

I PRO 310: Designing and Building Prototypes for Assisting Blind Swimmers, Spring 2008

PROJECT PLAN

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Introduction

I PRO 310 is continuing into its fourth semester of creating devices to assist the millions of blind and visually impaired people in the United States to swim independently and without sustaining injuries. Due to the size of the team, now and in the past, I PRO 310 divides itself into 3 sub-teams. The three sub-teams are the passive sub-team, the active sub-team, and the research sub-team; which this year has become the business plan/EnPRO sub-team.

Though we meet as a single I PRO several times a week, most of the work done outside of class will be in separate teams. Because of the great differences between each segment of the project, each sub-team has devised their own plan. The passive team will first present their plan to create a large device that can be installed into a pool to assist blind and visually impaired swimmers. Following that, the active team will present their plan to create a small device that can be worn by a blind and visually impaired swimmer to warn them about obstacles. Lastly, the business team will present their plan to devise a business plan to start a successful start-up business by using the device that the passive team is working on.

Table of Contents

1. Passive Team Plan	1
2. Active Team Plan	9
3. Business Plan Team Plan	17
4. Designation of Roles	27

Passive Team Plan

1.1.0 Objectives

The passive team's main objective for this semester is to end up with a device that would be suitable for a long term durability test in a pool facility of a school with blind and visually impaired swimmers. The other objective is to conduct two more usability tests with blind and visually impaired swimmers. Between each test cycle we will modify the device to be more safe and robust, while trying to improve the experience for blind and visually impaired swimmers.

1.2.0 Background

Blindness and low vision are conditions that affect millions of people in the United States alone. Most affected people adjust well to their unfortunate lack of vision or low vision and lead very productive lives, but one activity that many blind and visually impaired people still find difficult is exercise. Blind and visually impaired people don't feel safe when they are at a gym because of all the activity and machinery around them, and some forms of outdoor recreation are exceedingly difficult to accomplish safely without a reasonable amount vision. Swimming is also a great form of exercise, but again, a lot of blind and visually impaired people don't feel safe in pools with other people around to swim into and the potential to get disoriented or crash into a wall.

For the past three semesters, IPRO 310 has been working with Chicago Lighthouse and the Notre Dame Masters Swimming Program to understand the problems that blind and visually impaired swimmers encounter. Taking into account what they learned, six versions of the passive device have been created and tested, each version building on the previous version. Testing has been done with real blind and visually impaired swimmers wearing blacked out goggles (required for blind swimming competitions) to get consistent results. It's been a hope of all IPRO 310 teams that the work being done will allow many blind and visually impaired people opportunity to safely exercise on a regular basis.

Because we are conducting tests on human subjects it is very important that we follow correct guidelines throughout the course of this IPRO. We will all get IRB certified and be conscious of all the moral and ethical issues that human testing involves. We will keep the confidentiality of our test subjects. We also will be mindful of the culture of blind and visually people; they usually do not like being pitied and can for the most part do everything that sighted people can do.

Previous IPRO 310 teams have been very successful at creating a device that will allow blind swimmers to avoid running into lane lines. The problems they've encountered are not being able to create a device which we call "End Tappers" to notify the swimmer without human interaction that the end of the lane is approaching. Additionally, though the side tappers work

very well, they are still assembled to prototype quality standards. Other passive solutions to this problem that other groups and companies have developed include water and air jet guidance but usually do not always work successfully because while swimming, especially competitively, lots of air and water are moved.

1.3.0 Methodology

1.3.A The Problem

The problem we are trying to solve, with a wide scope, is that it is hard for blind and visually impaired people to get exercise safely. More specifically most blind and visually impaired people don't swim because they wouldn't feel safe in a pool because there is no protection for them. Those that do swim often endure pain intentionally as they follow the standard plastic lane lines closely to stay in a straight line.

1.3.B Plan of Action

We will be going through two nearly identical development cycles leading up to each of our two pool tests. The cycles will each proceed as follows:

- Problem recognition: The sub team will discuss what needs to be improved with the current iteration of the passive device, and prioritize what we want to concentrate on.
- Brainstorming: Potential solutions to the issues we are trying to address will be brainstormed with each issue assigned a lead person or people to make sure nothing gets ignored.
- Research and Prototyping: Select potential solutions will be researched in terms of materials selection and cost and as many as possible will be prototyped.
- Parts Procurement: For each successful prototype enough parts to create a testable device will be purchased.
- Assembly: With the help of the other sub teams, the device will be assembled for the pool test.

1.3.C Testing

At the end of each test cycle we will have a pool test where willing blind and visually impaired participants will help evaluate the device with a concentration on the parts we've changed. The testing for each subject will follow this schedule:

- Participant must have a consent form read to them and sign said form with a witness.
- Swim a control lap guided by IRB certified IPRO members using conventional tapping devices

- Swimmer is walked through the passive device and has all of the features explained and demonstrated.
- Swimmer swims the test lane with as many strokes as they know how to do/can and is timed.
- After every lap, the swimmer is interviewed with targeted questions aimed at evaluating new features and overall success of the device.

Following the second test cycle we will start a third cycle only through the problem recognition stage, leaving any remaining problems as advice for future IPRO 310 teams.

1.3.D Documentation

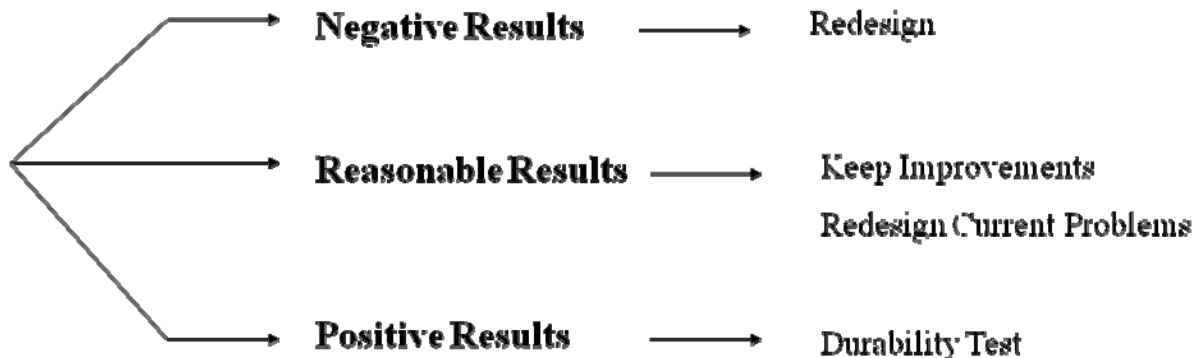
The team has been handed down an engineering notebook from previous teams. The engineering notebook documents everything that has been done with this project for the last two semesters. As we precede, all of our designs, notes and results will be compiled in this engineering notebook.

Once testing begins, each test will have a team member as a recorder for statistics such as lap times, how many tappers touched, how many repairs were needed, and other observations. We will also have an interviewer which will document the reactions of the swimmer to the passive device. All of the results and interviews will be stored in the engineering notebook.

1.3.E Analysis

The Analysis of our device will be based on the responses of our test subjects as well as our observations on how well the device holds up. In the problem recognition stage, we will use the analysis to figure out which parts still need improvement.

For the start of the second cycle, we will decide how to proceed based on the success of the first pool test; the course of action is shown below.



1.3.F IPRO Deliverables

Representatives of sub team will work with representatives of other sub teams to compile all of the IPRO deliverables so that they are all submitted with full information on the plans and status of every part of IPRO 310.

1.4.0 Expected Results

A large portion of the blind and the impaired vision population of the United States go without exercise due to the difficult task of finding safe activities to participate in. Swimming, although a great form of exercise is an activity that most blind and visually impaired people don't feel comfortable doing due to all of the commotion in the water and not knowing where the lanes or end walls are. Our expected result for this ongoing sub-team of IPRO310 is to create a device that can be installed into swimming pools to allow blind and visually impaired people to comfortably and safely swim.

The passive team's ultimate goal is to modify the existing version of the device from the previous passive sub teams to make it more robust and to also come up with 4 new ideas for the end lane techniques that they will also test. The major concern with the current design is that the side lane tappers do not meet the basic market expectation of remaining one functional device. The team will come up with a more appropriate design of attaching the side tappers to meet the market expectations.

The sub team also expects to develop a passive, human-free, end lane notification method that will let swimmers know that they are about to reach the end of the pool and that they should prepare to turn around.

When all of these improvements are made, the team expects to be able to prepare a second identical device to the development device and have it be ready for a long term durability and usability test at a school pool that has blind and visually impaired students who swim. We also expect to work with the business plan sub-team to come up with a possible course of action that would allow the device to go into production and be sold for use by blind people all over the United States.

1.5.0 Project Budget

Date needed	Expense	Cost
2/17/2008	First cycle prototyping	\$100
2/24/2008	First cycle build	\$400
3/9/2008	First cycle pool test	\$125
3/30/2008	Second cycle prototyping	\$100
4/6/2008	Second cycle build	\$400

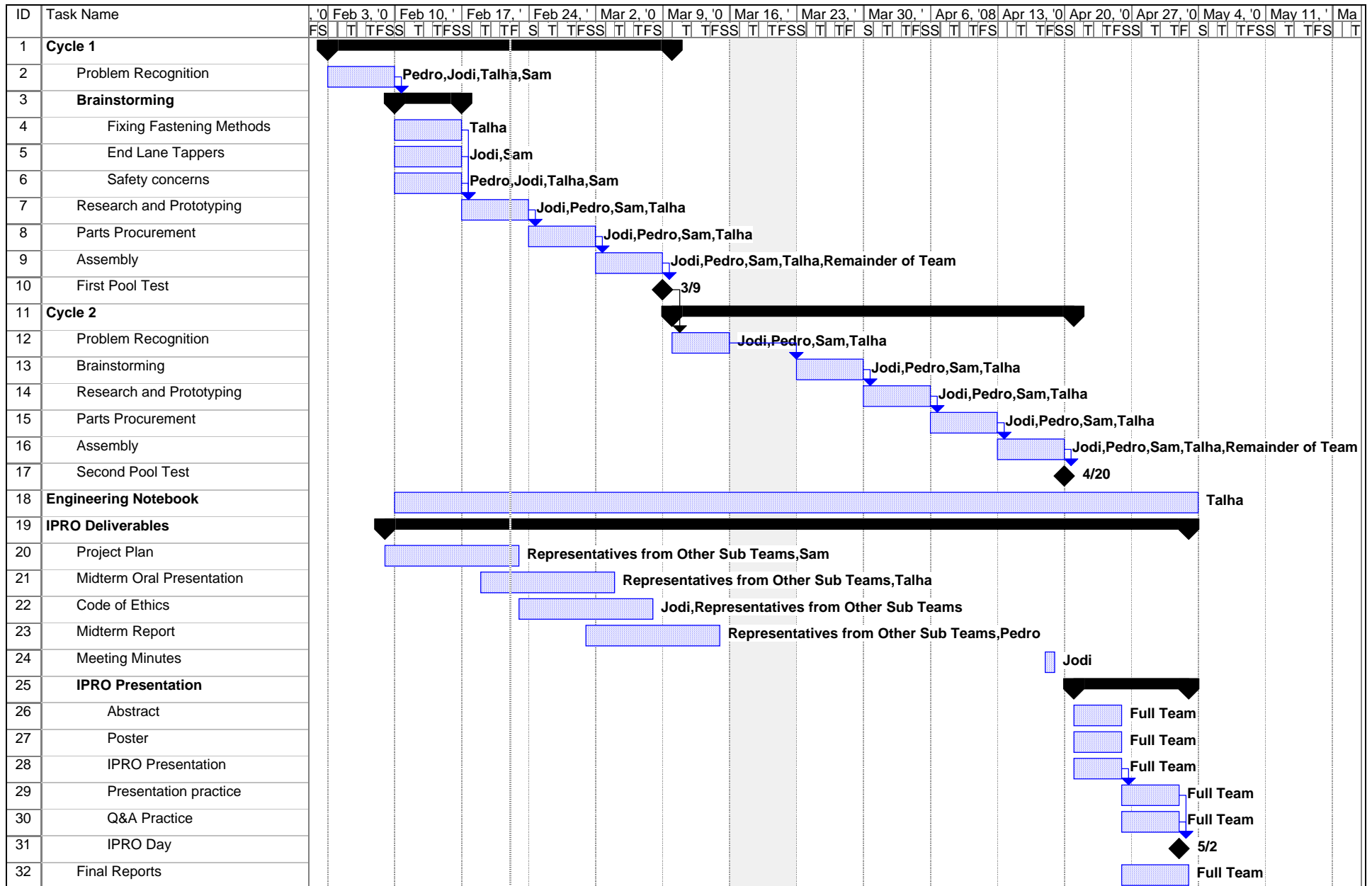
4/20/2008	Second cycle pool test	\$125
4/20/2008	Building a copy of current device for durability test	\$500
	Total	\$1,750

1.6.0 Schedule of Tasks and Milestone Events

First, here is a listing of tasks with details about, skills needed along with the time required for each task. Following that is a representation of the work we will do including milestones in the form of a Gantt Chart.

Task	Task Details	Skills Needed	#People	#Hours/ Person	Hours/ Task
Problem Recognition Cycle 1 2/3/08-2/9/08	Decide which parts of the passive device need modification.	Critical Thinking	4	3	12
Brainstorming Cycle 1 2/10/08-2/16/08	Come up with solutions to the problems identified.	Abstract thinking, Know Materials/ Mechanical skills	4	5	20
Research and Prototyping Cycle 1 2/17/08-2/23/08	Figure out what materials we need and what solutions will work.	Knowledge of Vendors, Materials and Mechanical skills	4	8	32
Parts Procurement Cycle 1 2/24/08-3/1/08	Buy all parts necessary for building the necessary version of the device.	Knowledge of Vendors, Accounting Skills	4	2	8
Assembly Cycle 1 3/2/08-3/8/08	Assemble the complete passive device for testing with help from other sub-teams.	Mechanical skill	8	10	80
Pool Test Cycle 1 3/9/08	Conduct a pool test to determine the success of the passive device with help from other sub-teams.	People skills, Project management, Swimming ability, Observation skills.	10	8	80
Problem Recognition Cycle 2 3/10/08-3/15/08	Decide which parts of the passive device need modification.	Critical Thinking	4	3	12
Brainstorming Cycle 2 3/23/08-3/29/08	Come up with solutions to the problems identified.	Abstract thinking, Know Materials/ Mechanical skills	4	5	20

Research and Prototyping Cycle 2 3/30/08-4/5/08	Figure out what materials we need and what solutions will work.	Knowledge of Vendors, Materials and Mechanical skills	4	8	32
Parts Procurement Cycle 2 4/6/08-4/12/08	Buy all parts necessary for building the necessary version of the device.	Knowledge of Vendors, Accounting Skills	4	2	8
Assembly Cycle 2 4/13/08-4/19/08	Assemble the complete passive device for testing with help from other sub-teams.	Mechanical skill	8	10	80
Pool Test Cycle 2 4/20/08	Conduct a pool test to determine the success of the passive device with help from other sub-teams.	People skills, Project management, Swimming ability, Observation skills.	10	8	80
Engineering Notebook 2/10/08-5/3/08	Maintain engineering notebook.	Organization skills, writing skills.	1	20	20
Project Plan 2/9/08-2/22/08	Write and compile the project plan.	Project Management, Writing skills.	2	5	10
Midterm Oral Presentation 2/19/08-3/3/08	Prepare and present at the Midterm Oral Presentation.	Presenting skills.	2	5	10
Code of Ethics 2/23/08-3/7/08	Write and compile the Code of Ethics.	Critical Thinking, Research Skills, Writing skills.	4	4	16
Midterm Report 3/1/08-3/14/08	Write and compile the midterm report.	Project Management, Writing skills.	2	5	10
Meeting Minutes 4/18/08	Write and submit meeting minutes	Listening/Writing skills, Reliability.	1	10	10
I PRO Day Preparation 4/21/08-5/2/08	Prepare abstract, poster, and presentation.	Writing, Design and Presenting skills.	4	10	40
Final Reports 4/26/08-5/2/08	Complete final reports	Writing skills.	4	5	20
Slack Time			4	5	20
Total					620
Hours from other sub-teams					176
Total from Passive Team					444



Project: passive Plan Date: Fri 2/22/08	Task		Milestone		External Tasks	
	Split		Summary		External Milestone	
	Progress		Project Summary		Deadline	

1.7.0 Individual Team Member Assignments

The passive sub-team has Pedro as its leader because he was in this IPRO last semester and is therefore knowledgeable in what needs to be done. The following table covers the team member assignments for the passive sub-team, the other members of IPRO 310 will be covered in those sections of this document.

Name	Major	Skills/Strengths	Experience/ Academic Interests	Tasks	Roles
Pedro Cruz	4 th year Business Administration - International Business	MS Excel, Word, Powerpoint. Speaks 3 languages (English, Spanish, German)	IPRO 310 Veteran, Leadership Positions at 2 College Soccer Clubs, Internship at Águas de Niterói, Gatorade Pan-American Games promotion	Full Cycle Participant, Midterm Report IPRO Day. 106 hrs	Passive Sub-team leader. Business Plan Team Member
Samuel Solomon	4 th year Computer Science	Wood/metal/plastic working, soldering, wiring (robots/circuits), cabling (sound/lighting systems), reading plans/circuit diagrams/blueprints.	Trained and Managed event production crews in highschool and college. Former President and 4 year member of Illinois Tech Robotics.	Full Cycle Participant, Project Plan, IPRO Day. 111 hrs	Passive Team Member, Agenda Maker
Jodi Warns	3 rd year Biomedical Engineering	Ms Excel, Word, Powerpoint, Matlab. Chemistry and Biology lab Techniques.	Laboratory Technician Assistant at Wayne State University, Administrative Assistant at AGM Automotives, Senator in IIT's Student Government Association.	Full Cycle Participant, Code of Ethics, IPRO Day, Minutes Submission. 111 hrs	Passive Team Member, Minute Taker
Talha Yousuf	4 th year Computer Science/ Computer Engineering	MS Office, Front Page, Outlook/Exchange, NetMeeting, Visio, Adobe Acrobat, Photoshop, Pagemaker, Macromedia Flash, Dreamweaver, Auto CAD.	Assistant Web Developer/ Network Support at Maria High School. Technical Support at Liberty Tax Service. Built LAN Servers and Workstations	Full Cycle Participant, Midterm Oral Report, IPRO Day. 116 hrs	Passive Team Member, Passive team Engr-ing notebook.

Active Team Plan

2.1.0 Objectives

I PRO 310 Active team's objectives are centered on upgrading the currently existing device. More specifically we plan to develop and implement a multi-mode, remotely activated, variable intensity vibration transducer unit that can be worn by a swimmer. We also need to develop a battery circuit, an ON/OFF switch circuit and then repackage the existing sonar device to improve its reliability and portability. The upgraded device will then be tested on blind and visually impaired subjects in a pool test.

The Active team is working on this project in conjunction with the Rose-Hulman Institute of Technology, which also has a team of students working to build a similar device. Another objective of the Active team will be to make modifications to whatever device they come up with.

2.2.0 Background

The blind and visually impaired population as a whole does not get enough exercise because of lack of facilities and equipment to make them feel safe. Swimming is a very good form of exercise, however, avoiding obstacles and swimming in a straight line constitute the difficulties preventing the visually impaired from swimming. Tactile feedback to the swimmer (using vibration) was deemed to be the most desirable method over audio methods because of the noisy environment and the wish not to take away yet another sense from the swimmer. It is not known what frequencies and intensities of vibration can be reliably discerned by various blind and visually impaired swimmers.

As of now, the active device is facing numerous user problems. Firstly, there is no power toggle switch; the only way to turn it on and off is plainly by inserting and removing the battery. Secondly, there is no feedback mechanism to inform the user whether or not the device is on. Since the user will be blind or visually impaired this feedback mechanism cannot be visual, and so it must vibrate or beep in order to tell the user that the device is on. Thirdly, it does not inform the user on the state of the battery; again it must do this either by vibrating or beeping. Next, the device is currently not adjustable to the user's preferences; the user is not able to control at what distance from the wall the device will begin to vibrate to warn the user that he/she is approaching the wall. Finally, the case of the device is not waterproof, and cannot even be used or even tested underwater.

The group from Rose-Hulman Institute of Technology has built an infrared device that consists of a transmitter placed underwater on the wall of the pool and a receiver that is strapped onto the swimmer. However, instead of using vibrations to warn the swimmer of the wall, they used beeps to warn the swimmer through the use of waterproof headphones. One of the problems

this group faced was meeting the required battery lifetime for the transmitter, which is 15 hours. The transmitter only achieved 5 hours of operation. Also, their transmitter does not warn the user of low battery. Another problem this group faced was meeting the range specification in the water. The range in the water was only 0.4 meters, which is well below the minimum range of 4 meters. Finally, the weight of the receiver was over the specified weight limit.

2.3.0 Methodology

The problem we are faced with is to design and build devices that aid blind and visually impaired swimmers. So far, a rudimentary sonar device has been developed which must be modified to add functionality and improve reliability. The packaging must be waterproofed and the circuitry upgraded to achieve the level of functionality previously outlined.

The active team analyzed the work done during the previous semester to get acquainted with the problem and to determine the tasks to be assigned for this semester. The defined tasks include:

- Obtaining a waterproof case for the device
- Build a multi-vibrator circuit
- Test different vibration types on test subjects to determine if they are discernible by a swimmer
- Electronic upgrade of device
- Ordering and purchasing of circuit components and other materials
- Test modified device on blind swimmers

In order to successfully modify the device, a firm background of electronics and related concepts are required. We therefore have set up a seminar with a representative of Cypress Semiconductors to learn to implement a PSoC (Programmable System on Chip) device in our device. The PSoC is a programmable system consisting of a microcontroller that can integrate multiple functions such as is required by our sonar device.

We obtained access to an electronics lab where the bulk of the circuit development will be done. The device will be tested on blind swimmers during a controlled pool test.

The potential solutions will be tested on blind and visually impaired swimmers by means of a pool test. The pool test involves the test subjects actually using the device to aid in swimming.

All results of research and testing will be documented in the engineering notebook by team members and then uploaded to IGROUPS so that everyone will have access to all of the findings.

The group will evaluate the product and jointly analyze the result. Guidance will be sought from our contacts at the Chicago Lighthouse, Cypress Semiconductors and the Rose-Hulman Institute of Technology.

A sub-team responsible for the report will divide the task of writing the report among themselves. A rough draft will be presented to the group for adjustment and the final report will be a polished version including everybody's work.

2.4.0 Expected Results

The results that are expected from the active team are to have a working prototype device that will be used for testing on the blind and visually impaired swimmers. The device should pass in terms of reliability; portability and functionality based on the project objectives.

Expected data which will be gathered through pool test, are the feedback from the swimmers about the vibration unit, the reliability of the material that is used to cover the vibration unit and the intensity required for different functions for example: approaching the end, approaching the sides.

One of the potential product that may evolve due to the test are smaller vibrating device with the same intensity of vibration and similar functionalities.

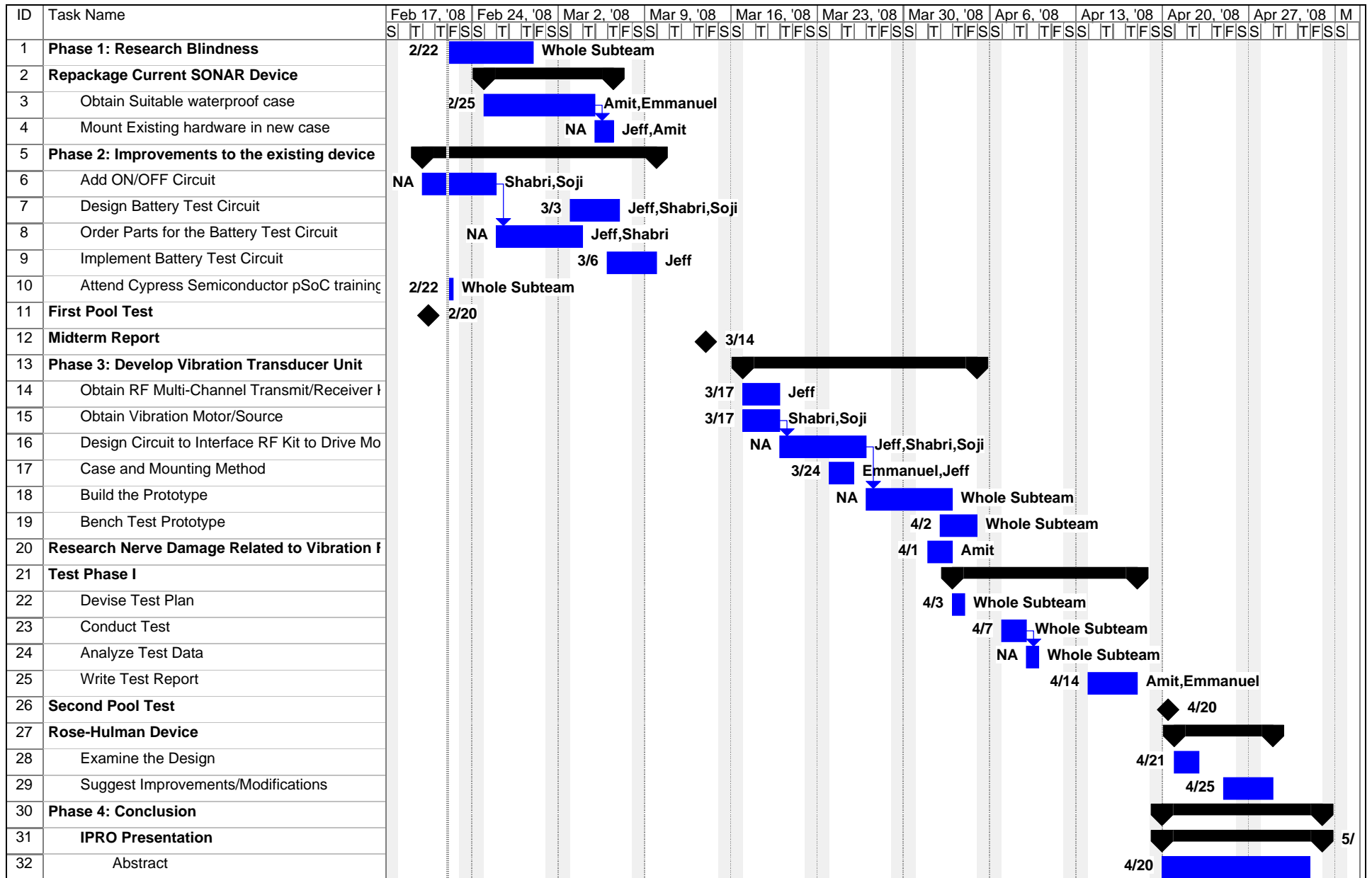
Potential outputs through the assigned tasks are gaining knowledge about the circuitry and the working of the active device that was constructed previously. Our expected result in terms of a proto type is to have a working device using a vibration transducer unit that can be worn by a blind swimmer and be remotely activated.

2.5.0 Budget

ITEM/WORK	DESCRIPTION/PURPOSE	UNIT COST	QTY.	TOTALS
Waterproof Case	Repackaging current device	\$60	1	\$60
RF Transmitter/Receiver Kit	For implementing the vibration transducer	\$100.00	1	\$100
Various Electronic Components and Hardware	For implementing the vibration transducer and modifying/improving the current sonar device and possibly the Rose-Hulman device	\$100.00	1	\$100
Food/Beverage	Entertaining guests, debriefing meetings, etc.	\$225.00	1	\$225.00
TOTAL:				\$485.00

2.6.0 Project Milestones

Please refer to Gantt chart on next page:



Project: Active Team Gantt Date: Fri 2/22/08	Task	[Blue Bar]	Milestone	◆	External Tasks	[Grey Bar]
	Split	[Dotted Line]	Summary	[Black Arrow]	External Milestone	◆
	Progress	[Black Arrow]	Project Summary	[Grey Arrow]	Deadline	↓

ID	Task Name	Feb 17, '08	Feb 24, '08	Mar 2, '08	Mar 9, '08	Mar 16, '08	Mar 23, '08	Mar 30, '08	Apr 6, '08	Apr 13, '08	Apr 20, '08	Apr 27, '08	M														
		S	T	T	F	S	T	T	F	S	T	T	F	S	T	T	F	S	T	T	F	S	T	T	F	S	
33	Poster													4/20													
34	Presentation Practice													4/20													
35	Question and Answer Practice													4/21													
36	Final Written Report																										5/

Project: Active Team Gantt Date: Fri 2/22/08	Task		Milestone		External Tasks	
	Split		Summary		External Milestone	
	Progress		Project Summary		Deadline	

2.7.0 Task Assignments

First is a chart with some background on each team member. Following the background, the tasks of each member will be listed.

Name	Major/Minor	Skills and Strengths	Experience and Academic Interests	Role
Emmanuel Sakla	Biology, Pre-med Minor in Psychology	Chemistry and Biology lab techniques Proficient in Microsoft Office	Doctor Shadowing at Hines VA Hospital Volunteering at Hines VA hospital Volunteered at St. Luke Medical group diabetes screening	Active Device Team Midterm Report
Jeff Schejbel	Electrical Engineering	Excellent workbench skills (soldering, board assembly, repair, etc.) and practiced with many shop tools. Fifteen years experience in digital and DC circuit design, Field Programmable (FPGA) and Complex Programmable Logic Device (CPLD) design.	Electronic Design Technician (1/93 to 10/07); member of the Hardware Design Group within the Engineering Department. Designed embedded electronics circuitry for equipment that monitored and controlled the dispensing of petroleum based liquids. IEEE Student member	Active Device Team Leader IPRO Day Presentation In Charge of Engineering Notebook
Amit Patel	Biomedical Engineering	Proficient in Microsoft Office 2007, Chemistry Lab procedures, and MATLAB software Fluent in Gujarati	Education Facilitator at the Museum of Science and Industry - June 2007-Present Sales Associate, The Home Depot.	Project Plan Timesheet Monitoring Active Team Minutetaker
Shabarinath Pabba	Electrical Engineering	Working with Programmable Logic Devices (PLD's), Implementation and	Desk Assistant , Department of Public Safety, IIT Co-owner , Nitisha Electrical Store, Secunderabad, India	Active Device Team Midterm

		Conversion of State Machines & Assembly Level Programming, Analyzing Signals and systems. Working with Logical circuits, Counters, Registers, Analyzing and designing synchronous sequential circuits. Programming Skills: Java, Assembly language.	Co-owner , Nitisha Medical and General Stores, Secunderabad, India	Presentation In Charge of Lighthouse Tour
Olasoji Denloye	Electrical Engineering	JAVA programming, MATLAB, SPICE, Assembly language programming. Analog and digital circuit construction and implementation, Learned to use Logic analyzers and oscilloscopes as powerful tools to investigate filters, PLDs, FSMs and transformers	Resident Advisor, Office of Residence Life – IIT; 2007 Autonomous Robot Fall 2005 Student Assistant, Office of Financial aid – Illinois Institute of Technology (IIT)	Active Device Team Ethics sub-team Compiled Resumes and Team Background

Tasks

Emmanuel Sakla:

- Waterproofing device case
- Mount vibration device on case
- Write test report

Jeff Schejbel:

- Organize PSoC Seminar
- Mount existing hardware in new case
- Design and implement battery test circuit
- Obtain RF multi-channel transmitter/receiver kit

Amit Patel:

- Mount existing hardware in new case
- Research nerve damage caused by exposure to vibration
- Write test report

Shabarinath Pabba:

- Implement ON/OFF circuit
- Design and implement battery test circuit
- Obtain motor for vibration device
- Design circuit to interface RF kits to drive motor

Olasoji Denloye:

- Implement ON/OFF circuit
- Design and implement battery test circuit
- Obtain motor for vibration device
- Design circuit to interface RF kits to drive motor

Business Plan Project Plan

3.1.0 Objectives

The business team's main objective for this semester is to assist IPRO 310 in developing feasible and effective business plan associated with Market Research, Value proposition, Competitive Analysis and Financial Model for entry business. The different phased objectives will each proceed as following:

- Conduct market research on blind people and visually impaired with prospective target markets to decide a specific niche for market entry
- Continue market research with forecasting future value of blind or visually impaired swimmers
- Conduct competitive analysis with prospective competitors on the same devices or tendency
- Understand the value of assistant devices for blind and visually impaired swimmers and conduct value proposition on how well the products will be accept by the target market
- Determine a marketing strategy based on competitive analysis, value analysis and market research
- Assess ROI, Rewards/Risks, Income Statement/Cash Flow in order to build financial model
- Finalize Business Plan based on the above points

3.2.0 Background

Enpro 357 is an extension of the existing IPRO 310 whose primary objective is to develop assistive devices which will aid the blind and visually impaired in an aqueous environment. Our objective as an extension of Ipro310 is to potentially develop a business with the Passive Device that has been created as a result of IPRO 310. We wish to continue networking with the Chicago Lighthouse and the Notre Dame Masters Swimming Program, prior contacts of IPRO 310, to gain a better understanding regarding the needs and problems confronting the blind and visually impaired swimmers as well as assessing the optimal channels to generate awareness of our assistive device to this target market.

However, we are still in the early stages of business plan development it is obvious to our team that the work completed in IPRO 310 is merely a stepping stone in assistive devices. Still in the grand scheme of things, this project's result will potentially become the first of many assistive

devices which will enable the disabled to become more independent and self-sufficient overall improving lives.

3.3.0 Methodology

3.3.A The Problem

Globally, in 2002 more than 161 million people were visually impaired, of whom 124 million people had low vision and 37 million were completely blind. In the United States, the numbers of blind people and visually impaired are 2.4 million and 15.5 million respectively out of the total population 852.6 million, this means almost 5 in every 100 people in the United States are blind or visually impaired. According to the data from World Health Organization, the number of blind and visually impaired people will increase significantly year by year because of the environment.

The problems in the first phase of the semester that we are trying to solve, with a wide scope, are to create a market analysis including market size & growth, to forecast value and marketing strategy; competitive analysis including finding competitors; competitive advantage and barriers to entry; value proposition analysis including how the market will be reached through the government, direct to blind and visually impaired customers, or institutions that want to assist blind and visually impaired people. We will also figure out the value and effectiveness of products already available for those target markets.

The problem that we are trying to solve in the second phase is to assess ROI, Risks/Rewards, Income Statement and Cash Flow in order to conduct financial model with the help of passive team and active team.

The problem we are trying to solve in the third phase is to finalize the business plan with combine the market research, competitive analysis, value proposition and financial model.

3.3.B Plan of Action

There are four distinct classifications of tasks in the whole semester.

Phase 1: Research Reports:

1. Conduct market research, competitive analysis, and value proposition estimation.

2. Generate tentative reports on each task---market research, competitive analysis, and value proposition estimation.
3. Combine reports between 02-25-2008 and 03-07-2008 in preparation of drafting business plan.

Phase 2: Draft Business Plan

After finishing the basic research, the business team will begin to draft the business plan without financial model.

Phase 3: Create financial model and improve business plan

In the third phase, the business team will be split into two sub teams which are response for financial model creation and business plan improvement.

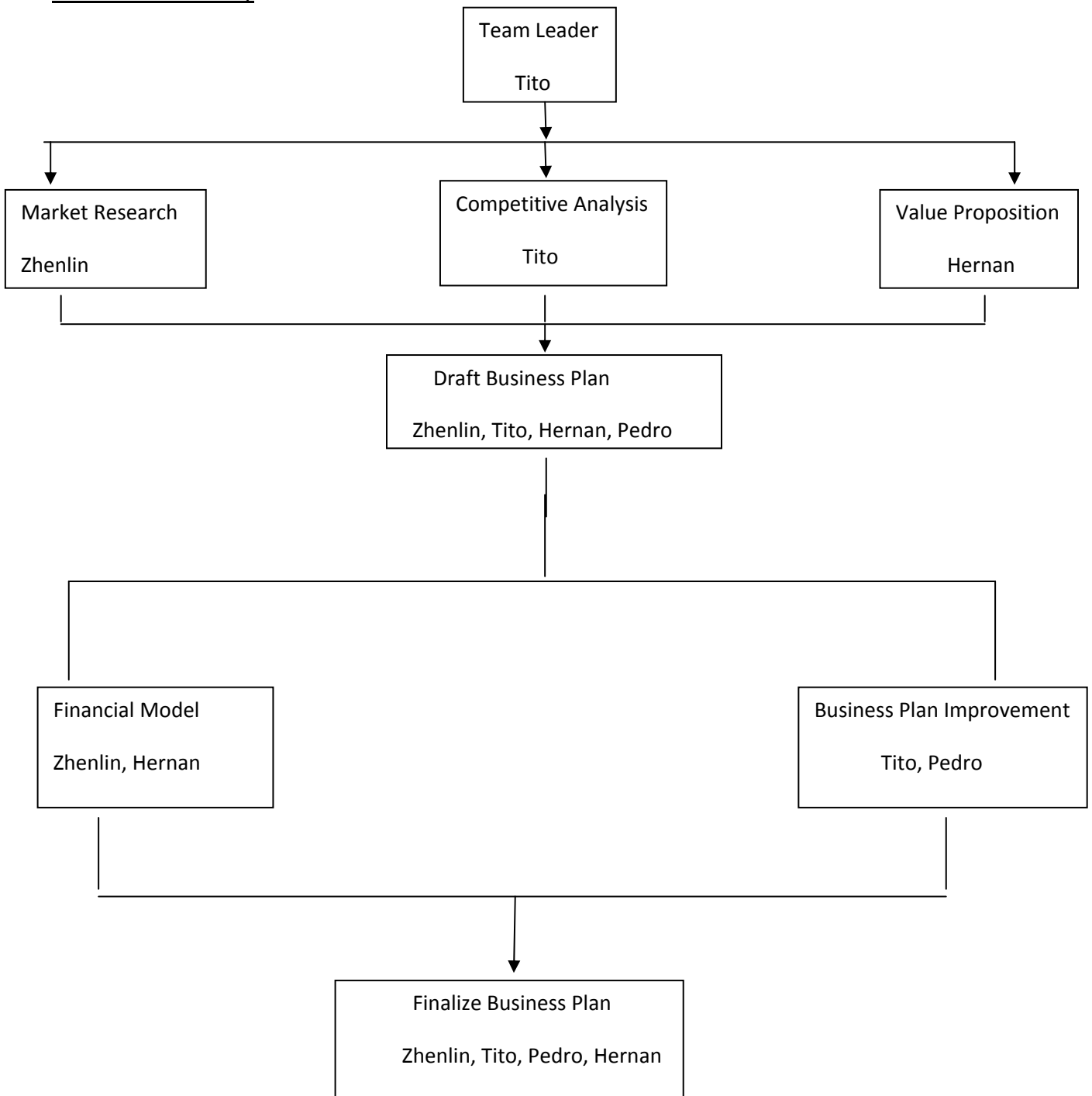
Phase 4: Finalize the business plan

In the last duration, the business team will accomplish the final business plan after getting financial model and improvement done.

Roughly, the total hours business team has to work are 400 hours, consisting of 4 members. But Perdo Cruz Lima is also belonging to passive team. Therefore, Zhenlin Lu, Tito Rodriguez and Hernan Canals have more tasks allocated to them. The average working time per week for Zhenlin Lu, Tito Rodriguez, and Hernan Canals is around 8.5 hours, and 4 hours for Perdo Cruz Lima.

The sub-team detailed division is as follows on the next page:

Sub Team Hierarchy



3.4.0 Expected Results

- Understand the initial target market for the passive and active device. This will include gaining an understanding of the size and growth of target market, forecasting future value for business entry.
- Determine competitive strengths and weakness in the passive device compared to other present or future devices on the market.
- Find short and long term value of the passive device, and update in order to avoid becoming obsolete.
- Create financial model to assess ROI, Risks, Income Statement and Cash Flow
- Formulate business plan for start-up business
- Pursue and participate in real business competition successfully

3.5.0 Schedule of Tasks and Milestone Events

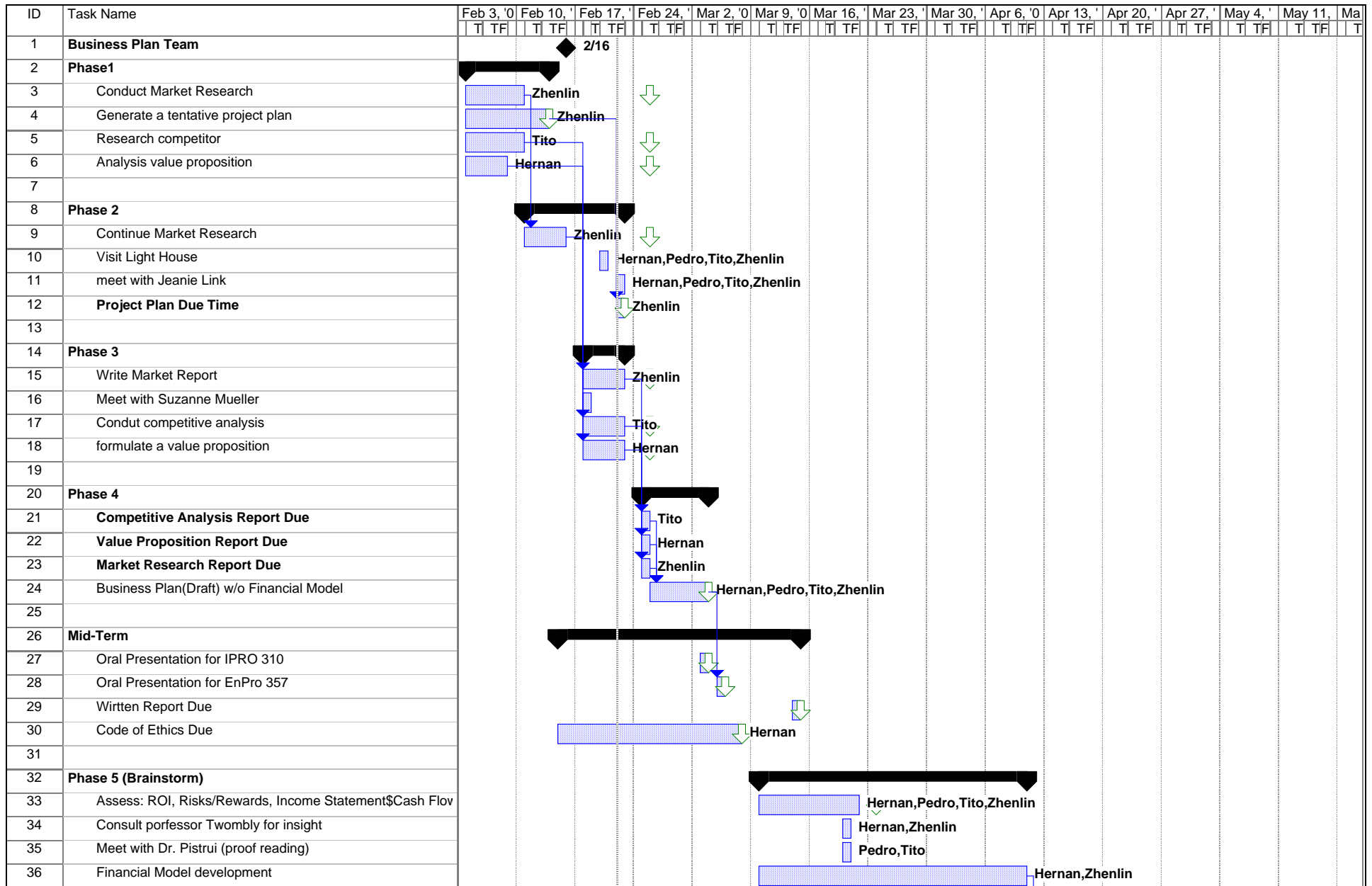
A Microsoft Project Plan is shown following the milestones and list of key tasks and deliverables with a schedule of the necessary tasks for this semester.

Milestones

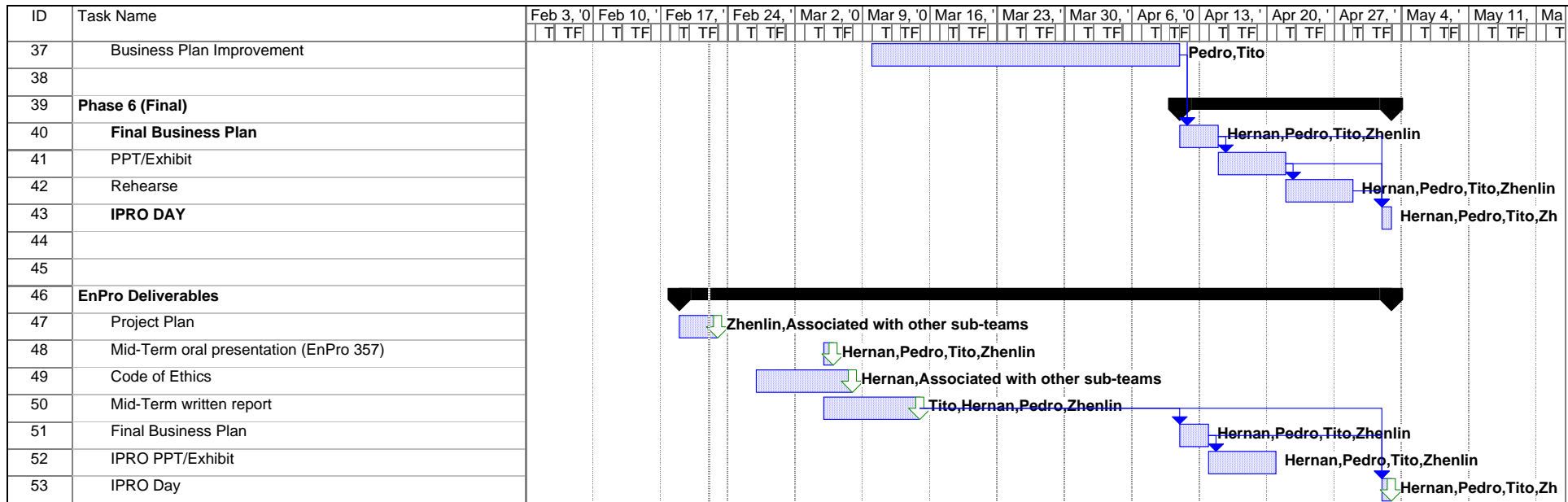
Milestones represent main progress toward the completion of our tasks and of our expected results. We have identified couple milestones to be completed and their expected happening time:

- February 15: Market Research Report, Competitive Analysis Report and Value Proposition Report completion
- March 3: Business Plan Draft completion
- March 5: Mid-Term oral presentation
- March 14: Mid-Term written report
- April 10: Financial Model completion
- April 10: Business Plan Improvement completion
- April 14: Final Business Plan completion
- April 21-April 25: Rehearsing for IPRO day
- May 2: IPRO Day

Week	Tasks	Hrs	Key Deliverables
3	Conduct Market Research Generate a Tentative Project plan	24 4	Project Plan Draft
4	Finalize Project Plan Continue Market Research Visit Lighthouse for the Blind Meet with Jeanie Link	2 24 3 2	Project Plan due Wednesday
5	Continue Market Research Meet with Suzanne Mueller Conduct competitive analysis	10 2 15	
6	Formulate a Value Proposition	25	
7	Formulate Business Model	30	Competitive Analysis Report Due Value Proposition Report Due
8	Finalized 1 st Draft of Business	20	Business Plan Rough Draft
9	Assess: ROI, Risks/Rewards, Income Statement & Cash Flow Consult Professor Twombly for insight Meet with Dr. Pistrui (proof reading)	15 1 1	
10	Split into Two Groups: <ul style="list-style-type: none"> • Fine Tuning – improve Business Plan • Financials – Continue creation 	10 15	
11	Both Groups Continue Improvements	25	
12	Final Meetings <ul style="list-style-type: none"> • Twombly • Dr. Pistrui Finalize Business Plan Create Final Presentation <ul style="list-style-type: none"> • PPT • Exhibit 	1 1 10 5 5	Final Business Plan PPT Rough Draft Exhibit Rough Draft
13	Finalize PPT Finalize Exhibit Practice	3 3 3	Final PPT Due Final Exhibit Due
14	IPRO Day	3	Final Drafts: Business Plan & Presentation



Project: Final Project Plan for Business Date: Fri 2/22/08	Task		Milestone		External Tasks	
	Split		Summary		External Milestone	
	Progress		Project Summary		Deadline	



Project: Final Project Plan for Business Date: Fri 2/22/08	Task		Milestone		External Tasks	
	Split		Summary		External Milestone	
	Progress		Project Summary		Deadline	

3.6.0 Project Budget

Light house visiting	\$25 for transportation fee
Wisconsin Blind School Visiting	\$125 for transportation fee
Other Research Fee	\$50
Total	\$200

3.7.0 Individual Team Member Assignments

The current EnPro 350 roster consists of 4 members who all major in business, which is ideal for an EnPro team who are working with an established IPRO.

Name: Zhenlin Lu (Business Team)

Year: 3rd

Major: Business Administration (Finance)

Experience: First time in EnPro, volunteer in a law firm, co-owner and founder of “Rain” Clothing Fashion Shop, Teaching Assistant for Business Statistics

Skills: Proficient in MS Office (Word, Excel, PowerPoint, Project), PhotoShop, Quicken, S Plus

Strengths: Strong quantitative, analytical, and interpersonal skills

Role: Project plan for business team and whole team, market research, financial model, business plan

Name: Tito Rodriguez (Business Team)

Year: 4th

Major: Business Administration (Marketing)

Experience: Student Intern, IIT office of Admissions, Midwest Marketing Concepts

Skills: Proficient in Microsoft Suite (Word, Excel, PowerPoint, Project), Visual Basic

Strength: Highly motivated and disciplined

Role: Business Team Leader, competitive analysis, business plan

Name: Pedro Cruz Lima (Business Team and Passive Team)

Year: 4th

Major: Business Administration (International Business)

Experience: Gatorade Pan-American Games Promotion, Águas de Niterói--Finance department internship, Vice-President Indoor Soccer Club (Mohawk Valley Community College)

Strength: proficient in MS Office (Word, Excel, PowerPoint), Speaking English, Spanish, German

Role: Passive Team Leader, business plan

Name: Hernan Canales (Business Team)

Year: 3rd

Major: Business Administration (Finance)

Experience: Manager for Grupo Forestal Industrial Mexicano

Strength: proficient in MS Office (Word, Excel, PowerPoint), Speaking English and Spanish

Role: Value proposition, financial model, code of ethics, business plan

Designation of Roles

4.8.0 Designation of Roles

Minute Taker: Jodi Warns

Agenda Maker: Samuel Solomon

Time Keeper: Tito Rodriguez

Weekly Timesheet Collector: Amit Patel

Master Schedule Maker: Talha Yousuf

iGROUPS Maintainer: Jeffrey Schejbal

Passive Team Minutes: Jodi Warns

Passive Team Engineering Notebook Maintainer: Talha Yousuf

Active Team Minutes: Amit Patel

Active Team Engineering Notebook Maintainer: Jeffrey Schejbal

Business Plan Team Minutes: Zhenlin Lu

Business Plan Team Research Notebook Maintainer: Tito Rodriguez