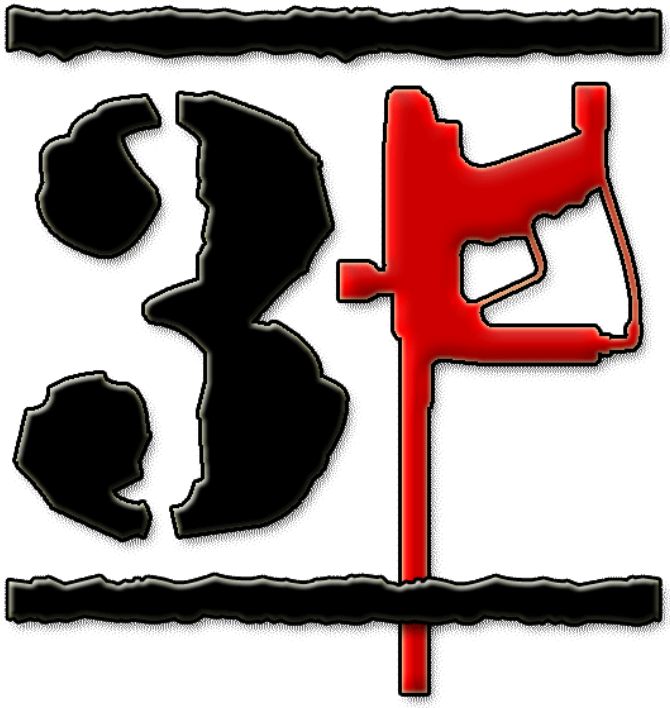
SMART SPECS IPRO 350

Fall 2010

Project Plan



SMART SPECS IPRO 350

Fall 2010

IPRO 350
Instructor: Jim Braband
September 2010

Charter

Team Contact Roster:

Name	Email	Phone
Conover, Stephen	s.e.conover@gmail.com	[redacted]
Braband, Jim	braband@iit.edu	[redacted]
Clovsky, Aaron	aclovsky@iit.edu	[redacted]
Hoylman, Phillip	phoylman@iit.edu	[redacted]
Hutchins, Sarah	shutchi1@iit.edu	[redacted]
Kawa, Konrad	kawakon@iit.edu	[redacted]
Bohac, Adam	bohacadam@gmail.com	[redacted]
Roa, Carlos	croa1@iit.edu	[redacted]
Wendt, Kevin	kwendt1@iit.edu	[redacted]
Boschert, Drew	aboscher@iit.edu	[redacted]
Tejada, Saek	stejada@iit.edu	[redacted]
Stogner, Jason	jstogner@iit.edu	[redacted]

SMART SPECS IPRO 350

Fall 2010

Team Time Available

Monday:

	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200
Conover, Stephen															
Braband, Jim															
Clovsky, Aaron															
Hoylman, Phillip															
Hutchins, Sarah															
Kawa, Konrad															
Bohac, Adam															
Roa, Carlos															
Wendt, Kevin															
Boschert, Drew															
Tejada, Saek															
Stogner, Jason															

Tuesday:

	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200
Conover, Stephen															
Braband, Jim															
Clovsky, Aaron															
Hoylman, Phillip															
Hutchins, Sarah															
Kawa, Konrad															
Bohac, Adam															
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Wendt, Kevin															
Boschert, Drew															
Tejada, Saek															
Stogner, Jason															

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Team Time Available

Wednesday:

	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200
Conover, Stephen															
Braband, Jim															
Clovsky, Aaron															
Hoylman, Phillip															
Hutchins, Sarah															
Kawa, Konrad															
Bohac, Adam															
Roa, Carlos															
Wendt, Kevin															
Boschert, Drew															
Tejada, Saek															
Stogner, Jason															

Thursday:

	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200
Conover, Stephen															
Braband, Jim															
Clovsky, Aaron															
Hoylman, Phillip															
Hutchins, Sarah															
Kawa, Konrad															
Bohac, Adam															
Roa, Carlos															
Wendt, Kevin															
Boschert, Drew															
Tejada, Saek															
Stogner, Jason															

SMART SPECS IPRO 350

Fall 2010

Team Time Available

Friday:

	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200
Conover, Stephen															
Braband, Jim															
Clovsky, Aaron															
Hoylman, Phillip															
Hutchins, Sarah															
Kawa, Konrad															
Bohac, Adam															
Roa, Carlos															
Wendt, Kevin															
Boschert, Drew															
Tejada, Saek															
Stogner, Jason															

Saturday:

	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200
Conover, Stephen															
Braband, Jim															
Clovsky, Aaron															
Hoylman, Phillip															
Hutchins, Sarah															
Kawa, Konrad															
Bohac, Adam															
Roa, Carlos															
Wendt, Kevin															
Boschert, Drew															
Tejada, Saek															
Stogner, Jason															

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Fall 2010

Team Time Available

Sunday:

	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200
Conover, Stephen															
Braband, Jim															
Clovsky, Aaron															
Hoylman, Phillip															
Hutchins, Sarah															
Kawa, Konrad															
Bohac, Adam															
Roa, Carlos															
Wendt, Kevin															
Boschert, Drew															
Tejada, Saek															
Stogner, Jason															

*Note: All spaces filled in with **RED** denote available time.

Members Position/Strengths/Weakness/Expectations

Name: Stephen Conover
Position: Design Team Member
Major: Biomedical Engineering
Strength: Quick learner, soldering and welding, very logical designer
Weakness: Lacks technology design experience
Expectation: To assist with the design and development of the prototype

Name: Aaron Clovsky
Position: Electrical Team Member
Major: Computer Engineering
Strength: Experienced in prototype design, familiar with the technology of the product
Weakness: Overly ambitious
Expectation: To assist with the design and development of the prototype

Name: Phillip Hoylman
Position: Business Team Leader
Major: Business & Management
Strength: Business & finance experience, paintballer, gets results
Weakness: Development of a business strategy
Expectation: Develop a market entry strategy while simultaneously leading the business team

Name: Sarah Hutchins
Position: Electrical Team Member
Major: Computer Engineering
Strength: Invested in the project, familiar with the technology
Weakness: Soft spoken, tough course load
Expectation: To assist with the design and development of the prototype

Name: Konrad Kawa
Position: Tech Teams Leader
Major: Computer Engineering
Strength: VHDL skills, tech experience, invested in project
Weakness: Overly ambitious
Expectation: To assist with the design and development of the prototype and lead the technology teams into a completed status

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Members Position/Strengths/Weakness/Expectations

Name: Adam Bohac
Position: Business Team Member
Major: Aerospace Engineering
Strength: Excellent researcher, paintballer, knows the market
Weakness: Lacks business experience
Expectation: To design and develop a market entry strategy and business plan

Name: Carlos Roa
Position: Design Team Member
Major: Mechanical Engineering
Strength: Experienced in CAD, optics, and is an experienced designer
Weakness: Never honed a final design
Expectation: To assist with the design and development of the prototype mask

Name: Kevin Wendt
Position: Tech Team Member
Major: Computer Engineering
Strength: Business & finance experience, paintballer, gets results
Weakness: Has never integrated technologies like these before
Expectation: To assist in the design and development of prototype software

Name: Andrew Boschert
Position: Business Team Member
Major: Business & Management
Strength: Deep interest in product, small business experience
Weakness: Heavy course load, time management
Expectation: To design and develop a market entry strategy and business plan

Name: Saek Tejada
Position: Design Team Member
Major: Mechanical Team Member
Strength: Mechanical and design experience, paintballer, ambitious
Weakness: Never incorporated technologies like this into a single unit
Expectation: To assist with the design and development of the prototype

Members Position/Strengths/Weakness/Expectations

Name: Jason Stogner
Position: Project Manager
Major: Industrial Technology and Management
Strength: Experienced Leader
Weakness: Interpersonal tact
Expectation: To guide my team towards success in order to complete our two objectives: a functional prototype and business plan completion

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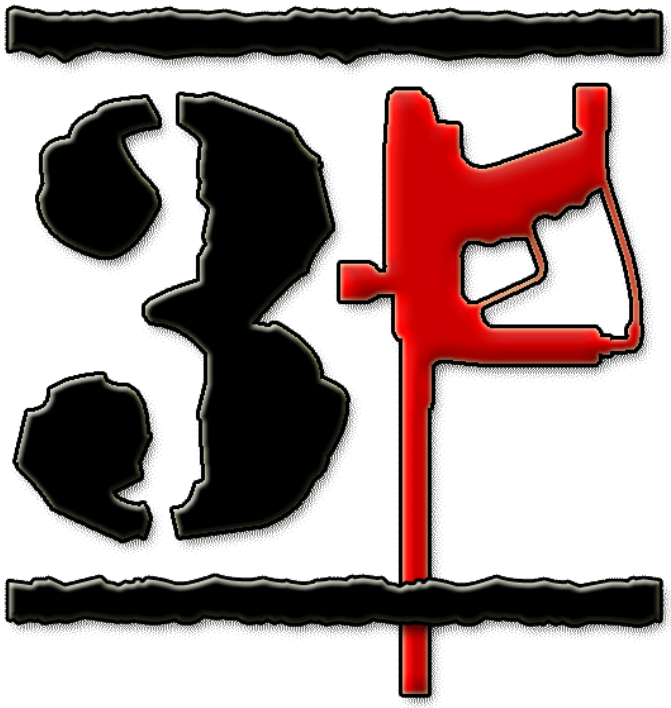
Team Identity

Name: Smart Specs

Motto: ***"See your team!"***

Logo:



Team Purpose and Objectives

A. Purpose:

1. Develop a system that provides a hands-free, networked navigational aid with team tracking capabilities and to develop a market entrance strategy.

B. Team Objectives:

1. Develop a functional prototype to demonstrate the unique underlying concept addressed by the IPRO.
2. Design a corresponding face protection device that will encompass the navigational and tracking capability technologies.
3. Provide a comprehensive market entry strategy.
4. Perform a comprehensive patent search and report the findings.

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Background

Utilizations of Global Positioning Systems (GPS) and tracking devices have influenced many advances in modern technology. GPS has replaced the map and compass and can be crucial to maneuver elements in combat scenarios. GPS's current platform requires the user to grasp a handheld device and direct his/her frame of view to a screen. This hinders its user in two distinctive ways: it requires the use of hands that could be better suited affixed to a weapon system, and it takes the user's eyes off the battlefield, reducing the user's situational awareness.

To enhance our end user's operational effectiveness, team Smart Specs has undertaken a project which integrates GPS, a heads-up display, and datalink technology to form a design that will give its user hands free team tracking and navigational capabilities.

This device, worn like a standard paintball mask, allows its user to track objects as well as designate objects to be tracked, which are all shown through a heads-up display. Given the example of a potential user, a US Soldier: Imagine being on the paintball field in the middle of a firefight. You can hear the popping of paintballs leaving their weapons and whipping by. You have separated from your squad and need to make your way to their location. You want to check your GPS device to orient yourself, but you are too nervous to take your hands off of your weapon and/or your eyes off of your surroundings. This is where the Smart Specs come in. The Smart Specs display allows you to maintain your natural field of view, and you are provided with a real-time heads-up display of augmented reality. The information, displayed like an animated map overlay, places markers on the location of your teammates. Following the markers will reunite you with your teammates. Smart Specs is the next generation of combat oriented GPS.

Potential Uses of Our Product

A. Paintball:
    1. Options would be focused around the scenario based paintball demographic and would be utilized to identify fellow team members in order to prevent fratricide within the team.

B. Military:
    1. Options for military include reconnaissance and battlefield awareness. Applications could be used in all aspects of personnel war-fighting efforts, but would be targeted toward special operations units. Different interest groups would include: Marine Recon, Navy Seals, Air Force Para-rescue, Combat Controllers, Army Delta Force, Rangers, and Green Berets.

C. SWAT/Search and Rescue/ Fire:
    1. Options would include search and rescue, surveying, and critical point awareness. Applications could be used in locating critical points of interest and tracking features for high-risk scenarios. Different interest groups would include police forces, fire-fighting units, and emergency medical units.

D. Sightseeing Specs:
    1. Options would include locating tourist's attractions and displaying content relating to the points of interest.

User Problems

A. Line of Sight:
    1. The user may encounter different problems with the application of Smart Specs such as failures to receive GPS information due to limited satellite availability.

B. Normal Wear & Tear:
    1. The user may also encounter problems with potential damages to the device as they will use it in rugged conditions.

C. Requires Power Source:
    1. The user may run out of battery power during usage. If this occurs the user may be required to resynchronize to the command node to reestablish the virtual hand shake to gain access to the command node network.

D. Regular Calibration Required:
    1. The user will have to conduct preventative maintenance checks on the equipment prior to use. This will include a calibration of the compass built into the unit. Failure to properly calibrate the device may result in an inaccurate array of friendly forces markers on the heads-up-display.

E. Blunt Force and Electronics:
    1. Should the user come into contact with anything other than what the mask is designed to withstand, the user may damage sensitive electronic devices built into the mask.

Technology Involved

A. Global Positioning System:
    1. The Global Positioning System (GPS) consists of: 24 to 32 satellites that orbit Earth, four monitoring stations on Earth, and GPS receivers. GPS satellites broadcast signals to GPS receivers on Earth in order to provide latitude, longitude, altitude, and GPS time to the user.

B. Heads-Up Display:
    1. A Heads-Up Display (HUD) is a transparent display that presents data to the user without having the user look away from his or her usual viewpoint. (This is opposed to a Heads-Down Display (HDD) which requires the user to look away from his or her usual viewpoint to read information. An example of an HDD is the dashboard in a car.)

C. Digital Compass:
    1. A digital compass, sometimes called a magnetometer, is used to tell direction. Most digital compasses come in an integrated chip that can decode sensor data and send that data digitally through serial communication.

D. Microcontroller:
    1. A microcontroller is a small computer on a single integrated circuit that usually includes a central processing unit (CPU) combined with support for other functions like crystal oscillator, timers, serial and analog I/O, etc.

E. Wireless communication:
    1. Made possible through radio waves.

Historical Success/Failure of Similar Systems

A. Augmented Reality:
    1. Augmented reality allows a user to enhance their field of view with a graphic overlay of data tailored to meet the needs of an individual's job, mission, or recreational activity
        i. Fighter jet helmet mounted display system. The F-35 Joint Strike Fighter (JSF) uses a Helmet Mounted Display System (HMDS) that gives the pilot the ability to operate effectively in day and night conditions. The HMDS projects images on the visor of the helmet to aid him in situational awareness and tactical capability. Because of the HMDS, the JFS is the first tactical jet fighter in 50 years to fly without a cockpit mounted HUD.

B. HUD for personal navigation:
    1. A wearable heads-up display unit has not been commercially made for personal navigation.

C. GPS navigation:
    1. A successful system used for personal navigation is GPS navigation. These devices can be found in electronic stores and included in some automobiles on the market today. GPS navigation uses your current GPS location, your destination, a compass, and algorithms that determine the best route for you to travel. However, these units are Heads Down Displays requiring the user to look away from his or her usual viewpoint.

Known Ethical Issues

A. We must ensure that the software being used for the project is licensed for appropriate purpose and not violating any copyright laws.

B. We must ensure that all engineers and business team members are aware that subsequent generations of this technology may be used in combat operations and may give the user a decisive advantage over their opposition which may result in a person's death.

C. We must ensure that all work, progress, chatter, documents whether physical or electronic, products, physical or intellectual property devoted to this EnPro and done amongst the EnPro 350 Fall semester 2010 team is in no way to be transmitted to any non-team member due to a non-disclosure agreement which will be signed by all team participants and any other non-team member of which assists in the project.

D. We have achieved co-operative consent from all team members that they do not conscientiously object to any of the aforementioned ethical issues and will thereby dedicate all necessary time and effort towards the completion of our EnPro's three primary initiatives.

Business or Societal Costs of the Problem

A. Para-Military Application:
    1. For communication in the field, radios and other tools are used to give commands or coordinates. Furthermore, by the time the information is given, the data may be too old to use. This costs its users time. Every second counts in the field.

B. Civilian Application:
    1. In scenario-based paintball, coordination and teamwork is the key to victory on the field. Being able to identify friendly forces on the paintball field prevents the occurrence of fratricide.

Research About Similar Products or Ideas

A. Similar products exist such as GPS devices which allow users to track the corresponding distance and direction to other sources. Products such as the Garmin Rhino product line provide a hand-held head-down display which enables the users on its net the ability to see one another when the GMRS radio attachment to the device is keyed.

B. HUD's also exist for aircraft and rolling stock vehicles and enable the pilot to track targets similar to the functionality of Smart Specs.

C. Wireless networks exist in a multitude of personal and commericial applications, however, outside of basic FMRS or GMRS FM push-to-talk radios, these networks do not exist on the paintball field as of yet.

Team Values Statement

A. **Selfless Service.** Refers to a service or action that one performs without expecting anything in return. These actions usually involve giving the best that the person has, because it is not paid back in any sense. The honor of the person is what ends up playing a big role, as he or she does not assume that the service has a monetary value. This concept is not limited to monetary remuneration, but any kind of reward that the person could expect from their job. This is a very important concept for our team, in particular because we are dealing with a new technology that can yield a profit down the line. A debate can arise if at any point we could get money, because every member that has worked in the project would feel that a part of that profit corresponds to him or her. Therefore, it is important for everyone to have the concept of selfless service in mind.

-Carlos Roa

B. **Cooperation.** The concept of cooperation involves multiple individuals working together to achieve common goals. Cooperative work is not competing, but that adds strength to the target. It may happen that a cooperative group competes with another, but within the group, nobody wants to beat his teammate, but together, the other team. Each cooperative team member must put the best of himself for the good of all. Nobody wants to win individually, but benefit as a whole. The cooperative group member feels an affinity for its peers and is part of a plan of action, which is involved, and shares their values. He knows that just being supportive, allowing to be helped and help get the desired purpose.

-Saek Tejada

Team Values Statement (continued)

C. **Integrity** is a fundamental collection of values and principles that bring about a sense of honesty and honor within a person, group, or company. Each military branch has core values which they drill into every member. Integrity is a part of the core values, and is the most important to uphold for without everything else is meaningless. The same applies to the project and future aspirations. In order to be successful the project/business must have integrity otherwise the business will not last. Within the project itself there must be integrity so information will not be stolen from others or the product be used without the support of the members. Also when selling or soliciting the product, integrity must apply so the consumers trust in what they are buying and will not be cheated.

-Adam Bohac

D. **Dedication** is the act of selflessness in the pursuit of a higher goal. This might be as simple as devoting a large amount of time to an essential task, but might include many other sacrifices along the way. Notably a dedicated individual is likely to reschedule all other activities that interfere with the production, especially in a team environment where the work gets passed on to the next individual who may need the extra time to take the objective to another level.

-Konrad Kawa

Team Values Statement (continued)

E. **Accountability.** A person is accountable if the responsibility of an action falls on them. There are many forms of accountability depending on the situation. In the case of this IPRO, each member is responsible for completing and turning in work on time and will be held accountable for not doing so, sub-teams are accountable for making sure the every goal assigned to them are completed, and everyone is accountable for the final quality of the project.

-Stephen Conover

F. **Motivation** is important to me because without motivation there is no drive to accomplish a task. If you let motivation fall your chances of success dwindle to nothing. This pertains to the group project because motivation is essential to keep high all semester to succeed in the goals we have set out we need to motivate each other so that our work is without fault, and our goals are met.

-Andrew Boschert

G. **Integrity**. To have integrity is to have the quality of adhering to your ethics. Building upon strong ethics, integrity will lead a person to success in any situation. The integrity of a team is reflective of the integrity of its members. Members of the team must be willing to be diligent and stick to honest deadlines that they set for themselves and always hold themselves accountable. Should any member of the team not have the integrity to complete what they agreed to, the integrity of the team fails. As a team, the integrity of our product reflects the integrity of our members.

-Kevin Wendt

Team Values Statement (continued)

H. **Teamwork.** Effective teamwork is the assimilation of all of the aforementioned principles of selfless service, cooperation, integrity[2], dedication, accountability while at the same time staying motivated. It is in places like IIT, battlefields across the globe and the paintball fields that span America where individuals of different ethnic, religious, and ethical backgrounds can come together honorably to take on challenges head first. Our understanding of the aforementioned concepts is what will drive our team toward success both here and beyond the classroom.

-Jason Stogner

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Expected Team Behavior

A. Team members will attempt to be present and on time for all meetings. Any foreseeable absences or early dismissals from meetings should be reported.

B. The proper procedure for missing class or leaving class early is to notify your team leader well in advance.

C. Team members should meet with their sub-team members outside of scheduled class time at a mutually convenient sub-team meeting time.

D. Team members will regularly check for email traffic regarding the IPRO as well as keep track of project updates on iGroups.

E. Team members should prepare a short report of each week's progress to be presented at the beginning of each class to the entire group.

F. All team members should commit to meet their set objectives by no less than seven days prior to IPRO day and shall show up for the same to represent the team on IPRO day.

G. All team members who are not present for class are responsible for seeking out information that was disseminated during class.

H. All team members who will not attend class during the officially scheduled meeting times must submit a written report each Friday or post a YouTube video or utilize other downloadable content whereby you can deliver a verbal report.

I. Sub-team work will be discussed during sub-team time allocated after the daily update brief and not before or during unless absolutely necessary.

Team Dynamics and Ethics Discussion

A. All team members should actively take part in class discussion and voice their opinions.

B. Each team members should be committed to promoting a healthy atmosphere for debate; henceforth, should not call out other team members by making embarrassing remarks or ethical criticisms.

C. Extremely debatable and controversial issues should be tabled until the next meeting and further discussion shall be promoted on forums (discussion threads in iGroups) following further introspection/research and a decision shall be made in sub-team meetings or the next all class meeting.

D. If Inter-team member conflicts cannot be resolved by the individual involved parties, the team leaders will attempt to come to a resolution. If all else fails the project manager will make the final decision.

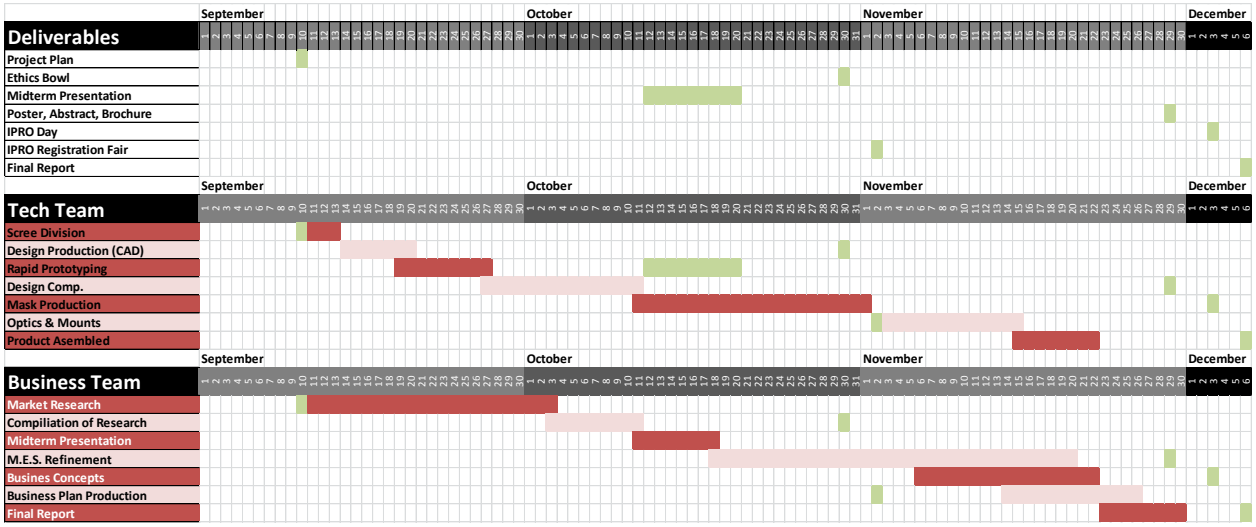
E. All team/sub team members should make sure that all the members on their team/sub team are showing equal commitment towards the efforts put in.

Project Methodology

A. Problem Solving:

1. Since this project will be an even mix of business and technical development, much of the tasks preformed will be development and marketing related.
2. Any topics researched will be posted on iGroups.
3. People doing any research will be expected to give a short update in class on the information they have discovered.

B. Gannt Chart:



Team Structure

A. Team Hierarchy Chart:

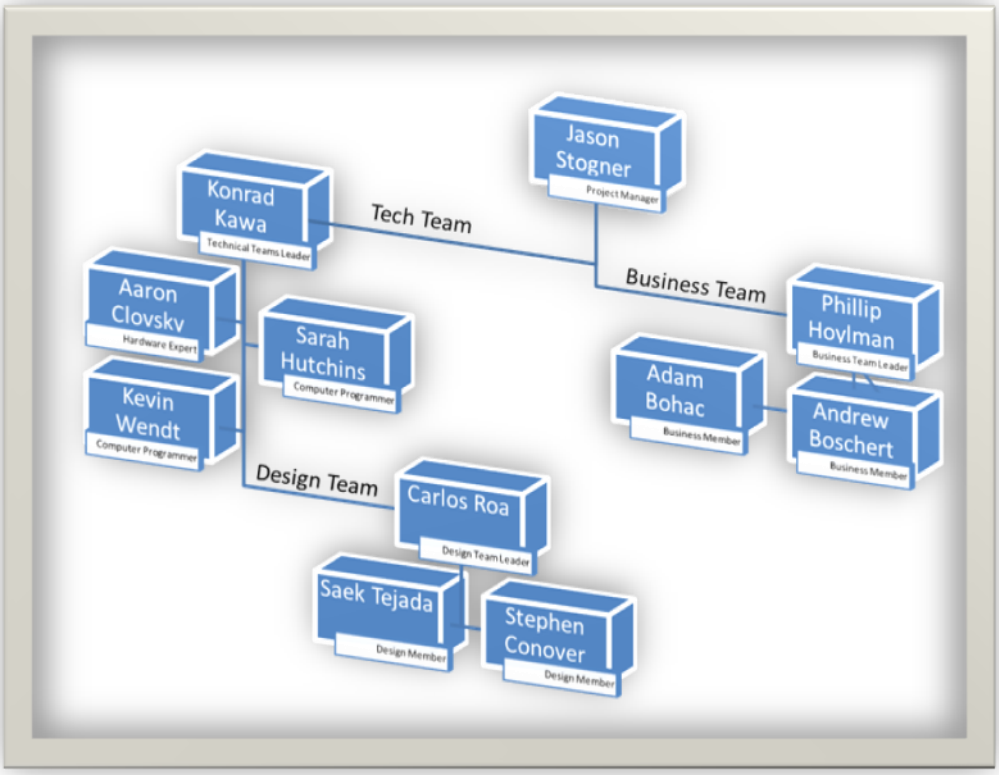


Figure 1: Team Hierarchy

B. Sub-team Breakdown and Responsibilities:

1. **Tech Team:** In charge of determining and developing electrical components and interfaces, this will be necessary for a functioning prototype.
2. **The Design Team:** In charge of designing the paintball mask of which the electrical prototype will occupy.
3. **The Business Team** Tasked to develop a business plan, with a market entrance strategy.

Expected Results

A. Technical Side:
   1. Creation of functional electrical prototype based on the concept
   2. Design of a paintball mask to house the electronic components
   3. Hardware and software demonstration of the concept in action

B. Business Side:
   1. Research and marketing of the product
   2. Compilation of market entrance strategy
   3. Compilation of business plan

Expected Data

A. Technical Side:
   1. A networked tracking system capable of communication with a central node
   2. Meet the need of the target market

B. Business Side:
   1. Target Market: Para-Military, Civilian, Recreational Size of target market
   2. Competitor analysis
   3. Customer needs analysis
   4. Last semesters findings

Potential Products

A. Augmented reality heads-up display with integrated geo-tracking device

Potential Outputs

A. Functional Prototype

B. Opportunity assessment on:

C. Who would buy the product

D. How it should be marketed

Expected Results of Deliverables Produced by Team

A. A working prototype that conveys the basic functionality of the product

B. Software and Hardware

C. A model or depictions of how it will be applied

D. Feedback from potential target markets

Challenges

A. In this EnPro, many challenges could arise that would affect the group. One would be a similar product undisclosed and in developed.

B. Another would be the time constraints, which leads to hardware and software interfacing issues. The time constraints would strain the development of the hardware and software.

C. Another impact would involve the research returning data that may not be applicable.

D. Trying to create a unique product and obstacles of researching similar technology is classified.

Project Budget

A. Electrical Components:

1. LCD display - T-55290GD050J-LW-A-AAN -- 75$
2. Co-Processor - Cerebot 32MX4 $80
3. Spartan 6 - XC6SLX45 - $80
4. SRAM - CY7C1062DV33 2x$30
5. PCB - 1000$ (SAE co-op)
6. GPS Shield
7. SANAV FV-M8 (EB-85A) 5Hz GPS Engine Module
8. XBP24-ACI-001 Wireless chip
9. Spartan 3E
10. Fabrication Materials

Project Total: $265

Note: All items in **RED** denote parts that need ordering.

Designation of Roles

Minute Taker: Phillip Hoylman Responsible for recording meeting information and posting it on iGroups in a timely manner.

Agenda Maker: Jason Stogner Responsible for creating an agenda for each team meeting. Agendas which provide structure to the meeting while offering a productive environment.

Time Keeper: Team Leaders In charge of moderating meetings and making sure important tasks get covered during meetings.

IGroups Moderator: Jason Stogner, Responsible for organizing emails, uploaded files, and file systems on iGroups.