

REASON OF CHOOSING EDUCATIONAL ROBOT MARKET:

Before choosing educational Market, We have done some research about the current over all robotics Market.

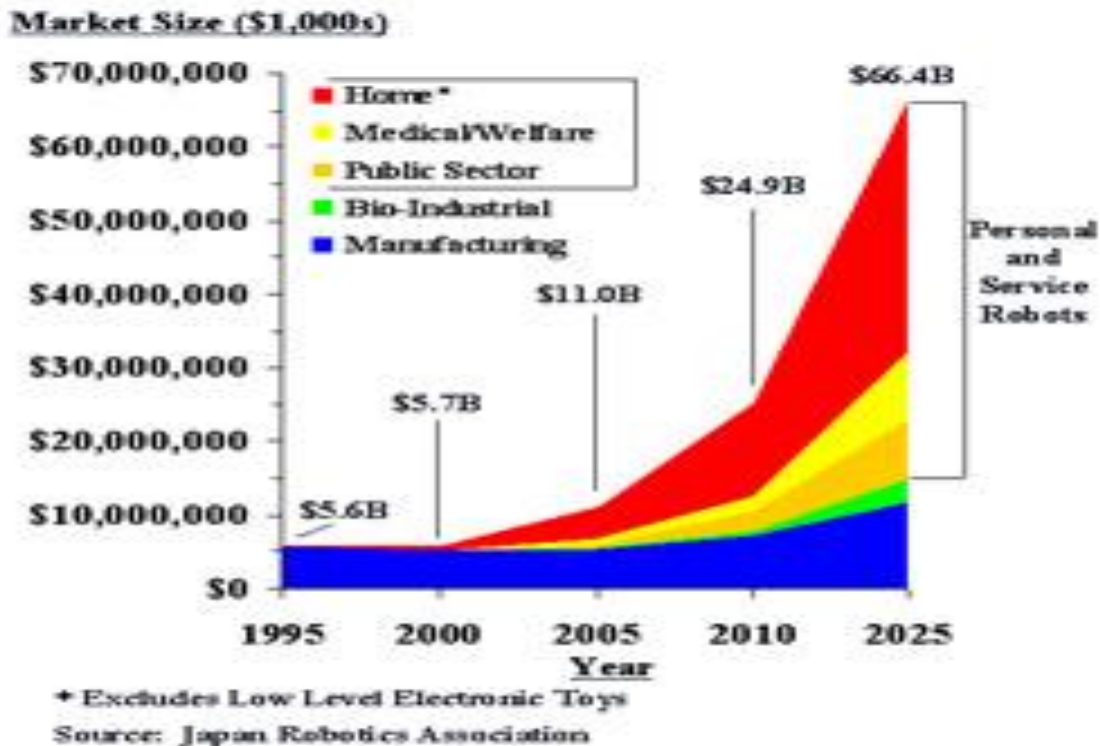


Figure 1: Worldwide Robotics Market Growth

This Graph shows the future cast of the over all robotics market. The blue colored part shows the industrial robotics market. And the other colorful parts are categorized in Personal and service robotics market. As we can see from this graph, after 2000, the robotics market is increasing dramatically and most of the robotics market is held by personal and service robotics market. Educational robotics market falls in this category. As robotics market is increasing, more students will be encouraged to pursue degree in robotics area and they will need micro controller for their use in that course. That's why we have chosen the educational robotics market.

OUR CUSTOMERS

As we got this idea of making microcontroller from the ECE 100 class in our college, who use handy board in their lab, our first customers will be students of ECE 100 class. We would like to sell out first product to this class as well as we would like to get feedback about our product.

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If our product will be successful in this class we would like to introduce it to other universities. From our research, we found that there are 1200 universities in all over US, which provides Electrical/Computer Engineering degrees. This might be having same courses as ECE 100 as we have in our college (IIT). So these universities will be our second customers.

Now days, there are so many robot competitions going on, most of them are held by High school students. As an example, there was Lego competition held last year and around 60,000 high school students took part in it. So, there are many high schools, which are really interested to introduce the robotics course in their school. Therefore, we will be selling our products to high school too.

Business Model

First of all, we want to establish ourselves as a small business. We have two main competitors in LEGO and the MIT Handy board. If we started to threaten these competitors, they could easily take us out. So, in order to combat this, we will simply stay out of sight of these competitors.

Our product production process will have several steps. First we design the schematics and then make the layout at IIT. We use these designs to create a part list, which we use to buy parts from an independent parts dealer. Then we send the designs in the form of a Gerber file along with the parts to an independent manufacturer. This manufacturer builds and assembles the microcontroller board and then sends back the completed product to us at IIT. The casing design will also be sent to a manufacturer with the proper designs, and then the completed casing will be sent back to IIT. We will then put the casing on the board here at IIT, which then completes our product. Now we are ready to ship our microcontroller to the customers. All the while, we will be continuing to develop our designs and update our product using our various resources at IIT.

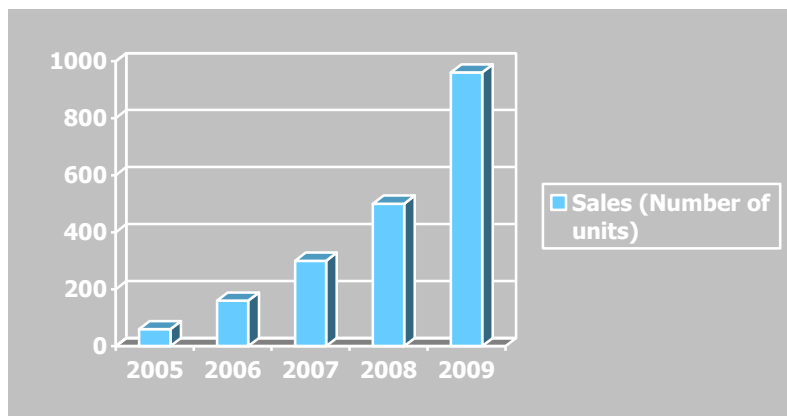
Market Potential

In order to show the huge possibilities our product has in the current market, we want to show how many students there are in the United States who might use our product in a class similar to ECE-100 at IIT. First of all, using 2004 census information, we found that there are over 25.5 million students enrolled in college in the nation. At IIT there are about 1800 undergraduates, with 398 of them being freshmen. The average number of students in ECE-100 is 60. This is 3.24% of the total population at IIT. Then, we found there to be 1195 colleges in the nation which offer majors involving electrical and or computer engineering, out of a total of 3648 colleges. This comes out to 32.76% of colleges in the nation have these specific majors. So, multiplying these percents gives us 1.06% of the total college population in the nation having the potential to use our product

in class, which comes out to 270,621 students. At \$100 each, the potential sales total is approximately \$25 million.

Expected Sales

\$25 million is far above what we expect to reach in sales, especially since we endeavor to remain only a small business. Our first customers will be the next ECE-100 class. It should be about 60 IIT students. After the successful completion of the class, we will have adequate testimonial and documentation of the abilities and success of our product in a classroom setting. We can show this to nearby schools in hopes that those schools will adopt our product into their classes. So, we should sell around 60 to each new school we pick up. After each successive year, we shall bring our product to more schools, eventually spreading throughout the country. Meanwhile, at IIT the second class of students taking ECE-100 will come around, and, as textbooks, some microcontrollers might be borrowed or resold or shared between students who already took the course, or are still taking the course. This is accounted for in Graph 1 by accounting 40 units to each returning school, and 60 units sold to each new coming school. Graph 1 shows a modest continual growth after year one in 2005. This graph is only a rough estimate of what we can expect to reasonably achieve with our new business.



Graph 1

Handy board as a competition

A competitive analysis has been performed to contrast the handy board and some of its features and strengths so, when design a new micro-controller all the areas must be met and expanded in order to benefit the designs of a new micro-controller. Below are seventeen reasons that the handy board succeeds in manufacturing.

1. The handy board is in the business of selling 6811-based microcontroller system that allows you to build mobile robots for educational, hobbyist and industrial purposes. Many professors use this handy board to design their robots curriculum around this microcontroller.

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2. Our top three competitors are; the handy board company, LEGO Mindstorms & series of robots and The Robix Company. All of these companies use the microcontrollers for their robot designs. The concepts of improving on a microcontroller are the same ideas as we are implementing on.
3. The importance of their business line is financially because of the controlling of the market. This market for LEGO as an example relies on toys for children. These toys's are affordable and have a wide range in pricing. This also has an impact in the educational background; especially in universities & high school. Many professors are implementing these robots into their classrooms as part of their curriculum.
4. Their corporate strategy is trying to get more of the consumer hooked on their product. From children to adulthood, as games or as hobbyist or as education robots; these are all main contributors in corporate strategy. This strategy is applied by advertising across the board and trying to make an impact in the market.
5. Our success is dependent on a reliable microcontroller that has many features than our competitor. This would entail more memory, more functions and less expensive than the other microcontrollers. As far as the Lego robots their edge is price range and for the handy board is size, sensors, infra-red ports, battery operated unit and programmability of board.
6. The key product for handy board and us is the microcontroller itself (6811). The only difference is the features that we include in our microcontroller versus handy board. However, one of our key points is the price availability versus the handy board. The handy board has been around for a few years and their prices are elevated on the high end. If we sell our board, we can definitely make an impact in this area.
7. For the handy board it will be the microcontroller itself. Its availability can be installed in any kind of robot. This makes the handy board different than any robot itself. On the other hand, the Lego robot is assembled as a kit. This kit is what makes them different from the handy board. Both handy board and Lego's sell robots but, they differentiate themselves from one another.
8. As I mentioned above, the top three companies are all competitors of each other. One differentiates from the other but, all are in the same market selling robots or parts to make robots. If we decide to design this microcontroller these companies will be our competitors (the handy board company, LEGO Mindstorms & series of robots and The Robix Company).

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9. These companies position themselves in the market by producing; reliable, sturdy, user friendly, well known robots names into the market and accomplishing this for many years.
10. The customers are the same for all competitors. They are toys for children, hobbies for adults and the educational robots for schools. These handy boards have all the features that each individual wants. So, these individuals are pretty much in use of these handy boards and the user creates an understanding of these boards, which makes them unique for that person.
11. These companies are most vulnerable in the cost of their microcontroller boards and their biggest threat is a company just starting out in business with cheaper microcontroller boards than theirs. The top three companies that I researched say about the same thing; a reliable robot or microcontroller board that has more features than the competitor.
12. Promoting their products would have to fall under advertising. Advertising can be accomplished in magazines, newspapers, pamphlets, TV and radio. But, I think that the most advertising done in these boards or robots is in robot conferences or shows.
13. If we start out we would not be much threat to these businesses. We would probably have a fifty, fifty change in being successful in this market but, only time will tell has to how successful we would be. If we attack these businesses with a price reduction they may counter that until they defeat us. On the part of joining with them, I don't know maybe they'll buy us out.
14. It looks like the easiest way of purchasing is via internet and maybe some hobby stores, here & there and schools with a robot curriculum.
15. Today's businesses basically hook you with their products. This done so you can keep buying for them. As long as the product is user friendly and can be modified and is very robust, then you have a potential customer for ever. In order to have this customer switch you need a microcontroller that is cheaper and can do more than theirs and also prove to customer that this product is versatile.
16. To get customers to switch you need to price down your product, give your microcontroller a fancy name (e.g. the 101 micro chip controller), improve on the features, advertise your microcontroller board and demonstrate in shows or conferences your product.
17. The other businesses pretty much have everything covered, from sales, to development and from research everything is covered. All these business are providing customer satisfaction. For instance each business has a specialty and people that are experienced in buying these microcontrollers will know where to go and what to buy.

Market Strategy

We have our first customers guaranteed at IIT by requiring students in ECE-100 to buy our product for the class. So, we use this class to beta-test our product. They will use it in real applications, and provide feedback on how effectively it handled the job. The students as well as the professors can give suggestions on what we can improve on the product, what can be added, what can be taken away, and any other suggestions or problems they may come across in class.

We also have an active robotics club at IIT (IIT First Robotics Club). They attend competitions and conventions throughout the year. We will have them use our product to spread the word about it through actual use. People can see our product in action at these competitions and conventions, giving our product credibility. The First Robotics Club can also explore the potential this product has by pushing the limits of its capabilities. All the while, the club can provide feedback as well to help develop and update the product.

Finally, we have two main methods of getting our product to the people, our website and college bookstores. We have already developed a website for our product, and can take order online via email. We also can sell through college bookstores, starting here at IIT. When we get other schools interested, then we can move our product to their stores as well. We will also keep providing updates for our product often to reduce the possibility of students reselling their microcontrollers after they complete the course.

LEGO as Competition

The LEGO robotics program is an obvious and major competitor to our microcontroller kit. LEGO produces a series of robotics merchandise. One of the core sets of the LEGO robotics program is the Robotics Invention System 2.0. This product costs \$199.99, and comes with the following:

- RCX microcontroller brick
- LEGO Mindstorms CD-Rom software “Big blocks” system
- USB Infrared transmitter
- 3 guided challenges
- 6 pro challenges
- Constructopedia
- 2 touch sensors
- 1 light sensor
- 2 motors
- 718 LEGO pieces

This kit is labeled for ages 12 and up. It is available to buy at many sites online, as well as many stores where toys are sold around America, along with all the other LEGO products.

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This kit is closely associated with the First LEGO League (FLL). This league was formed by a partnership with FIRST (For Inspiration and Recognition of Science and Technology) and LEGO. FIRST inspires to design programs to help young people learn special life skills like self-confidence, while motivating them to pursue opportunities in science, technology, and engineering. The FIRST robotics competition was started ten years ago with 28 high school teams in New Hampshire. Now, there are over 600 teams participating worldwide, in 17 Regional events and a Championship event.

The FIRST LEGO league includes 60000 children worldwide on 6000 teams. It is sponsored by LEGO, as well as 30 universities, and 100 other program sponsors. In America, the children involved in the league are ages 9 to 14, and are 70% boys, with an average team size of 8 to 10 children. Outside of America, the ages range from 10 to 16.

The LEGO name has Danish origins from “LEg GOdt,” meaning “play well.” In Latin, LEGO means “I put together.” LEGO is a toy company. They make toys that are open to the imagination of all who buy them. LEGO is built on 5 core values:

- Creativity. Their products give the freedom of self-expression in a very open ended way.
- Imagination. Inspire exploration and discovery.
- Learning. Education through play.
- Fun. Actively playing with your toys, and experiencing the satisfaction of creation.
- Quality. Produce good products with ethical values.

The LEGO Company is worldwide. It has production centers, product development, and corporate offices all over the planet.

The LEGO Company itself has many subgroups in the company. The robotics subgroup is only a small portion the company as a whole, and is not a major focus of the corporate plan. Recently, LEGO decided to focus on the classic LEGO products, such as the bricks themselves. LEGO is initiating several LEGO brand stores into the market, and found that there is much demand for individual sales of the bricks. In their plans, they state they are getting back to the classic LEGO products the company was built on. Recent years have experienced losses in newer facets of the LEGO Company, such as the LEGOLAND parks and special movie tie-in products.

The top five product categories by sales in 2003 were BIONICLE, LEGO Sports, LEGO *Star Wars*, LEGO Racers, and LEGO Creator. The Mindstorms robotics category did not even appear on the top five. Clearly the robotics program is not a major factor in current sales, as well as the plan for the future. It seems as though not much focus is left for the robotics program at LEGO.

Nevertheless, it is not out of the picture. There are 39 LEGO Mindstorms Centers located all over the world. These centers are often used in conjunction with science or

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technology museums. They are visited by school children for projects and demonstrations, and also used by families with children. And the FIRST LEGO league is still fully functioning and growing every year. There are also new products added to support the FLL every year.

Despite the LEGO Company's stronghold in the market, there are still risks involved. Customer demand is always changing, and it is difficult to predict how it will do so. This is shown by some of the recent losses LEGO experienced with special movie promotional products that lost money. Currency is a large risk factor with the international company of LEGO. The main unit of currency is the Danish Mark. Currency exchange rates fluctuate all the time, and LEGO has to be aware of the costs and profits made in different countries. LEGO also is turning to fewer customers, although much larger. The risk is increased, for if one large customer drops out, a lot of profit is lost.

LEGO is a very unique company. They have no closely related competitors. They do compete with other toy companies, and there are some companies who copy LEGO, but none have ever posed much of a threat to LEGO. LEGO protects themselves from copiers from upholding patents and right.

Customers continue to come back to LEGO because LEGO toys are always expandable. All the toys are compatible with the other LEGO toys, and can be built into anything the builder imagines. They provide a medium for creative learning simultaneous with enjoyment. Customers are typically children anywhere from 0 to 16 years of age. Larger lightweight blocks are made for younger infants, and more intricate and detailed blocks are made for older more sophisticated customers.

Customers generally praise the LEGO Company's products as very entertaining. The biggest complaint would be the price. But, LEGO basically sets whatever price they want, due to the lack of direct competition. LEGO is so huge that they have no large weaknesses. A large setback in one area can easily be cancelled out by small successes in several other areas. But, they would have to be most vulnerable in attracting new customers. More and more children's toys are being shifted towards more technological devices, leaving LEGO bricks less desirable. But, there will always be a demand for active entertainment.

LEGO promotes themselves through a variety of means. They have television advertising, as well as magazines, and they have a very popular website. They also promote their products through other means, such as the FIRST LEGO League, LEGOLAND parks, Mindstorms centers, brand name stores, and many others. They pitch their products in many different ways, according to what area of the company they are pitching. Their pitches range from educational, to the latest blockbuster movies, to the classic individual bricks themselves.

Our microcontroller kit would probably barely even turn their heads. LEGO has a huge advantage over us in that they are an established company with years of experience and growth behind them. They also have a lot of money to back themselves up. It could be

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possible to work with them though. MIT already accomplished this feat in 1984, when they worked together to develop the LEGO Technic computer control line. This paved the way for the first computer controlled LEGO robots.

Customer loyalty has been built up over the years. LEGO is well past an established and trusted company. Plus, LEGO makes expansion sets for existing products, bringing in many returning customers. The BIONICLE series has new sets come out that progress through a storyline. Customers buy the next set to continue on in the story.

In order to get customers to switch from the LEGO Mindstorms kit, we need to provide similar functions for less cost. LEGO products are more expensive, because LEGO can set whatever price they feel. Our product needs to be less expensive, but still needs to be user-friendly and easily expandable.

Works Cited

“About FIRST Robotics Competition.” March, 10, 2005.
<<http://www.usfirst.org/robotics/aboutrb.htm>>.

“Annual Report 2003 LEGO Company.” Corporate Communications. 2004.*

“Company Profile 2004.”*

“FIRST LEGO League Homepage.” March 10, 2005.
<<http://www.firstlegoleague.org/>>.

“LEGO Shop: Robotics Invention System 2.0” March 10, 2005.
<<http://shop.lego.com/product.asp?p=3804>>.

Profit Analysis

In the profit analysis we must consider five subgroups areas which are revenue, sales & marketing, design & develop (G&A), parts, and finally the profit margin. These items are broken down individually to show its importance of value as it pertains in that subgroup. In these subgroups we must explain such advantages as well as disadvantages with a final value of each area independently. We must consider that each of these subgroups will vary such as parts and depending on the quantity purchased.

First is the profit analysis. In the profit analysis we must focus on the revenue of the business. Areas that bring income to the business such as cash and sale of purchased

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boards equate to revenue. This revenue is based on the net sale of boards at a certain sale price. The cost of the boards may be based individually or in quantities. In this business plan I will explain both individually and by quantities in the subgroup of parts, assembly and freight.

As mentioned above revenue is truly the amount of income that reflects in the company from other source and must be separated and treated individually in a business. Revenue is subtracted either by its large overhead or high operating cost and definitely other factors that are not considered in this business plan. However, overhead is relating to the employees that make the company move and stride for sales to increase its profitability or its overall revenue. Employees are certain individuals that specialize in certain areas of their abilities, which enhance the profitability of the company's product.

On the other hand operating cost is relating to how the business is operating on a day to days bases. Operating cost are expenses incurred on the company in order to keep its doors open on a daily bases. Such expenses are utilities. Utilities are non-profitable areas and takes away from its overall revenue of the business. Such utilities may be grounds keeper, maintenance function or modifications to the business where you are residing. But, utilities are a key factor in reducing your overall revenue. We must also consider the miscellaneous expenses. All companies have a miscellaneous expense that was not accounted for or an unexpected excursion in the company's budget.

In today's business we need to reduce cost affecting areas that remove money from our overall revenue. Such factors are basic and must be studied in today's market place in order to stay in a comfort zone. One of the main contributing areas that we must focus on in our business is the overhead cost. In order for a company to succeed we must understand how we can reduce such area as overhead. The other major factor is operating cost and its expenses. In order to stay ahead of the market place we must realize were are expenses are going and how we can control these expenses.

Sales & Marketing

Our next category is the sales & marketing. The sales & marketing area relate to such areas as selling our product, business cards, flyers, direct mailing, newspaper ads, bookstore markup & miscellaneous accounts. In the sales portion we must concentrate on selling the company products to our customers. This sales division must be one of the most heavily supported and functional departments in our business. The sales department is regarded by many firms as the key of the company's net income contributors. A steady growth in sales means that your business has all the collateral needed to invest for future research & development areas or future plan.

By selling these beta boards to our customer's it means that the company is producing a product that is regarded in the market place as a value instrument in their university. This beta boards will be modified so; sales will be involved in selling a new model every two years. As explained above a steady sale of beta boards means a steady growth in your business.

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The other category of sales is its counter part called marketing. Marketing your product like the beta board is the most important and beneficial part of your business. As explained above, a sale brings in the net income portion of your companies profitability and marketing also contributes to the profitability margin of your business. Marketing your beta board must be detailed and explained in your operating manuals. In marketing you must display these beta boards like an electronic show as an important and crucial part of your companies operation. Marketing is also involved in advertising your beta board via flyers, newspaper ads, magazines or technical literature.

Design & Develop, G&A

The designs & development is associated to the overhead of the business such as a part-time employee which will be given the task of performing the following customer service, re-ordering beta boards and the daily office operations. Such tasks are demanding but significant to the business in order to keep the business moving ahead. As I explained above, the overhead is one of the most significant because this shrinks our overall revenue and works against us in dollars and sense. An independent part-time employee (Must posses a technical background in electrical engineering) will have the job duties of upgrading the designs of the micro-controller (Beta board), the quality inspection and modifying the technical manual.

The part-time office employee will be performing the duties on a set price of \$50.00 every two weeks for the whole year. The independent employee will be a graduate student and will be paid the amount of \$15.00 an hour for 120 hours a month for a whole year. These pay rates will fluctuate with the economy and years of service.

Parts, Assembly, Freight

The next category is the parts, assembly and the freight charges. This subgroup utilizes money from your revenue and therefore like design & development it is one of the most expensive areas in your business. In dividing each area into its own entity we will discuss the parts first. Parts are associated with the component that is required to make the beta board function many processes. These parts are such as; microprocessor integrated chips (IC), non-inverting buffers, inverters, capacitors, resistors and connectors. These expenditures are the main components used in the beta board which is required to perform any movement or a certain a task.

Attach with this final written business plan I have provided a chart (Profit Analysis Chart) that will reflect this values into years of operations. Although the parts inventory was really narrowed down to the value of each component per 100 boards built, in all cases is just an estimate. The total amount of parts in each board is approximated to

\$40.14 with assembly¹ charges. These approximations are allowed a margin of ±\$2.00 of the actual cost of a beta board.

Profit Margin

This revenue is subtracted by the expenditures of the sales & marketing, Design & Development and the parts, assembly and freight charges. The total profit is called the overall capital gain of the business. The overall profit is divided by the institution (Illinois Institute of Technology) and the facilitator (The professor assisting the business). These numbers are divided as such; 50% to the institution that is partaken in your business and 50% to the professor in charge of incorporating the technicalities of the business. As explained about review the attached document for drawings, designs and charts in order to understand this business plan.

Year	2005	2006	2007	2008	2009
Units Sold Per Yr.	60	160	300	500	960
<i>Expected Revenue on Sale of Boards</i>	\$6,000	\$16,000	\$30,000	\$50,000	\$96,000
Market & Sales					
<i>Bookstore Markup (20%)</i>	\$1,200	\$3,200	\$6,000	\$10,000	\$19,200
<i>Direct Mailing</i>	0	\$1,000	\$1,100	\$1,200	\$1,300
<i>Promotion</i>	0	\$500	\$800	\$1,200	\$1,500
General & Administrative					
<i>Technical Service</i>	\$500	\$1,400	\$1,900	\$2,400	\$2,800
<i>Administrative</i>	\$300	\$1,200	\$1,600	\$2,000	\$2,400
Parts					
<i>Components & Assembly</i>	\$2,400	\$6,400	\$12,000	\$20,000	\$38,400

¹ These approximations of assembling one beta boards are not reflected on the true cost. However, many boards may fluctuate considerably and is dependent on how many layers are needed; the physical size, how any components are inserted in the beta board and how many boards need to be assembled. It is recommended that a design of the microprocessor is attached with the Gerber files for correct dimensioning.

Subtotal Profit Margin	\$1,600	\$2,300	\$6,600	\$13,200	\$30,400
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PROBLEMS

The current products in the educational and hobbyist robotics market are lacking. The biggest problem with them is that they are too expensive for the average student. The MIT Handy Board costs about \$300.00 while the Lego Mindstorm costs about \$200.00. This creates a problem that students that would like to work with robotics cannot do so without sharing with each other. If a college class uses a MIT Handy Board it probably only can afford a few of them each year. Thus anyone that wants to or needs to take that class has to share with 2, 3, or even 4 other students.

This also poses other problems. While in lab, students are unable to test to make sure if all of the programs work, and thus usually only one or two people get to actually do the lab work that is required. Outside of class the student is unable to test their program and must hope for the best once they enter the lab session. This is not very good use of lab time.

The other problem that arises out of having so many people share the same board is that with so many hands using the board, someone is bound to drop, bump, or do something that would cause the board to break. This is besides the fact that the Handy Board is currently sub par from a durability standpoint. IIT's ECE 100 class has to replace about half of the boards each year due to them breaking.

The Lego board is not without its faults. There have been problems in the past with software compatibility. The problem was that the board was not sophisticated enough. Thus this board is only targeted toward younger students.

SOLUTION AND DESCRIPTION

We propose to solve these problems. The main problem is the cost. We would design a microcontroller that would be inexpensive enough that a student could afford them. We choose a number that we believe students could afford: \$99.95. This price is the cost of an inexpensive textbook. Thus if the student is required to purchase one for the class, it would not be outrageous. Besides having a lower cost, we still need to differentiate ourselves from the current competitors. Thus we decided to improve make our board durable and sophisticated.

The board is made with the Motorola 68HC11 microprocessor. The 68HC11 microprocessor has an 8-bit data bus and a 16-bit address bus. It can have built-in EEPROM/OTPROM, RAM, digital I/O, timers, A/D converter, and synchronous and asynchronous communication channels. The chip is very inexpensive, costing less than \$5.00, while still being a powerful microprocessor.

To improve the durability we designed a casing that would help protect the board. This would give us a step up on competition such as the Handy Board. The casing was designed to be lightweight and protective, but to still allow for sufficient heat transfer to help control the heat that the microcontroller produces.

To improve the sophistication of the microcontroller we decided to use a compiler that would allow for high-level programming. This compiler would also help keep down the cost because it is developed as open source software. This compiler, GCC (GNU Compiler Collection), is an integrated distribution of compilers for several major programming languages. These languages currently include C, C++, Objective-C, Objective-C++, Java, Fortran, and Ada. Thus by choosing such a compiler we allow for students to learn or use the languages that they have learned to program the robot. This would improve the students' knowledge of these languages and allow them to use something that they might use on the job.

Finally we would also include more memory than the other competitors. This also allows for more sophistication. By having more memory space in your microcontroller your robot can perform more instructions than its competition. Thus by being able to perform more instructions it can do more complex things.

THE PATH FORWARD

For the actual business we propose that it would be supported through IIT to help cut down on the risks that need to be taken. The business itself would be run by a part time staff, probably a professor and a student or two. This would allow for competent employees, but cut down on the costs by only having them as part time. They would be involved in checking the orders every day either on-line or mail, and also promoting the product via online and direct mail to universities. If there were any orders then they would order the microcontrollers, and deal with the shipping and packaging. Every couple of years or so the microcontroller should have an upgrade to prevent it from being stagnant. These upgrades could include a USB port, more memory, more sensors, etc. Finally once we are involved with other universities we could market the microcontroller through their bookstores for convenience for their students. Also this might attract a few additional buyers such as robotic clubs at the school.

There are a few things that are needed to be done before the business can be started. First the microcontroller itself must be assembled and then tested. If the tests all go well then a couple things can be done. The casing can finally be made, and the power source can be finally attached. The power source can and should be included in the casing. The battery that we recommend is a lithium ion battery. A manual also must be written for the board. It should include a description of it and its components. Another thing that should be written up is a lab manual. Since we are targeting an educational market we should have some sample programs, a tutorial, and a few labs/projects. Once all of these are completed the product should be ready for the ECE 100 class. Once completed the board should receive upgrades about every other year. This way the board and the cash flow will be kept fresh.