidate for *Bachelor in Science of Engineering*

Freeport High School, Freeport, ME — **2010-2014**

- Graduated *Summa Cum Laude with Distinction*

Work and Service Experience

Limbeck Engineering, *Cofounder and Engineer*, Freeport, ME — **2013-Present**

- Created, with friends, an LLC to further our development and construction of an ROV
- Engineered and built two versions of the submersible
- Documentation: https://robogoby.blogspot.com/

Laughing Stock Farm, *Farm Hand,* Freeport, ME — **Summer 2015**

- Took care of 11 acres of vegetables with five other farm hands, including driving large machinery
- Contact: Lisa Turner (207)-841-8385 | lisa@laughingstockfarm.com

Freeport Conservation Trust, *Volunteer*, Freeport, ME — **2011-2014**

- Took care of a trail near my house and organized occasional events

Tuscan Brick Oven Bistro, *Busser,* Freeport, ME — **Summer 2014**

- Bussed and set tables
- Contact: Margaret Duplessis (207)-314-4795 | mduplessis72588@gmail.com

Wolfe's Neck Farm, *Teen Ag Crew,* Freeport, ME — **Summer 2013**

- Ran the farm for the summer – under the supervision of two full time employees

Activities

Men's Ultimate Frisbee, *President,* Princeton, NJ — **2014-Present**

- Player on the team
- Organize travel and housing for tournaments

Princeton Garden Project, *Manager,* Princeton, NJ — **2014-Present**

- One of five garden and events organizers

Princeton Triangle Club, *Theatre Technician,* Princeton, NJ — **2014-Present**

- Build the set for a musical each year
- Backstage crew for ten shows, including five shows on tour

Outdoor Action, *Leader,* Princeton, NJ — **2015-Present**

- Lead, with two others, a group of ten freshmen on a week long backpacking trip

Skills

Software: Solid Works (3D Modeling), Maya (Animation), Microsoft Excel

Programming: Java, C, Python, Linux

Other: CPR certified, WFA certified

Liam P. Wade

17 Estuary Point
Freeport, ME 04032
liam.wade@maine.edu
(207) 751-8739

Education

University of Maine, Orono, ME, *Bachelor of Science*: **2018**

- **Awards,** University Dean's Award**,** University of Maine Chadborne Award, College of Engineering Award
- Chemical Engineering Major
- Grade Point Average 2.96/4.0

Freeport High School, Freeport, ME, 2014

- Graduated *Cum Laude*

Work Experience

Limbeck Engineering, *CFO,* Freeport, ME — Summer 2013-Present

- Worked on the design and construction of Project RoboGoby
- Maintained financial records for the company
- Informed potential consumers though our social media presence

Advanced Composites Center, Research Technician, Orono Maine — Spring 2015-Present

- Collected and organized data for supervisors
- Used SolidWorks to assist in modeling of the offshore wind project

Delorme, Manufatoring, Yarmouth, ME — Summer 2015-Fall 2015

- Assisted in manufacturing InReach GPS units

Corsican Restaurant, *Busser and Prep Cook,* Freeport, ME — Summer 2013- Winter 2013

- Worked as an assistant and prep cook
- Cleaned cutlery and dishes
- Bussed and Set Tables

Activities

Alpha Tau Omega, Brother, Orono Maine — Spring 2015-Present

- Organized event with other organization as well as among members
- Served on Philanthropy and Social Outreach committees

Men's Nordic Skiing, *Member,* Freeport High School — Winter 2010-Winter 2014

- Competed against schools across the state
- *Capitan* — Winter 2014
    - Organized preseason practices
    - Oversee pre-race preparation and waxing

Ultimate Frisbee, *Member*, Freeport High School — Spring 2013

- State Champions in Class B 2013
- *Senior Member* — Spring 2014
    - Organized younger team members and practices
    - Assisted in drills and practice in the absence of our coach

Community Service

Appalachian Mountain Club, *Volunteer,* White Mountain Chapter — Summer 2012

- Repaired trails and bridges while complying with "Leave no trace" protocols

Sitting Pretty "Chair"ity, *Volunteer*, Freeport, ME — Spring 2011-Present

- Organize and assist in the annual charity Auction/Fundraiser

Skills

Proficient in: SolidWorks 3D design and Maya Animation, Programming (JavaScript and Java and C++), Microsoft Word, Microsoft Excel, Microsoft PowerPoint, Social Media