Spring | 2011

Simply Park: IPRO 365

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Abstract

Efficiency in parking facilities has been set to low standards since self-parking was introduced in the 1950s[1]. As technology has developed, parking has been left in the past. Drivers are increasingly realizing the problem as they become accustomed to other technology, which increases the efficiency of their lives (eg smartphones). While driving around searching for an open lot, circling a garage for an parking spot, or wandering through garage a looking for a parked car, people have time to ponder the many improvements that should be made to the parking experience. Simply Park: IPRO 365 is taking initiative to seize the possibilities new technologies offer the parking industry. The result should be improved driver experience as well as increased efficiency and profitability of parking facilities.

The system will include signs visible to passersby that display the number of vacancies within a parking facility. Once in the parking facility, additional signs will direct drivers to sections of the facility with vacancies. Colored lights above each parking spot will indicate the state of occupancy for quick reference when looking down an aisle. When a driver parks, the ticket they receive at the entrance gate will associate their ticket to the spot they parked in, so when the driver returns to the facility he/she can present his/her ticket to a kiosk which will notify him/her how to get back to his/her car. As the vehicle leaves the ticket association will be reset and displays will update to show one more spot available. Additional interfaces through mobile and internet applications will further expedite the parking process.

[1]National Public Radio. Parking Garages: A Multilevel History. 18 November 2009. 20 November 2010 <http://www.npr.org/templates/story/story.php?storyId=120545290>.

Team Information

Roster and personal information found in Appendix A

Mission

Many have experienced parking can be a headache. Though it seems a small hassle, drivers prefer to spend more time at their destination than searching for a parking space or trying to find where they parked to begin with. Traditional systems are not able to dynamically inform drivers of vacant spots and rely on drivers remembering where they parked. This makes it difficult for facilities to operate efficiently near capacity causing driver distress, wasted vacant spots, and limitations on potential throughput of vehicles.

The mission of IPRO 365 is to increase the efficiency of parking systems leading to an improved driver experience and increased profitability. The envisioned system monitors the vacancies in a parking facility and directs drivers to vacant spots via signs and mobile applications. Once parked, the system associates the driver to their spot and provides directions to their spot on return to the facility. By creating a network of facilities on this system, drivers can quickly find local parking and facilities can attract drivers from a broader range. Ideally, a unified payment system across the network would utilize smart card technology reducing credit card charges to the facilities and increasing ease of payment for drivers.

Objectives (overall)

Improve efficiency of parking facilities

- **Improve driver experience**
    - Reduce time and difficulty of finding a parking facility with open spots
        - ●Signs
            - Display with number of spots available at entrance gate
            - Show what size spots are available if applicable (eg compact vs full size)
        - ●Internet/mobile applications
            - Ability to find specific facility or all facilities with our technology
            - Find current availabilities
            - Check occupancy trends (eg more spots available at certain hours at this parking facility)
            - Make reservations online
    - Reduce time and difficulty of finding an open parking spot in a parking facility
        - ●Signs directing to available spots
            - Direct vehicle to appropriate size spots if applicable
        - ●Internet/mobile applications also apply
    - Reduce time and difficulty of finding parked vehicle upon return
        - ●Kiosks / directions system that guide drivers back to their car
        - ●Intuitive labels

        - ●A mobile app that may be used for storing your location and guide you back to your car.
    - Improve ease and convenience of payment (smart cards/RFIDs)
        - ●Card accepted at any system with our technology
    - Frequent driver/parker rewards system
    - Monitor development of consumer interest
- **Increase profit**
    - Increase throughput of parking facilities
    - Reduce/eliminate credit card fees (smart cards)
    - Decrease cost of labor
    - Pro-rate based on occupancy level
    - Price sections / spots differently (eg above level 6 cheaper for all day parking)
    - Collect occupancy data for parking facilities
        - ●See what times/seasons are busy/slow
        - ●Better adjust price, offer deals, manage system
    - Monitor development of similar technologies
    - Monitor development of industry interest
- **Provide tiered options for parking facilities (combine as pleased)**
    - Display total vacancies in facility (sign and/or network)
    - Display directions to vacancies within facility (signs)
    - Associate vehicles to their parking spots
    - Online/mobile reservations
    - Smart card payment system
    - Frequent driver/parker rewards
- **Network of parking facilities on our system increases advantages for all**
    - Within our network drivers would
        - ● have the ability to use one smart card for payment
        - ●gain reward points for parking
        - ●be able to check for open spots/prices

Objectives (Spring 2011)

Business and Sponsorship

Our primary objective is to produce a comprehensive business plan utilizing the unique selling points of our new technology. Contained within this business plan, will be a loyalty scheme for returning customers, a green initiative which we aim to have subsidised by the local government and full cost benefit models for parking garage owners and Simply Park itself, for both leasing and purchase options.

A viable pricing model is a key part of this business plan. We target constructing a pricing model for a number of parking lots in different areas, utilizing our new technology. This pricing strategy will enable parking lot operators to maximize revenue with minimal initial outlay.

Our second key objective is to attract sponsorship from interested parties, be they parking lot operators or local investors. Our ideal sponsorship candidate would have access to multiple parking facilities and be willing to allow our team to implement prototypes of our technology. Sponsors with access to component technologies such as RFID's would also be prime candidates. We are hopeful of working with IIT in their construction of a new parking garage at 35th and State.

Customer Aesthetics

Our focus is on the gathering customer's experiences and expectations of parking facilities as well as getting feedback regarding our suggested parking system. We will also compile information on parking standards around the world. With this information we will offer suggestions to the R&D and business teams to optimize the system for customer satisfaction and profitability. We will also work with the deliverables team to create animation of the ideal experience in the Simply Park system.

Research and Development

Our first objective is to create a detailed schematic of all components and how they interact within the three tiers. We will then detail specifications necessary for each component. With this information we will consult vendors, in coordination with the business team, to determine feasibility and cost of components. Finally we will construct a cost estimate for the three tiers including hardware, software, installation, and overhead expenses.

Deliverables

Our primary objective is to create a professional appearance through refined models, presentations, and other tangible representations of the Simply Park system. To do this we will create a scale model of the Simply Park system as well as a video, brochures, business cards, and presentations to bring to potential sponsors.

Background

For drivers in urban areas today the most important impact on the choice of parking is cost related. All other variables with a significant impact on parking choice are time related, i.e. search time for a parking space, duration of parking, and walking time from the parking space to the final destination.[2] Throughout the United States, transportation agencies have begun implementing advanced parking information systems to increase customer satisfaction and to improve traffic operations. Through the use of various message signs, these systems provide motorists with real-time information about parking availability at appropriate decision points on their route so that they can make an informed decision about where to park. These systems are being deployed in a variety of environments including central business districts, airports, and transit park-and-ride lots. The goals in deploying such a system can vary depending on the operating environment. When deployed in a transit environment, goals can include improved user satisfaction, increased parking utilization at a lot that is currently under-utilized, and

[2]Off-Street Parking Choice Sensitivity, John Golias, George Yannis, and Michel Harvatis; *Transportation Planning and Technol.*, 2002, Vol. 25, pp. 333–348

increased transit ridership.[3] When deployed in an urban setting various factors play a role in parking management. Due to strong competition for space from housing development, business enterprises, and city planning/green space activities parking is as much a social and political issue as it is a practical issue.

Sign Deployment and spot availability displays have been used in various settings, as have RFID location systems. A study conducted in 2003 at Detroit's Wayne County International Airport indicated that many travelers opted for off-airport parking because of the level of confidence they had in the time it would take to find a parking space and to take a shuttle to the terminal. Over 50 percent felt that the lack of parking availability signage on the freeways approaching the airport was a significant factor in their decision.[4] Advanced parking management systems have been operational in Europe and Japan since the early 1970s to reduce the congestion, environmental impact, and driver frustration associated with trying to find parking in city center areas. In the U.S., however, the use of the available technologies to distribute parking information to travelers is still in its infancy. Yet companies like Chicago Parking Management, Inc.[5] strive to increase customer satisfaction via advances in automation and technology i.e. automatic ticket dispensers and license plate recognition systems. The efficient use of space is becoming more evident as our city centers age and expands. Parking manage

Industry Standards

The standard parking facility has a gate at the entrance that leads into a space with parking spots, whether it is multilevel or a flat lot. The customer receives a ticket stamped with the time, drives in, parks, and eventually drives around the facility to the exit gate where payment proceeds. Signs indicate entrances and exits as well as direction of traffic. Payment is either automated with credit cards or an employee collects payment at a booth. Amount of payment is determined by length of stay; rates are hourly or daily.

Customers generally must pull into a parking facility to determine whether there are any vacancies available. Systems which attempt to monitor available capacity often rely on human input and have difficulty in dynamically responding to customers entering and leaving the facility. When customers enter a parking facility, they are fronted with the task of finding a spot amongst the possible hundreds. Upon return to the facility customers must remember where they parked and frequently wander aisles and levels of the facility in search of their vehicles. Traffic is often congested and dangerous as drivers compete to find open spots, pedestrians walk to and from their vehicles, and departing customers navigate to the exit gate.

Especially when near capacity, parking facilities have difficulty operating at maximum efficiency. Spots go unused as potential customers overlook them, are deterred by the frustration of parking, or are denied access by primitive systems erroneously reporting full capacity.

[3]U.S. Department of Transportation, Federal Transit Administration Evaluation of Transit Applications of Advanced Parking Management Systems – Final Evaluation.*Report* May 9, 2008.

[4]U.S. Department of Transportation, Intelligent Transportation Systems (ITS), Advanced Parking Management Systems: A Cross-Cutting Study.

[5]Chicago Parking Management. About Us: Chicago Parking Management. 2010. 25 11 2010 <http://www.chicagoparkingmanagement.com/About_Us.aspx>.

Similar Technologies

Much of the technology this project proposes to compile and use, is already in use in similar projects of different scopes. Currently the city of San Francisco, in an effort to provide better parking services, is implementing a program known as SF Park where metered parking spaces across the city are being outfitted with wireless sensors in order to track, in real time, which spaces are in use and how much longer they will be in use for. "This data is streamed to servers, which make it available to every commuter with a smart phone, laptop, or a willing friend/relative on the other side of their cell phone."[6]

At Rutgers University in New Jersey, a team has been developing a technology that will tell the driver the closest available spot. This technology will detect street parking spots, but not parking spots in a parking garage. The combination of an ultrasound device mounted to the car and a GPS system will generate a map of nearby available spots. The ultrasound will detect objects as it travels and relay information to the GPS system. "This technology has 95% accuracy due to the ultrasound device detecting trees, garbage bins, and others as parked cars."[7] This system will require a certain amount of cars with an attached ultrasound device to circulate the area.

A team from the Center of Embedded Network Sensors at the University of California Los Angeles, created a system to monitor occupancy in one of the campus parking structures. The system uses sensors to detect changes in the infrared radiation emitted by objects. The system records length of time a disturbance lasts and uses this information to guess if the disturbance was a vehicle, multiple vehicles, or a pedestrian. This development has been tested in the parking garage for the medical building and has not yet left the realms of their university.[8]

Another system created for counting vacancies was developed by a partnership between Oakton Community College and GAO RFID. "The system is composed of RFID-embedded vehicle tags, readers at entry and exit points, applications software and a TCP/IP network communication protocol".[9] The article was not clear on the stage of development or success of the project.

Some parking facilities have taken the concept of counting vacancies to another level. Intelligent Devices in Georgia has developed a system that gives real time availability of parking spots for multi level parking garages. They use ultrasonic sensors to detect whether a car is parked in a particular spot. A system of colored lights on the ceiling above each spot indicates availability (ie green means spot available, red means spot taken). To supplement their light system in the garage, they also have signs that begin to inform drivers of space availability while they are still on the highway. Once in the garage, signs direct drivers to regions with open spots, and the roof lighting system allows drivers to find spots conveniently.[10] This system is already being successfully implemented.

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[6]SF Park. How It Works: SF Park. 2010. 8 November 2010 <http://sfpark.org/how-it-works/>.

[7]Joneitz, Erika. Techonology Review: Communications. 8 February 2010. 9 November 2010 <http://www.technologyreview.com/communications/24497/page1/?a=f>.

[8]"Wireless SENSOR NETWORK finds parking spots." *Machine Design* 81.17 (2009): 81-86. *Business Source Premier*. EBSCO. Web. 3 Dec. 2010.

[9]"College studies RFID in warehouse environments." *Mobile Radio Technology* 25.3 (2007): 26. *Business Source Premier*. EBSCO. Web. 3 Dec. 2010.

[10]Intelligent Devices. "Intelligent Parking." 2010. Design Guide: Intelligent Parking. 7 November 2010 <related:www.intelligentdevicesinc.com/pdf/software/intelligent_parking/ip_design_guide.pdf intelligent devices parking design guide>.

Parking inefficiency has not only been tackled in the United States. Many countries in Europe have systems already developed and running very similar to the previously mentioned systems. As the technology continues to develop, Park-lotD -Ginza in Japan takes a different approach to sensing cars. They use camera-based technology to monitor the number of cars in a parking facility and in individual spots. Using that information they were able to set up a display system that can be seen from a distance showing available spots. This system is still in its testing phase in underground parking lots and outdoor parking Tokyo. The technology is fairly successful with a 99.9% accuracy for detecting cars, but has problems detecting when a car is behind another car.[11]

Wohr has been developing automated parking structures. This type of parking allows double the amount of car capacity compared to a traditional parking garage. It is fully automated, where the user only needs to park his/her car on a platform. The platform moves the car to an available spot. This is done through a series of sensors that move the car through a specific route, to get it to it's parking space. The car is immobile throughout the process, which is not assisted by any human whatsoever. This type of parking garage can guarantee a customer's car comes out just the way it was put in, however a simple maintenance can shut down the facility for a whole day. Emergency maintenance can last several days in the case of something breaking.[12]

Ethical & Societal Considerations

Ethical issues may need to be addressed throughout the duration of the project. Therefore the technology chosen for implementation should come from reputable sources. To avoid the preventable loss of available funds determined by the budget, the goal of this IPRO is to avoid sub standard materials, scrupulous businesses, and dodgy financial arrangements. All business arrangements, contracts, and acquisitions should be reviewed before the team and agreed upon with the faculty advisor.

In the current economic environment in the United States, a social concern for this IPRO is to promote local business. By promoting local businesses and conducting primary research in and near Chicago, Illinois this project can support the local economy, reduce communication lag time, increase "face-time" with competitors, manufacturers, lot proprietors, et al. and reduce shipping/transportation time and cost. Generally this IPRO should be aware that this project has the potential to grow to a size and proportion past our comprehension at this point. By keeping things local it is the goal of this IPRO to maintain a high degree of control over project development and direction.

End users and operators of any device or product produced as a result of this IPRO should feel confident that all safety precautions and security measures have been taken. Personal privacy will be maintained. Additionally, the proposals of the project should meet the highest standards of effectiveness to ensure that product quality is transferred to the consumer. The technology applied in the development of this project should not intrusive to consumers, physically dangerous, or discriminatory.

[11]Ichihashi, H.; Katada, T.; Fujiyoshi, M.; Notsu, A.; Honda, K.; , "Improvement in the performance of camera based vehicle detector for parking lot," *Fuzzy Systems (FUZZ), 2010 IEEE International Conference on* , vol., no., pp.1-7, 18-23 July 2010

[12]Wohr. Park Safe:Wohr. 2010. 28 October 2010 <http://www.wohr-parking.co.uk/parking-systems/parksafe/>.

Proper thought and attention should be given toward the development of significant and valid surveys and questionnaires. The purpose of this is the avoidance of population exclusion and to encompass the most broad consumer base. When required, the identification of proper data collection methods can prove to be a vital time and effort saving activity.

Team Values Statement

Desired Behavior

- Show up on time for meetings; if you know ahead of time you will be late or missing a meeting give written notice to the team leader.
- Be punctual with task completion.
- Communicate clearly and timely about time and obligation conflicts with assignments.
- Reply to emails in a timely manner (within 24 hours).
- Stay on task at meetings by following the agenda.
- Ask questions when something is unclear.
- Use the activity log to track personal goals and accomplishments.
- Prior to making IPRO expenditures, you should fill out a purchase request form, give written notification to your team leader and faculty advisor, and wait for clearance.
- Share all information with team members through google docs and use the google group email, parking-ipro@gmail.com, to contact the whole team. Communicate with subgroups through the appropriate email:
    - rd-ipro-365@googlegroups.com
    - customer-aesthetics-ipro365@googlegroups.com
    - business-ipro-365@googlegroups.com
    - deliverables-ipro365@googlegroups.com
- Keep a professional attitude

Conflict Resolution

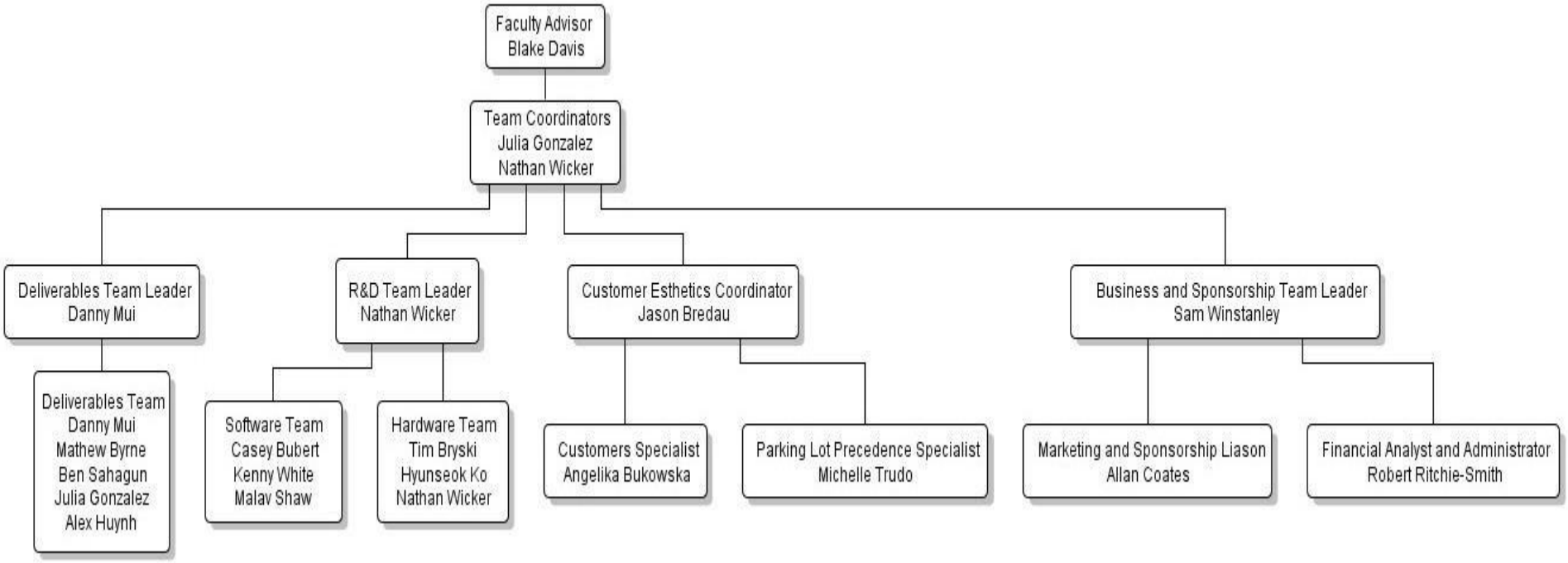
- Address interpersonal problems with the whom it regards:
    - If addressing the issue with them directly doesn't help, then the problem should be discussed with the team/sub-team leaders
    - If you feel it is necessary to contact an IPRO instructor about this issue, give written notice to the person/people it is addressing
- Discuss problems with team/sub-team leaders and/or IPRO instructors
    - If team leaders and/or IPRO instructors feel it is necessary, time will be set into the agenda to address the whole team.
- If a team member doesn't feel comfortable bringing an issue forward, they should contact the IPRO team leader and they will help address the issue in an anonymous form, whether it's contacting the individual which the problem addresses or bringing up the issue at a team meeting.

Work Breakdown Structure

Problem Solving Process

Our team has been divided into sub-teams that will each be contributing to one of the objectives for spring 2011. The sub-teams will be working parallel in order to accomplish tasks and reach our goals in a timely manner.

Team Structure



Faculty Advisor - Guide the students in their project planning and execution, suggest options and/or point out counter-examples, and advise on integral issues pertaining to the direction and focus of the IPRO. Review and sign off on team budget and individual purchases.

Team Coordinators - Act as liaisons between the IPRO student members and the faculty advisor. Lead team meetings. Ensure communication is flowing between groups and deadlines are met.

Business and Sponsorship Team Leader - Oversee business operations and become the hub of communication between departments.

Marketing and Sponsorship Liaison - Head communications between potential sponsors and the IPRO team.

Financial Analyst and Administrator - Assess costs and develop pricing strategies. Also compile minutes and manage the budget.

Customer Aesthetics Coordinator - Ensure focus is maintained during the research and gathering of consumer's information. Compile information gathered to be used by the other sub-groups. Work with the deliverables coordinator to produce deliverables.

Customers Specialist -Gather information of customers' experience with parking lots and their opinions of our IPRO ideas on how to improve our parking lots. This is done through the creation and distribution of surveys and speaking with parking lot owners and customers.

Parking Lot Precedence Specialist -Focus on the research of parking lot standards in major cities around the world, ranging from low-tech parking lots to high-tech parking lots. The data collection is ranging from parking spot sizes, prices, technologies used in the parking lot and anything else that may be valuable to the IPRO team.

R&D Team Leader - Responsible for writing meeting agendas, generally directing the team, and maintaining contact and consistency with other teams.

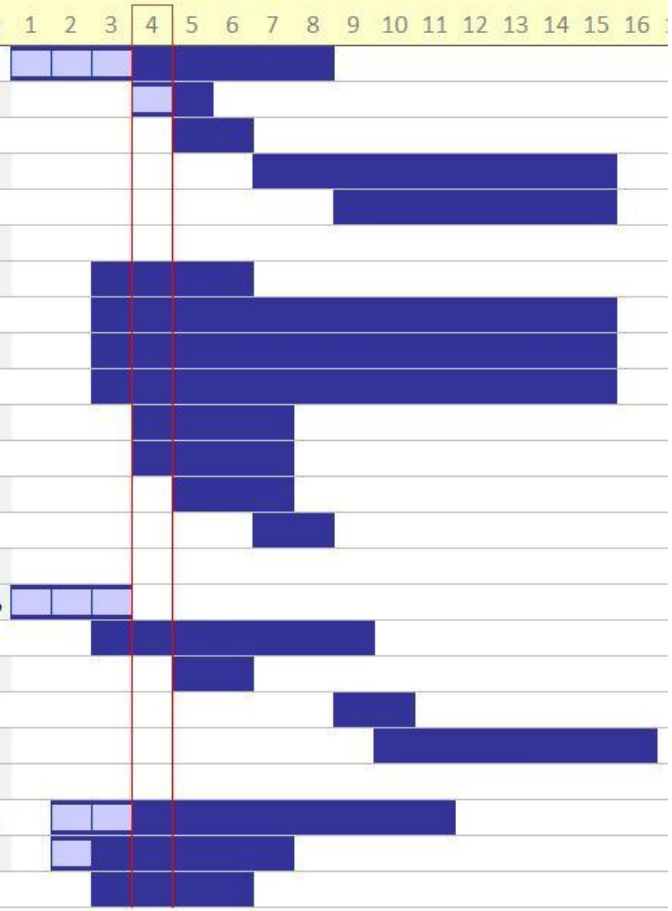
R&D Software and Hardware Teams - Responsible for designing and researching components in their respective category as well as acting as technical representatives of our IPRO when meeting with outside entities. Dynamic task forces will be formed around specific tasks at hand based on skill and availability and may involve members of both teams. General design will be considered by the R&D team at large.

Deliverables Team Leader- Ensure IPRO deliverables are completed to acceptable standards and submitted on time.

Deliverables Team - Design and present IPRO deliverables. Give the IPRO a professional appearance and provide presentation items for meetings with outside entities.

Gantt Chart

#	List of Activties	Planned Start	Planned Dur	Actual Start	Actual Dur	% Done
1	Research Similar Technologies	1	8	1		30%
2	System Schematic	4	2	4		20%
3	Component Specifications	5	2			0%
4	Consult Vendors	7	9			0%
5	Cost Estimate	9	7			0%
6	Pricing Research	3	4			0%
7	Sponsorship Search and Negotiations	3	13			0%
8	Green Initiatives	3	13			0%
9	Marketing and Advertising	3	13			0%
10	Business Model (For Simply Park)	4	4			0%
11	Business Model (For Garage Owners)	4	4			0%
12	Loyalty Program	5	3			0%
13	Cost Benefit Models	7	2			0%
14	Project Plan	1	3	1	3	100%
15	Presentation For Sponsors	3	7	3		0%
16	Midterm Presentation Deliverables	5	2			0%
17	Registration Fair Deliverables	9	2			0%
18	IPRO Day Deliverables	10	7			0%
19	Survey Consumers	2	10	2		20%
20	Industry Precedents	2	6	2		5%
21	Storyboard Perfect Experience	3	4	3		0%



Deliverables

The end product of the Spring 2011 semester will be proof of concept for methods of monitoring the number of spots available in a parking facility, directing drivers to available spots, and reducing the time and difficulty of finding ones car upon returning to the parking facility. Pending the design chosen, we will have a system that increments a display of the number of available spaces with the opening of an exit gate and deincrements the display with the opening of an entrance gate. A separate system will be able to detect vehicles as well as special tickets and associate the detected ticket with a spot. A third system will be able to control signs within a facility directing drivers to open spots given information on the occupancy of individual spots. For details of the deliverables of individual tasks see Appendix B.

Potential Obstacles to Project Success

The largest risk to the success of the project is posed by completely automated parking systems like those by Wohr. If automated parking systems become the standard, the market for our product would disappear. Current industry players also greatly influence our fate, as we will be dependent on their interest and support in developing the project; if we do not find industry interest, we will need to modify our approach based on their input. Apart from automated systems, competing counting and tracking systems may expand into the market we are seeking to get into. On a team level, poor internal communication could be detrimental to our success, and on an institutional level, insufficient funds could dampen progress.

Budget

Amount	Justification	Specific Items
$50	Public survey equipment	Hand held counters, clipboards, printed surveys, pens etc
$100	Professional appearance	Business cards, brochures, website, and booklets
$100	Transportation to survey locations, vendors, and potential sponsors.	I-GO car rental, parking, and gas expenses for locations not reasonably accessible by public transportation
$500	Presentations models for potential sponsors and IPRO day	Sensors, displays, lights, wiring, rapid-prototyped components, and construction materials for a parking garage model and other IPRO day display elements
$75	Food for our very long team meetings which extend over the dinner hours	Snacks and refreshments
825	Total Budget	

Designation of Roles

Time keeper: Julia Gonzalez will be responsible for making sure team meetings go according to the agenda in a timely manner.

Agenda Maker: Each sub-team will be responsible for presenting their accomplishments for the past week, and their goals for the next week at each meeting. The team coordinators will address any administrative tasks, prior to the sub-teams present.

Minute keeper: Each sub-team is responsible for assigning a minute taker within their team. For general team meetings, the team coordinators will divide the task.

iGroups moderator: The deliverables sub-team will be responsible for making sure that all final deliverables are uploaded to iGroups properly and on time. The group will also be responsible for making sure the website over all is up to date with any information necessary.

Appendix A

Roster

Team Member	Major	Contact Info
Paul Boruch	Mathematics	Butterforyourtoast@gmail.com
Jason Bredau	Architecture	jbredau@gmail.com
Timothy Bryski	Biomedical Engineering	tim.bryski@gmail.com
Casey Bubert	Computer Science	cbubert@gmail.com
Angelika Bukowska	Architecture	abukowska88@gmail.com
Matthew Byrne	Architecture	matthewbyrne@gmail.com
Allan Coates	Business Admininstration	coatsey10@gmail.com
Julia Gonzalez	Physics	julia.gonzalez4@gmail.com
Alex Huynh	Civil Engineering	ahuynh452@gmail.com
Hyunseok Ko	Material Science Engineering	thardaway1@gmail.com
Danny Mui	Architecture	d4nny.mui@gmail.com
Robert Ritchie-Smith	Business	r.ritchie.smith@gmail.com
Benjamin Sahagun	Architecture	mrollie16@gmail.com
Malav Shah	Computer Engineering	malav.shah3011@gmail.com
Michelle Trudo	Architecture	michelletrudo@gmail.com
Kenny White	Information Technology Management	kenny528@gmail.com
Nathan Wicker	Mechanical Engineering	ltlwicker@gmail.com
Sam Winstanley	Business and Marketing	winstanley.sam@gmail.com

Personal Strengths, needs, and expectations

	Paul Boruch
Strengths	Good collaborator, ask a lot of questions, outside of the box thinker, mathematical and computational skills
Weaknesses	Sarcasm, procrastination, lose focus
To Develop	Project management skills, knowledge about the parking lot industry
Expectations for the Project	I want to develop good friendships with people in the group and also be part of a project that has future implications

	Jason Bredau
Strengths	Use of various digital medias to create drawings, models and presentations. Organization and research abilities.
Weaknesses	Procrastination and self-confidence of my own work.
To Develop	To be able to work in group/team situation more effectively than before.
Expectations for the Project	For the IPRO to develop far enough so that it would catch the interest of other people/sponsors who would be interested in helping further the development of this IPRO into something real one day.

	Tim Bryski
Strengths	My Strengths include a personable attitude and motivation. I'm good at mathematics and public speaking.
Weaknesses	My weaknesses definately include procrastination and organizational ability.
To Develop	I would like to develop better organizational skills that would allow me to better manage a project.
Expectations for the Project	My expectations for the IPRO are to provide fierce competition for the other IPRO's this semester. I expect that every team member work at least as hard as I do. I expect our advisor to help us along the way via advice and guidance.

	Casey Bubert
Strengths	Coding, and Technical Problem Solving. Experience in web design, databases, and mobile applications
Weaknesses	Technical communication
To Develop	Improve my technical communication ability. extend my lacking knowledge of hardware
Expectations for the Project	To construct a proof of concept prototype, portions of a business plan, and do well at IPRO day

	Angelika Bukowska
Strengths	Art, creativity, organized, 3d modeling, photography, model building, photoshop, various computer programs. I took a couple of psychology classes. I'm also minoring in business management.
Weaknesses	Electricity, mechanics, creating computer programs, physics,
To Develop	Improve in communication in working with a team, learn more about the business side of the project,
Expectations for the Project	I really want this idea get pushed further and see it implemented in today's parking garages.

	Matthew Byrne
Strengths	I can make 3d models. I can also do animations in 3ds maxs. Can do board layouts and drawings
Weaknesses	Things get busy at the end of the semester Time management as an architect most of the time i am working on assignments right until they are do
To Develop	Learn how to better work in teams and see what other majors can bring to the table
Expectations for the Project	To win IPRO day and to have a smooth and successful project

	Allan Coates
Strengths	I feel that my strengths rely heavily on my real world experience, having been an account manager for one bank and a customer service rep for another as well as managing and operating a small holiday resort in France at age 19. I feel my working experiences have given me valuable experience in working in a team and also in dealing with people.
Weaknesses	I would say my main weakness would be compromising with others. I normally like to stick to my own opinion and have things done my way. However, I understand that in a team situation this can not always be the case.
To Develop	I would like to work on my ability to work as a team member rather than a team leader as I feel that to better understand how to lead a team, one must understand what it is like to be lead.
Expectations for the Project	My expectations are quite high. I enjoy more hands on assignments and feel that IPRO will provide me with a chance to get involved with real world problems and deal with people.

	Julia Gonzalez
Strengths	Managing and organizing projects, presentations, lead team meeting, strong problem-solving skills, motivation
Weaknesses	Can be stubborn, has a hard time working with apathetic people, doubtful initial reaction to most ideas
To Develop	More technical knowledge, ability to depend on others to finish to do their part well
Expectations for the Project	I expect our team to be committed and to work efficiently to produce high quality work. Our team should know all the ins and outs of parking systems as well as where the parking industry is going.

	Alex Huynh
Strengths	Public Speaking, structural analysis, moment bending diagrams, good teamwork
Weaknesses	Dynamics
To Develop	To be able to becoming a better leader and a better team worker
Expectations for the Project	Develop a convenient and efficient method for storing motorized transportation vehicles

	Hyunseok Ko
Strengths	Creative Ideas, Mathematical area, Material & Mechanical related area
Weaknesses	English is not my first language and this limits in explaining what I really want to say.
To Develop	Whether it is correct or not, I want to be discuss my idea with competitive peers confidently.
Expectations for the Project	The first meeting was very impressive. I have taken only one IPRO, but this one seemed more organized and passionate. I am hoping to achieve result that might not be ideal but that all of us can be satisfied.

	Danny Mui
Strengths	Graphics, Photoshop, computer programs, creativity, putting together presentation board/book, problem solving, patience
Weaknesses	Public Speaking, working in a team efficiently
To Develop	public speaking and working in a team efficiently
Expectations for the Project	Develop a project completely that can be incorporated into real-life application. Learn to work better in a group and take on new perspectives to problem solving

	Robert Ritchie-Smith
Strengths	Good team player, motivated
Weaknesses	Communication skills, confidence
To Develop	Mature into a better team player, learn more leadership qualities.
Expectations for the Project	To win IPRO day

	Benjamin Sahagun
Strengths	Design thinking (coming up with unique solutions to problems, Problem solving skills
Weaknesses	Procrastination, presentation skills
To Develop	I would like to develop my teamwork skills in order to apply these skills later in life in architecture projects. I would also like to apply my knowledge to help solve the problem within the multidisciplinary team.
Expectations for the Project	I expect this IPRO to be successful and keep on track for a good IPRO day event.

	Malav Shah
Strengths	strong Analytical and problem solving skills, Task oriented, productive , troubleshooting skills
Weaknesses	fear of public speaking, communication skills, poor presentation skills
To Develop	more technical aspect of parking lot system, project management and planning
Expectations for the Project	I want team to develop a working prototype of counter and sensor system by the end of spring semester. so that we can add more bells and whistles to the project according to how the market requirement is and what direction the future of parking lot will evolve.

	Michelle Trudo
Strengths	3d modeling, renderings, working well in teams, laser cutting, and presentation boards
Weaknesses	time management, public speaking
To Develop	to have better time management
Expectations for the Project	seeing this IPRO all the way through

	Kenny White
Strengths	Good Management skills, good inter-personal skills, some networking, database knowledge, google apps.
Weaknesses	Programming, work 2 jobs and f/t student resulting in some time management issues
To Develop	Better my time management and project skills
Expectations for the Project	Get a good groundwork for the next round of students to work on next semester and move towards implementation.

	Nathan Wicker
Strengths	task oriented, problem solving and design minded, solid modeling, non-apathetic
Weaknesses	fluency of speech, limited practical knowledge, can get stuck on ideas, can be skeptical of ideas
To Develop	general expertise in parking systems, general understanding of relevant technologies (sensors, networks, programming interface, display), understanding of what level of technological comprehension is necessary to design a system and effectively work with technological experts, ability to depend on others to do their part well, how to get meaningful public opinion, how to asses practicality of a design, how theory translates into real problems
Expectations for the Project	I expect the team to develop an expertise in parking systems so decisions can be made with understanding of the market, industry, and consumers. I expect team members to maintain a professional commitment to the project, working on tasks seriously and producing dependable, quality work.

	Sam Winstanley
Strengths	Very outgoing and strong communication skills, perfectionist, good business acumen.
Weaknesses	Procrastination.
To Develop	I would like to continue the development of my team skills and help the group succeed at IPRO day.
Expectations for the Project	To produce a realistic and viable business proposal.