

Team Charter

A – Team Member Roster (Name & Contact Info.)

Name	Email	Number
Chan, Ronald	rchan1@iit.edu	██████████
Chatman, Amanda	achatman@iit.edu	██████████
Divito, Michael	mdivito@iit.edu	████████████████████ ██████
Dohm, Jacob	jdohm@iit.edu	██████████
Ghafoori, Marc	mghafoor@iit.edu	
Lee, Timothy	tlee24@iit.edu	██████████
Perizes, Fotis	fperizes@iit.edu	██████████
Reznicek, Dustin	dreznice@iit.edu	
Roberson, Jon	jrobers3@iit.edu	██████████

B – Team Member Strengths, needs and expectations

Ronald Chan

Strengths: Skills in 2D & 3D Design Software, Experience in design, Organization skills

Weaknesses: Time Management

Skills to Develop: Working as part of a group and managing work

Expectations for Project: Learning to work with people of other discipline and having the ability to design something worthwhile

Amanda Chatman

Strengths: 3rd year double major in aerospace engineering and applied mathematics, communication, background in technical support and customer service

Weaknesses: knowledge of cell tower technology, design software

Skills to develop: leadership, public speaking, knowledge of cell tower technology

Expectations for project: to work closely with IIT and our sponsor to design and eventually construct a cell tower on campus.

Jacob Dohm

Strengths: Architecture student: experience in design, graphic, and programming presentation

Skills to develop: Inter-profession working, problem solving creativity

Expectations for project: to refine and process a realistic project that encompasses everything that we set out to do

Ghafoori, Marc

Strengths: 4th year architecture student, experienced with design and renderings. Have a good understanding of self sustaining designs.

Weaknesses/Skills to develop: Working with a group and time management.

Expectations for project: The experience with working with students of different discipline and developing a plan for the IIT campus.

Michael DiVito

Strengths: 4th year mechanical engineering, experienced with Autocad, has knowledge in alternative energy.

Weaknesses/Skills to develop: communicating with team members, consulting with outside resources

Expectations for project: to contribute as much as possible to finding a tower site, designing a new innovative urban tower, and submitting a proposal for construction of a tower on campus to IIT.

Timothy Lee

Strengths: works well with others, easy to approach, opinionated, easily grasps concepts

Development: suggesting ideas to appeal to everyone, understanding the technological aspects of the ipro, distributing the workload evenly amongst my teammates

Expectations: a thorough and complete iteration that will be functional and aesthetic, innovative and adaptive to new technologies while still retaining some of the more functional ones that exist, and to present the information we've gathered and produced effective to the panel of judges and the client.

Dustin Reznicek

Strengths: conceptual design knowledge, 2D and 3D design software, model building, and architectural knowledge

Weaknesses: economic analysis of projects, no previous knowledge about cellular technology,

Skills to Develop: ability to work and communicate with a team, client, and community, to understand zoning requirements and building permit procedure,

Expectations for Project: Hoping this is a worthwhile project and that our team can develop a feasible and interesting product for our sponsor. If this is successful maybe our sponsor can use our design and apply it to urban environments.

Jon Roberson

Strengths: Communication, Conflict Resolution, Civil Engineering background, MS Office

Weaknesses: Use of design software, Knowledge of Cell tower technology

Skills to Develop: Developing Design Criterion, Working in a team, General knowledge of Cell technology

Expectations for Project: To work hand in hand with our sponsor and IIT administration to develop an outstanding Cell Tower for IIT's campus

Fotis Perizes

Strengths: Networking, Expertise in 2D & 3D Design Software, Knowledge of cell tower technology / networks / bands, Access to carriers on the sales end

Weaknesses: Time Management, Availability

Skills to Develop: Working in a team, Proper distribution of work/ management of work

Expectations for Project: To understand all processes and phases of designing and building a cell tower, and to develop a realistic view of project cost and timeline

C - Team Identity

Team Name - Universal Towers

Logo –



Motto - Serving the IIT campus one tower at a time.

Team Purpose and Objective

The purpose of the IPRO is to consider a new generation of cellular towers specifically designed for the urban environment. The IIT campus will serve as a “representative” location on Chicago’s south side for purposes of this project, but the overall objective is to develop a concept and design for a self-contained, secure and environmentally friendly facility that can adapted to almost any other urban location.

The team’s goal is to design the urban cell tower of the future in the context of IIT’s location on the south side of Chicago. The final conceptual design will recognize the complexities of the urban setting with significant attention paid to architectural appeal,

environmental considerations, economic realities and energy-saving opportunities. The deliverable for the team is a set of design specifications and renderings appropriate for a selected location on the IIT campus.

Objectives

The project would entail a considerable amount of research, both general and site-specific, followed by creation of a conceptual design and a set of design specifications for an IIT location selected by the team. Specific tasks would include:

- Study current and emerging cellular technologies and implications for cell tower design
- Review alternatives to traditional cell towers (e.g. roof-mounted antenna) and the pros and cons in an urban setting
- Locate examples of cell tower designs that are aesthetically pleasing and could fit an urban setting
- Examine the local IIT area to determine existing coverage, current and future needs, and the specifics of the current IIT relationships with cellular service providers (e.g. we have antenna mounted on roofs of IIT Tower and Machinery Hall).
- Survey members of the IIT community for ideas on how a cell tower could be designed to underline our architectural excellence, commitment to technology, focus on sustainability and contribution to the community.
- Develop and refine a number of conceptual designs.
- Select a final conceptual design using an appropriate set of decision criteria
- Prepare a set of design specifications and renderings specific to the selected IIT location
- Review of Chicago Zoning Requirements and building permit procedure
- Prepare a preliminary cost estimate for the project
- Consult with Carriers:
 - 1) AT&T
 - 2) T-Mobile
 - 3) Sprint/Nextel
 - 4) Cricket
 - 5) Verizon
 - 6) US Cellular
 - 7) Various Wi-Max Carriers including Clearwire and other wireless data apps
- Identify emergency and public safety users, campus security (i.e. security cameras) and other

Background

Charles Hayes has provided customer-specific services and facilities to the telecommunications industry for over 20 years. He currently owns the land and towers

of more than 40 telecommunications sites located in Indiana, Michigan, Ohio and Texas. Tower sites are located in city centers, neighborhoods and rural communities. Charles has used a variety of tower designs including monopole, lattice, guyed-tower and stealth.

As the number of cell phone users continues to increase, capacity is becoming an issue, especially in highly populated urban areas such as Chicago. The urban setting poses unique design considerations for cellular towers. One of the largest constraints when designing a cellular tower in an urban setting is space. Ground space is limited which eliminates traditional tower designs such as guyed towers or any truss designs that requires a large base. Additionally, large building density poses a threat to signal transmissions.

There are over 100,000 cellular towers in the United States. There have been many attempts at creating a cellular tower site that is more aesthetically pleasing. Stealth towers have been constructed to hide the appearance of the tower. For example, towers have been designed to look like palm trees as well as a cross in front of a church. Although these designs hide most of the tower, they often are more expensive and have a lower capacity than a normal tower. Another common problem in cell tower sites is the up keeping of the shelters and equipment at the ground level of the tower. It is typical of some sights to be completely stranded after the initial construction of the tower which yields an unattractive site.

Considering all of these constraints, the city setting requires a high concentration of cellular towers. The IIT campus will serve as a “representative” location on Chicago’s south side for purposes of this project, but the overall objective is to develop a concept and design for a self-contained, secure and environmentally friendly facility that can adapted to almost any other urban location. Charles is interested in building a number of sites within the Chicago city limits that would be more secure and aesthetically pleasing than those you will notice as you tour the local community. His goal is to create a concept that represents a radical departure from conventional cell tower sites and quickly build a prototype site that could be shown to the wireless industry. In this regard, Charles has some preliminary ideas that would use a monopole design, but acknowledges that this is only a starting point for the project.

One of our goals is to create a cellular site that can be seen as a model example of a tower for the urban setting. In order to reach this goal, we must approach all aspects of this project in an ethical matter. The main ethical situation that the group needs to address is the consent and approval of the IIT and south Chicago community. It is very important that the surrounding community is aware of the building of this cellular tower and approves of the additions to our environment.

Team Value Statement

1. Commitment

a. Acceptable:

- i. Keeps all obligations that they agree to, or arrange for accommodations to be arranged to ensure the commitment's completion.
- ii. Being accountable for the workload distributed to each person is also an example of such behavior.

b. Unacceptable:

- i. Consistently fails to keep obligations that they agree to, and do not arrange for accommodations to be arranged to ensure the commitment's completion.
- ii. Consistently being unaccountable for the workload distributed to each person is also an example of such behavior

2. Creativity grounded by reality

a. Acceptable:

- i. Voicing new/innovative ideas while understanding practical/time/financial constraints.

b. Unacceptable:

- i. Pessimistic, "can't do" attitude.

3. Communication Values

a. Acceptable:

- i. progress throughout the design development
- ii. Stays in constant contact with group members
- iii. Speaks out during class period
- iv. Accountable for lateness and missing classes.

b. Unacceptable:

- i. Does not share and contribute to the design process
- ii. No prior notice for lateness and missing classes
- iii. Constantly keeping to himself
- iv. Never calls or share with the rest of the group
- v. Never around and does not show up for group meetings

4. Results Oriented Performance

a. Acceptable:

- i. Thrives to complete and perfect his/her tasks in a timely manner

b. Unacceptable:

- i. Does not complete individual tasks by deadlines or with acceptable quality agreed upon by the group.

5. Team Work

a. Acceptable:

- i. Works together
- ii. Relies on others to help finish assignments
- iii. Comes together to form a finished project or assignment.

b. Unacceptable:

- i. Takes on too much by themselves
- ii. Not taking on enough
- iii. Not trusting teammates

Members of IPRO 344 will always conduct themselves as a team. Each member will go to class and subgroup meetings on time and ready to participate. We will be accountable to each other and ourselves by doing the work we are assigned. If we cannot fulfill our commitments to come to a meeting, finish assignments, or meet deadlines we will let our team members know in advance and request extensions. Our team will use communication to foster strong teamwork. We will speak up and voice our concerns and ideas and will challenge ourselves and our teammates to be active listeners. Team members will also be proactive and will think about the success of the project as a whole and not just each member's individual commitment. We will take full advantage of the technology available such as IGroups and email to maintain project activity outside of class.

PROJECT METHODOLOGY

Work Breakdown Structure

Process to Solve Problem

- Meet with Sponsor and gain sufficient knowledge of Cell Towers
- Research need for Cell Tower on IIT campus including information of coverage and capacity
- Research interest from carriers in renting space on a tower if available of IIT's campus.
- Designate an acceptable location for Cell Tower and resolve any conflict with Administration or the community associated with having a Cell Tower on IIT campus.
- Develop design criterion based on Chicago building code and general needs of carriers to mount equipment.
- Create a design(s) both for IIT campus and a universal tower for other Chicago locations.
- Present design to Sponsor and IIT administration for input
- Use input from Sponsor and Administration to make changes to design.
- Get approval for final design from Sponsor and Administration.
- Use final Design to create IPRO Day deliverables including scale renderings and physical model.

	Charles S Hayes(Sponsor)	
	Jim Braband (Lead Faculty)	

	To Be Named Leader	
Tech Team		Design Team
Amanda Chatman Tech Team Leader		Jacob Dohm Design Team Leader
Timothy Lee		Ronald Chan
Mike Divito		Marc Ghafoori
Fotis Perizes		Dustin Reznicek
Jon Roberson		

Team Structure

Team Leader has not been assigned because the group decided that a leader should not be appointed at the beginning of the semester but in time presents himself through his leadership skills and work ethics.

Expected Results

This project will require a wide range of general and site-specific research and hands-on activities from every member of the group to reach our goal of a self-contained, secure, and environmentally friendly cellular tower facility capable of fitting and adapting to almost any urban location. Research and activities will include:

- Research of alternatives to traditional cell tower design
- Locating current towers that are aesthetically pleasing in its specific urban environment
- Research design specifications of cellular tower construction
- Consulting cellular carriers regarding coverage and equipment
- Surveying the IIT community

- Examine IIT area to determine existing coverage, current and future needs
- Developing cost estimation about materials, equipment, construction, carriers ...etc.
- develop and refine a number of conceptual designs
- prepare a set of specifications for the IIT location including plans, sections, elevations and 3D renderings
- build a physical site and tower model

Expected data from research or testing may include:

- Pros/cons of certain design materials and equipment
- Site specific design requirements
- Cellular carrier coverage and rates for potential users
- community needs and wishes
- Detailed cost estimation of final proposal

Potential Products of our research and development include but are not limited to:

- A structural tower that will assimilate perfectly to the unique IIT campus environment
- A strategic location and placement of the tower that will be a result of the potential user surveys
- An aesthetic quality of the designed tower, which will promote the IIT spirit and tradition
- An innovative method & appropriate hardware for collecting and reusing energy to ensure the constant supply of power to the tower

Potential outputs to be produced through each of the project tasks:

- Budget
- Design requirements and specifications
- Tower location of IIT's campus
- Sustainable strategies
- Feasible and aesthetically pleasing cellular tower

Potential Deliverables:

- Responses and feedback from surveys taken by potential users (including students, faculty, residents), and operators
- - A set of 2-dimensional drawings and specifications for the design of the tower
- 3D and photorealistic representations and drawings of the tower in the context of the site
- A physical scale model of IIT's campus in relation to the scale model of the

team's designed tower

- A fully functioning prototype ready for carriers to place their equipment and antennas for use

With every project in research and development (R&D) or even Design and Build you will find a plethora of challenges and problems that will rise:

- We must remember to stay organized and well connected and networked amongst group member, or we risk the loss of information and progress
- One major challenge we will face is with the development a method to reduce the energy need of the tower by introducing some self sustaining systems. This will be difficult and will demand a lot of calculation and testing to ensure that it will be sufficient enough to provide an adequate power source.
- A commonly assumed risk will be the security and safety of the tower's site on or near IIT's campus. We can assume that it will be subject to vandalism and destruction due to surrounding neighborhood conditions.
- Another challenge that we will face will be how well this tower will serve the IIT community and surrounding area. This will include its signal strength, overall aesthetic appeal, and noise pollution (if any- determined by methods used for power supply and air conditioners)

Incorporation into the Solution Process:

The purpose and goal for this semester Ipro is to ultimately create and present a unique cell tower to the Students and Administration of IIT which in turn will be installed on the campus of IIT on a suitable site.

Budget

- \$200 - Models
(2 Small scale models)
Materials – MDF, Bass Wood, Acrylic
- \$20 - printing Material
- \$250 - site visits & interviews
- \$100 - Survey Incentive

Total - \$570

Designation of Roles

- Minute Taker - Marc Ghafoori
- Agenda Maker – Timothy Lee
- Time Keeper – Rotating task

- Igroup Moderator – Jacob Dohm & Amanda Chatman