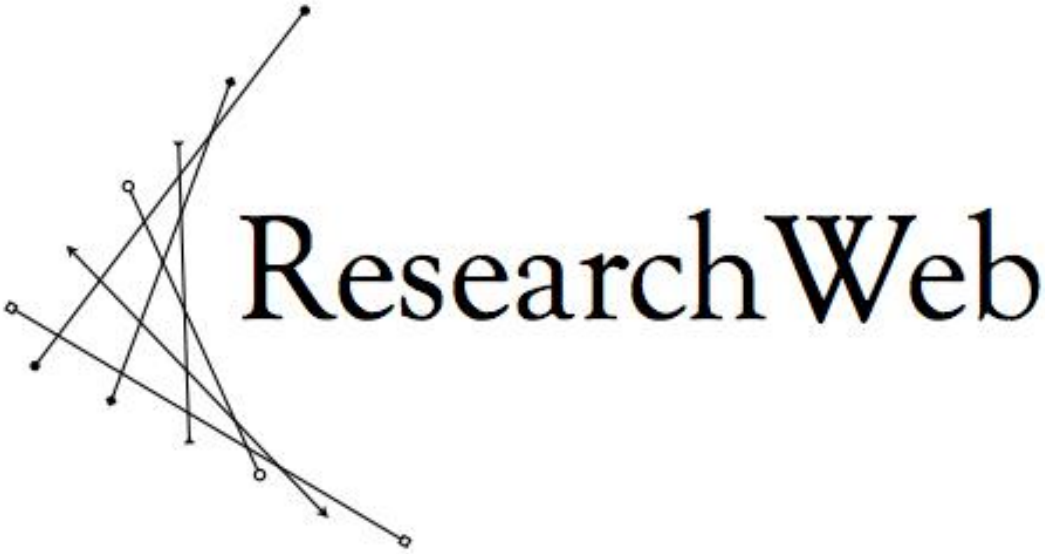

IPRO 321 – Spring 2010

Developing a Collaborative Online Student Research Forum

Project Plan

Advisor: Prof. Ellis

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I. Abstract

IPRO 321 has the task of facilitating the performance of undergraduate research in the Illinois Institute of Technology (IIT) by creating a website called ResearchWeb that integrates and connects undergraduates with colleagues, faculty members and resources.

The team's approach to the task is three-sided, based on the three main stages of undergraduate research performance. The first stage is undergraduates' looking for research projects, followed by their performing the actual research tasks. The final stage is students' presenting the research findings. These stages can be summarized in three words: Looking, Performing, Presenting.

Tackling this project requires a six-step process. To start, the IPRO 321 team will understand the problems in the three aforementioned stages that ResearchWeb will address. Second, the team will observe the performance of research in IIT. Third, visualizing the potential functionalities of ResearchWeb that would tackle problems in the three stages will consolidate the team's plan of action. Fourth, evaluation of the visualized solutions and selection of the most appropriate ones will let the team focus in the most pressing issues. Fifth, the implementation of the selected solutions will have the first impact on IIT and generate feedback. Sixth, iterating the previous steps as necessary will assure the creation of a high-impact, high-quality website.

This project plan justifies the creation of ResearchWeb and gives a detailed description of the IPRO 321 team's current plan of action. It also includes team members' information, the previous achievements of IPRO 321, and an assessment of the current status of the undergraduate research process in IIT. Finally, this document includes how the team members are organized to attain specific milestones through a comprehensive work breakdown structure and Gantt chart.

In the team logo the lines represent the connections made between students and professors. When several of these connections exist within a community they produce a web of knowledge stronger than any single connection could be on its own

II. Team Information

Purpose Statement

The team of IPRO 321 was created to facilitate the performance of undergraduate research at the Illinois Institute of Technology for the benefit of undergraduate students and faculty by developing a robust website.

Team Objectives

- *Guide* undergraduate students in their first attempts to be part of a research team
- *Increase* communication of research opportunities to IIT students
- *Ease* the undergraduate research hiring process for professors
- *Enhance* collaboration between current undergraduate researchers with colleagues working in different projects or laboratories
- *Streamline* the peer-review process for undergraduate research papers so professors and students in a department related to the topic of a specific paper can easily and anonymously be involved in the peer-review process
- *Disseminate* information about upcoming research conferences and competitions
- *Enhance* communication between current undergraduate researchers and undergraduates not involved in research who are interested in specific research projects
- *Facilitate* the creation of undergraduate research journals
- *Create* a website that accomplishes the aforementioned objectives that is marketable to other research driven educational institutions
- *Advertise* this web-based tool to faculty members and students at IIT

III. Background

The Process of Performing Undergraduate Research

Undergraduate students who perform research must follow a series of steps before they can consider their project completed. Even though there are many means of accomplishing these steps, the process of performing research can be thoroughly understood by dividing it in three main, linear stages. Students must first look for research opportunities in and outside of their educational institution. After making arrangements with a sponsor, who is most of the time a professor, they perform the day-to-day activities related to the nature of their research. The research project culminates with the presentation or publication of findings. Figure 1 illustrates this process concisely.

Figure 1. The three stages of performing undergraduate research

Approaching the broad topic of performing research from these three perspectives will give focus to the team's efforts and, consequently, increase its impact. It is important to understand what each stage encompasses. This Project Plan will base its analysis on these three stages.

Finding a Research Team

Currently, undergraduates find research opportunities in several ways:

- Speaking to a professor who is performing research in the student's field of interest.
- Having a professor seek out a student who they feel could make a contribution to their laboratory work.
- Applying for Research Opportunities for Undergraduates (REUs). These are usually ten week programs funded by the National Science Foundation and the National Institute of Health.
- Other connections such as a relative or co-worker who knows someone seeking laboratory assistance.

Performing Research: day-to-day activities

Performance of research can involve several activities such as, but not limited to, the following:

Data Manipulation

Manipulation and displaying of data in order to draw conclusions. This includes the tasks of data entry, data analysis, recording data, and coding data.

Experimental Tasks

Tasks that aid in the continuation and/or completion of any experiment. These include designing methods, performing experiments, handling animals or chemicals, microscope observation, practicing safety protocols, and solving unexpected problems.

Procedural Tasks

Tasks that aid the overall research project. These include developing hypotheses, surveying, interviewing, assisting graduate students, computer programming, error analysis, and interpretation of results.

Presenting Findings: conferences and journal publications

Conferences

At the international, national and even city-wide levels, most professional societies organize research conferences every year. The conference proceedings are published in print or web postings. Although these can be very specialized, undergraduate researchers can present. These types of conferences are usually well advertised and most researchers are aware of their existence. However, many of them can be elusive to the undergraduate researcher because of their advertising focus. For example, the Chicago Area Undergraduate Research Symposium (CAURS) is open to all undergraduate students from universities in the Chicago Area, but few students in relatively small research universities do attend it, as CAURS advertises solely in the largest 6 universities in Chicago.

At a more local level, there can be institutional research fairs and departmental symposia. These are more accessible to the undergraduate researcher as professors will invite their students to them.

Journal Publications

An important step in most research projects is to publish results and conclusions in scientific journals. The publication process always requires peer-reviews. As undergraduate researchers are usually not the main researchers in a project, their findings are published with the name of the professor in charge.

Web-based Solutions similar to ResearchWeb

Other websites already exist that perform some, but not all, of the functions we wish to include in ResearchWeb. The closest current solution is Yahoo! Research, which provides means for people to find a research project to join and presents completed research. Other websites provide access to completed work only; they include:

- Furman University Electronic Journal of Undergraduate Mathematics (http://math.furman.edu/~mwoodard/fuejum/content/toc.html/)
- StudentPulse (http://www.studentpulse.com/)
- WordPress (individual blogs; http://www.wordpress.com/)
- Google Research (http://research.google.com/)
- Caltech Undergraduate Research Journal (http://www.curj.caltech.edu/)

Current Status of the Research Performance Process at IIT

Finding

The Office of Undergraduate Research (OUR) has a compilation of the undergraduate research projects available at IIT. Students can apply online and the office takes care of the administrative tasks related to the student-professor matching process. The areas in which the OUR can improve include increasing the number of faculty members that use their matching process. It is common to find students who are doing research because they asked their professor personally or because the professor asked them to join her/his research team. A website that contains students' professional profiles would let professors make a more informed decision and give undergraduates a greater opportunity to be contacted to join a research group.

Performing

The day-to-day activities of student researchers at IIT are specific to each laboratory and position. Common concerns among undergraduates performing research include the difficulty of contacting other students in similar research areas and learning the specialized software and machinery present in almost every research laboratory. A preliminary survey the team did this week supports this statement.

Presenting

A few conferences and symposia are organized or advertised widely in IIT and there is no current online place where information about these is posted. Regarding journals, the OUR is actively organizing students and faculty to create an IIT Undergraduate Research Journal. A website can conveniently compile information about conferences and symposia and facilitate the constant exchange of feedback necessary to create a peer-reviewed, potentially renown journal.

Previous IPRO 321 Work

The Fall 2009 team of IPRO 321 created the webpage researchweb.iit.edu. Assessing the previous team's product from the current year's perspective, they focused efforts on creating solutions that increased intercommunication and information exchange between undergraduate researchers. The webpage has the form of a forum and provides the following tools:

- Customizable project pages that show research project progress through Gantt charts and a Calendar
- Searchable database with files shared that the webpage subscribers can upload for general review
- Wiki creator for publishing papers
- Search engine to look for specific uploaded files, other users, wiki pages, and projects
- Public forum

As it can be seen, the Looking and Presenting stages of undergraduate research have been tangentially approached. Due to the significant bifurcation between the past team's approach and the current goals and emphasis, we decided to start the webpage from scratch, taking into account the previous team's experience and findings.

Ethical and Societal Considerations

The ethical considerations about the development of ResearchWeb derive mostly from the free exchange of information and high connectivity that it encourages. The website could be used to plagiarize other persons' work. Also, the connectivity needs to have the same ethical considerations that interpersonal relationships do, including the potential for harassment between users.

The current limitations in connectivity between professors and undergraduate students interested in performing research can lead those students to feel dissatisfied and frustrated. As IIT uses research to attract new undergraduates, the limited means available to fulfill that promise can drive administrators and recruiters to an ethical dilemma.

IV. Team Values Statement

Desired Behavior

Each member of the team has agreed to confine the values of the team to the values below. We are all in agreement to the terms, with the extremities defined below. Each member shall evaluate the other members based on the values defined, to the discretion of the evaluating member. All members are expected to dedicate seven to eight hours of undivided attention to the project each week.

Participation/Contribution

The team is expected to hold themselves and each other to participate and contribute appropriately. Categorizing each member's individual level of achievement in this aspect is as follows:

Role Model – Member misses limited meetings, and only for legitimate reasons. Member always puts forth their best effort, regardless of prior knowledge or motivation. Each task the member is assigned is performed in a timely fashion without need for continual reminders. Member comes to class always prepared. The needs of the team are always put before the agenda of the member, and positive feedback is always available from this member. Member consistently dedicates the full time expected of each individual.

Unacceptable – Member has several unexcused absences. Tasks performed by this member are lacking and late. Member is consistently late to class. Member is unnecessarily harsh in their feedback of others. Member is uninterested in the overall goal of the team. Member spends little to no time on the project on a weekly basis.

Attitude/Behavior

Each member of the team is expected to behave properly at all times. Attitude should always be positive unless there is reason for disappointment. Categorizing each member's individual level of achievement in this aspect is as follows:

Role Model – Member shows highest respect for other team members consistently. Member greets others in passing and is a good listener when others are speaking. Differing opinions are expressed politely and reactions are noticed by this member. Member is patient and understanding and works with the group to maximize group benefit rather than personal ones.

Unacceptable – Member is rude and acts inappropriately. Member uses profanity when speaking and tries to draw attention to him or herself in an unappealing manner.

Dedication

The members of the team are expected to show dedication to the project and overall goal. Categorizing each member's individual level of achievement in this aspect is as follows:

Role Model – Member understands all aspects of the project and could adequately explain the project in whole. Member shows initiative in research and excitement for new opportunities for the project. Member is willing to help out where necessary and presents information in an organized and structured manner.

Unacceptable – The project is obviously not a priority for this member. Member is always complaining about the work and is not willing to help out. Member's work is finished halfheartedly and shows little to no initiative.

Communication

Communication is key to the success of any project, and this project is no exception. Categorizing each member's individual level of achievement in this aspect is as follows:

Role Model – Member is an active contributor in most, if not all, discussions. Member keeps the team up to date on individual tasks and communicates any need for help. Member encourages others to communicate and does not dominate any conversation. Electronic communication is responded to in a timely fashion.

Unacceptable – Member must be prompted to contribute, if he or she does, to conversations. Member does not respond to electronic communication. Member dominates or withdraws from any or all conversations.

Conflict Resolution

Problems within the team will be solved on case-by-case bases. The involvement of other members from the team will be required on any escalated case, and complete honesty is expected. The team adviser will be available to mediate any problem where it is deemed necessary. Any problems resulting in the violation of any university policies will be immediately reported to the proper campus authorities.

Problems with the project will be evaluated by the team as a whole. Assignment into further research may be necessary. Action and direction to be taken with respect to the problem will be decided by the team.

V. Work Breakdown Structure

Problem Solving Process

The Problem Solving Process for IPRO 321 will follow sequentially through these points: Understand -- First, the team will need to fully understand the problem that ResearchWeb strives to solve.

Observe -- The team will perform case studies of faculty and undergraduate students currently doing research. Additionally, the team will review the surveys performed during previous semesters. The user needs will be established from analysis of these case studies.

Visualize -- The team will establish how ReseachWeb will address the identified user needs. A Software Requirement Specifications (SRS) will be generated to document solutions.

Evaluate and Refine -- The team will analyze all solutions and then choose the most pressing issues of ResearchWeb to tackle.

Implement -- The team will divide into two sub teams: one to focus on content, and another to focus on programming. The teams will work together to implement the solutions.

Iteration -- The team may find it useful to cycle through the steps of this process several times to reach the desired product.

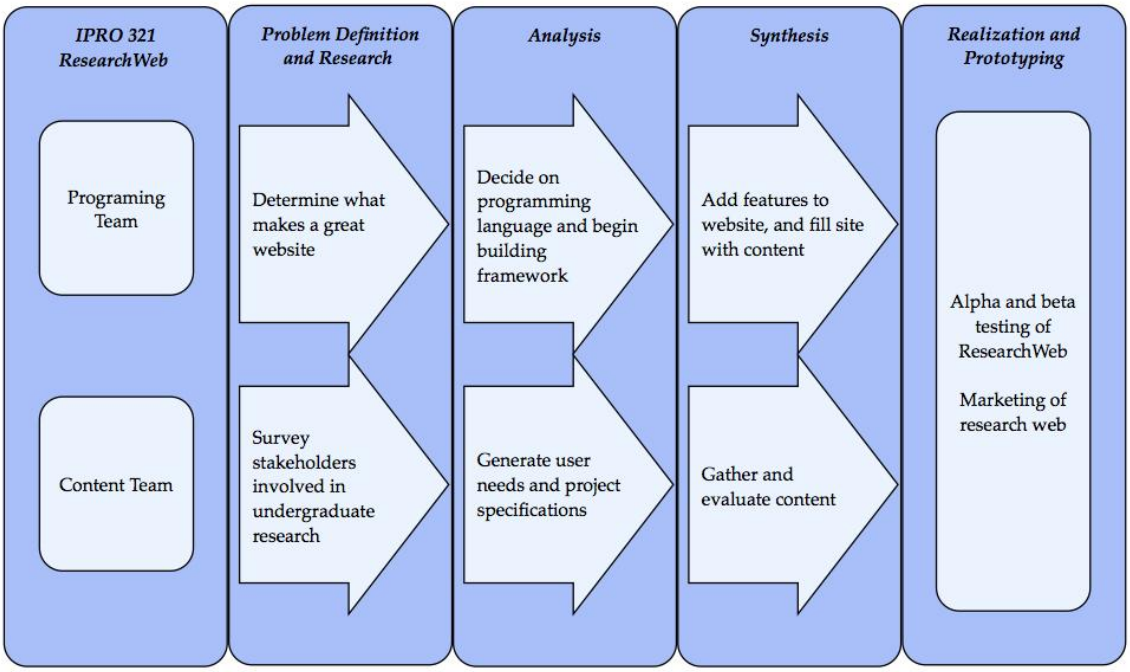

Figure 2. Team Problem Solving Process

Team Structure

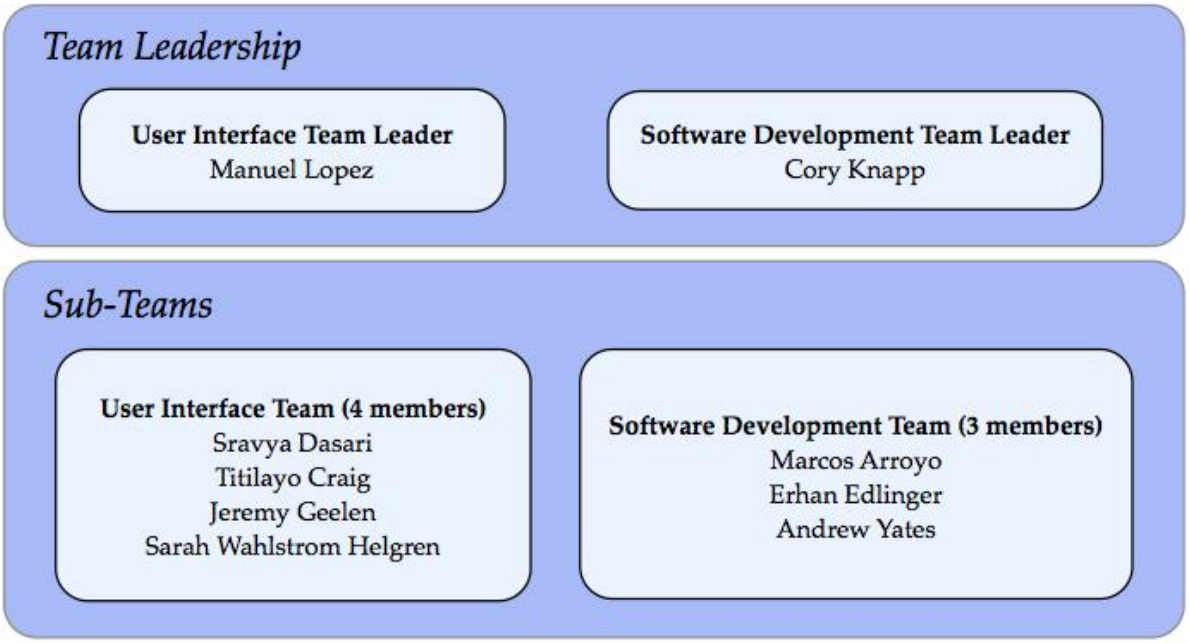

Figure 3. Team Structure

User Interface Team Major Responsibilities

- Perform case studies of both undergraduate students and faculty doing research.
- From case studies, determine most useful content
- Construct database of research and presentation opportunities
- Alpha and Beta testing
- Construct Software Requirements Specifications

Software Development Team Responsibilities

- Construct Software Requirements Specifications
- Creation of mock ups and prototype
- Alpha and Beta testing

Gantt Chart

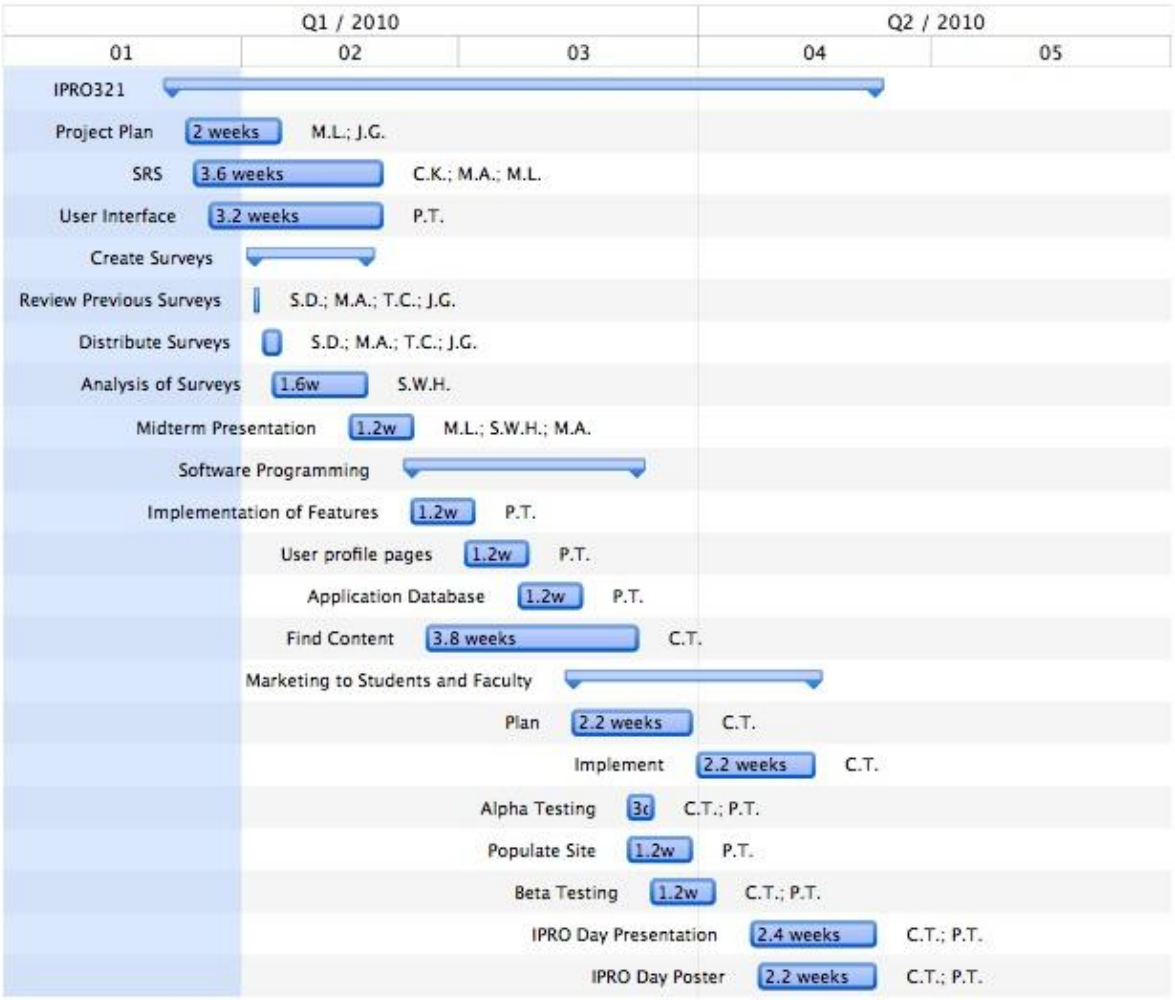

Figure 4.

In Figure 4, each task has either team members or a sub-team in charge of its completion. The initials represent the first and last name of the team member in charge, P.T. stands for Programming (or Software Development) Team and C.T. stands for Content (or User Interface) Team.

VI. Expected Results

Stakeholders

Undergraduate Students

The process of finding, performing, and presenting undergraduate research at IIT will be easier. The involvement of undergraduate students in research will increase. Student will see IIT as a research oriented university that encourages early involvement in research.

Professors Conducting Research with Undergraduates

The amount of candidates for professors' undergraduate research positions will increase.

Office of Undergraduate Research at IIT

The administrative involvement in the undergraduate research process will decrease.

Office of Undergraduate Admissions

The Office will have an additional selling point to attract potential students who may be interested in research.

Potential Obstacles to Success of the Project

Internal

Internal obstacles are team originated hindrances that can, and should, be avoided with proper effort. These include:

- Miscommunication
- Lack of motivation
- Time mismanagement
- Lack of time commitment

External

External obstacles are obstacles that are out of the team's control and we must work to overcome. These include:

- Students may not want to register for ResearchWeb
  - May not see it as important
  - May not have time to register/use the site
- Faculty members may not be willing to post their research
  - May think it is not a useful enough tool
  - May not have time to register/use the site

- Marketing
  - Reaching the right target audience may be difficult
- Survey Bias
  - Our surveys are taken on campus and are limited to the views of the IIT population
- Testing
  - People may be unwilling to help test
  - Having a limited number of testers makes it difficult to make the website bug free

VII. Budget

The only anticipated costs of IPRO 321 are the costs of three $50 incentives for increasing student involvement. The total cost is $150.

VIII. Designation of Roles

iGroups Moderator: Cory Knapp and Manuel López will together moderate iGroups. Their role is to make sure that iGroups is up to date and organized, as well as make sure that all IPRO deliverables are submitted on time.

Agenda Maker: Cory Knapp and Manuel López will alternate creating the agendas. The agendas will serve as both an objective list and a timetable for each meeting.

Minutes Taker: Sravya Dasari will serve in the role of minutes taker. Each meeting, meeting minutes will be composed to provide a summary of the events and decisions that took place in that meeting.

Time Keeper: Titilayo Craig is the group's time keeper. The time keeper keeps the group on schedule according to the agendas.

IX. Appendix A: Team Members Roster

Robert Ellis – Adviser

Team Member	Major	Contact email
Marcos Arroyo	Computer Engineering	marroyo1@iit.edu
Titilayo Craig	Applied Mathematics and Computer Science	tcraig@iit.edu
Sravya Dasari	Computer Science	sdasari2@iit.edu
Erhan Edlinger	Computer Science	eedlinge@iit.edu
Jeremy Geelen	Electrical Engineering	jgeelen@iit.edu
Cory Knapp	Applied Mathematics and Computer Science	cknapp2@iit.edu
Manuel Lopez	Aerospace Engineering	mlopez14@iit.edu
Sarah Wahlstrom Helgren	Biomedical Engineering	swahlstr@iit.edu
Andrew Yates	Computer Science	ayates@iit.edu

X. Appendix B: Team Members' Strengths, Weaknesses and Expectations

Team Member	Strengths	Areas for Improvement	Skills Expected to Develop	Project Expectations
Andrew Yates	Experience programming in Ruby, Java, Python, and C. Experience with XHTML.	Teamwork and communication	Teamwork, software design, and communication.	I expect good teamwork and communication to result in the creation of a successful website by the end of the semester.
Cory Knapp	Experience programming in C, Java, and Haskell; Writing skills	Organization; leadership skills; teamwork	Leadership skills; team working; software design	The team will create an effective tool to further undergraduate research.
Erhan Edlinger	Experience programming in Ruby and Java. Experience with HTML.	Teamwork and Organization.	Teamwork, communication, and organizational skills.	Through teamwork and diligence we will create a website which undergraduate researchers will want to use.
Jeremy Geelen	Efficient Worker, strong communication skills, writing skills	Time management, prioritizing	Time management, teamwork skills	A cohesive and effective team leading to the completion of all objectives.
Manuel López	Project management experience, presentation skills	Website design and development	Effective leadership	Create a useful tool to contribute to the improvement of my Alma Mater

Team Member	Strengths	Areas for Improvement	Skills Expected to Develop	Project Expectations
Marcos Arroyo	Experience programming in C, Java, and some experience with website development in HTML	Teamwork, presentation, and leadership skills	Developing a website with Ruby on Rails and working efficiently in a team	The team will do it's very best to fulfill all the objectives
Sarah Wahlstrom Helgren	Three undergraduate research experiences at three different schools	Constructive criticism of others' work	General knowledge about building websites, and an understanding of how research is conducted in other fields	The team will successfully work together to build a functional site
Sravya Dasari	Experience in building a website	team work, Organization skills	presentation skills	The team will effectively build a research website for undergraduates.
Titilayo Craig	Experience working on a research project, also programming in Java, C and PHP	Team Communication skills	Knowledge on technical writing and research procedures.	To create a functional website that will aid the undergraduate research experience at IIT.