ATRC COMMUNCATIONS

An Interactive Qualifying Project

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by

Anthony Begins   **Stephan Zeveska**

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Professor Allen H. Hoffman, Advisor

Professor Holly K. Ault, Co-advisor

Abstract

The Assistive Technology Resource Center (ATRC) at Worcester Polytechnic Institute (WPI) was founded in 1999 to serve as a regional provider of assistive devices, services, and engineering solutions. Through courses, projects, and other activities, the WPI ATRC provides a more technical approach to developing assistive technology solutions for its clients than other Assistive Technology (AT) centers that focus more on the clinical aspects of Assistive Technology. Several IQP's have been conducted in the 4 preceding academic years. Lyons and Trimby (2008) defined the need to organize past projects into a central data base. Hristov, Mawhiney, and Wilson (2009) created that database but left a need for a more comprehensive collection. George and Kalluri (2010) created a marketing document for the ATRC, as well as a more comprehensive list of past ATRC projects. These advancements established the need for providing an adequate framework for the ATRC to communicate with the WPI community as well as the outside community. Over the course of this project a management structure for the ATRC along with procedures for operation of the Rehabilitation Engineering Lab were developed. To create an ideal outcome where the ATRC's operation will become self-sustainable and sound enough to re-establish regular communications, an informational brochure, newsletter, and website templates were all created to assist in this communication. After these implementations, the ATRC's primary need becomes a dependable staff to carry out the outlined procedures and to re-establish the EPICS (Engineering Projects in Community Service) program in the efforts to expand and gain internal and external support and attention for the WPI ATRC.

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Chapter 1. Introduction

The Assistive Technology Act of 2004 defines Assistive Technology as "…any service that directly assists an individual with a disability in the selection, acquisition, or use of an Assistive Technology device." Assistive Technology exists to aid individuals with any form of disability in accomplishing tasks and taking part in activities that they either normally could not do, or could not do so as effectively as able-bodied individuals. The improved abilities of individuals that are using assistive devices make Assistive Technology a valuable asset in treating disabilities and they also make Assistive Technology an important industry.[1]

Some Assistive Technology is available as commercial products. However these commercial products are made for a broad range of people, which in many cases do not suit the needs of individuals with unique needs. These situations re-enforce the need for Assistive Technology centers, and stress the fact that engineering skills are vital and play a key role in the success of Assistive Technology. Often times, Assistive Technology devices are not universal, and may require modifications to meet the needs of an individual, or a complete custom product may need to be produced. These requirements create the need for localized and regional centers dealing with the engineering aspects of Assistive Technology. Continued development of such products and technology, and updates and modifications of such devices are entirely necessary to satisfy the needs of the individuals who are unable to use more universal products. The ATRC at WPI serves as such a center, providing resources and the practical and professional assistance of students and faculty. The ATRC at WPI focuses on many

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[1] http://www.me.wpi.edu/Research/ATRC/

projects to educate students in the skills necessary to create successful Assistive Technology and to further advance the level of effectiveness and availability of such technology.

Since the ATRC at WPI hasn't been staffed in the most recent academic year, the management structure, organization of the laboratory and outside communications have deteriorated. The goals of this project are to develop a Standard Operating Procedure outlining administrative duties for ATRC staff, templates for updating publications, and instructions for updating the ATRC website, along with developing a plan for re-establishing regular communication between the ATRC at WPI and the outside regional community that the organization serves.

Chapter 2. Background

It is necessary to examine other successful Assistive Technology Centers as well as progress made by the WPI ATRC in order to successfully make necessary changes to the WPI ATRC. Prior studies involving the WPI ATRC indicate which processes have been successful in the past, and what could be implemented in order to benefit the organization in the future.

2.1 Assistive Technology Centers

An important fact to note is that while many Assistive Technology centers have a common goal, which is to improve the quality of daily life of a person with a disability through means of a device or product, not all Assistive Technology centers are the same. There are centers which are more "full-service" centers that take a client's need and work to produce an applicable solution, centers which work with simply theory, and other centers with more specific purposes, such as University of Pittsburgh- Human Engineering Research Laboratories and the Rehabilitation Institute of Chicago (RIC) which are elaborated upon later in this chapter.

2.1.1 ATRC at WPI

Since its inception in 1999, the Assistive Technology Resource Center (ATRC) at Worcester Polytechnic Institute (WPI) has been active as a regional provider of assistive devices and services. Through student and faculty involvement, the ATRC provides resources and a technical perspective to issues related to disabilities and focuses on the prospect of using technology and engineering skills to assist persons with disabilities. The WPI ATRC serves through its mission statement to "foster the use of Assistive Technology through collaboration with professionals associated with local and regional clinical, educational, and governmental

and social service organizations that serve persons with disabilities." Currently, the WPI ATRC works closely with area organizations, such as the Massachusetts Hospital School, Center for Living and Working, and the Seven Hills Pediatric Center of Groton, Massachusetts. Within the university, the ATRC is active in providing practical design experience in three undergraduate courses; Introduction to Engineering (ES 1020), Introduction to Engineering Design (ME 2300), and Rehabilitation Engineering (ME 3506). These courses work with Assistive Technology related projects to give students practical design experience. The ATRC Laboratory also works to further develop products designed and built in these courses so that they can be used by persons with disabilities.

2.1.2 University of Pittsburgh - Human Engineering Research Laboratories

The Human Engineering Research Laboratories (HERL) at the University of Pittsburgh has received notable attention for its success in area of AT. The HERL successfully acts on its mission statement, "to continuously improve the mobility and function of people with disabilities through advanced engineering in clinical research and medical rehabilitation" by providing the community with real-world solutions to existing problems.

The HERL has interacted with a wide spectrum of clients, ranging from the Department of Veteran's Affairs to the Quality of Life Research Center. One project that has gathered them notable recognition is their project "PerMMA," a wheelchair that features robotic arms. According to HERL's website, "PerMMA was featured at the Consumer Electronics Show (CES) in Las Vegas in 2012 and the cable show C-SPAN devoted part of an episode of its program 'The Communicators' to PerMMA at CES." The PerMMa wheelchair features robotic arms that aid in

increasing the mobility of an individual using wheelchair. These robotic arms feature the ability to be operated by the user of the wheelchair, in addition to a caregiver that can operate them from a remotely.[2]

2.1.3 Rehabilitation Institute of Chicago (RIC)

Established in the 1950's, the Rehabilitation Institute of Chicago now has over 62 locations. The RIC currently holds the reputation as the number one Rehabilitation Hospital in America for the past 11 years according to the US News and World Report.   With various federally supported research programs, the RIC works in areas ranging within stroke, spinal cord injuries and orthopedic devices. Through all of this work, the RIC fulfills its mission statement of being "…dedicated to excellence in providing the highest-quality patient care, research and education. We are the leader in rehabilitation care. With compassion, hope and creativity as the hallmarks of our service, we strive for the fullest assimilation and acceptance of the physically disabled in the community." Since the RIC employs many experts within the field of AT, the RIC actively recruits persons interested in a future career working in Rehabilitation, from undergraduate students to professionals currently in the workforce. [3]

2.2 Engineering Projects in Community Service

Engineering Projects in Community Service (EPICS) is an international organization where "undergraduates design, build, and deploy real systems to solve engineering-based problems for local community service and education organizations."[4]

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[2] (http://www.herl.pitt.edu/sites/default/files/newsletters/NewsletterVol11No1.pdf).
[3] http://www.ric.org/aboutus/mission/index.aspx
[4] https://engineering.purdue.edu/EPICSU/About

Since its inception in 1995, the program has expanded from being a single site at Purdue University, to being represented at 17 college campuses across the United States and the world.

At WPI, EPICS has been active in bringing students out of the classroom and providing them with the aspect of practice that is essential to WPI's motto of "Lehr und Kunst," meaning "Theory and Practice."

EPICS at WPI has produced noteworthy projects in the past, ranging from a Frisbee throwing device, a laptop tray for a wheelchair, wheelchair glide control system and a spray can holder for a person missing portions of his index fingers.

Finally, most recently, EPICS at WPI has been recognized in a national video competition for Engineers Week 2010, where a group of WPI students produced a video detailing WPI's EPICS program. [5] The video produced for Engineers Week garnered WPI a 2nd Place award in the competition, awarding the program a poster, national recognition through the Engineers Week Program and recognition among the WPI community itself.

2.3 Previous Studies

To ensure that the Rehabilitation Engineering Laboratory continues to operate efficiently, periodic review of its actions are necessary to decide how to progress into the future. Past IQP groups have reviewed the status of the operation of the ATRC and have attempted to implement plans for easy maintenance and sustainability. These plans are

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[5] http://www.wpi.edu/news/20090/vcontest.html

necessary to keep the ATRC running efficiently. These plans have included such items as weekly walkthroughs of the lab, recruitment of more students, and consistent cleaning and organization. These plans, however, while intending to be continually used after implementation, tended be somewhat over-reaching, and were not attainable as 'short-term" goals. Thus, the Center is continually re-evaluated to ensure that it does not fall behind on Assistive Technology projects, and stays up to date. The current status of the ATRC has been reached through the studies of the following IQP groups: Lyons and Trimby (2008), Hristov, Mawhiney and Wilson (2009), and George and Kalluri (2010).

2.3.1. Lyons and Trimby Study (2008)

The study conducted by Lyons and Trimby was the first of several groups to evaluate the operations of the ATRC in the Rehabilitation Laboratory. This group recognized the need for the lab to be better organized. Means of standardizing this lab included organization, storage and cleaning of the area, as well as establishing system of labeled areas.

Other needed improvements included a means to update the Lab's website, and a database that would detail previous projects. The ability to retrieve all relevant information would make this information more accessible to outside contacts. This IQP identified a significant need for communication between the lab and outside organizations. Better communications would establish connections to similar academic groups, as well as professional groups and societies related to Assistive Technology.

2.3.2. Hristov, Mawhiney, Wilson Study (2009)

The group of Hristov, Mawhiney, and Wilson completed the second IQP on the structuring of the ATRC in 2009. While continuing the work which had already been done by Lyons and Trimby, this study evaluated other needs that were previously overlooked. They created a baseline for a revamped floor plan, which reorganized the layout of tools, storage and workspaces. From there, the group also worked on the database of projects. The database was updated to include projects completed as MQP's, as well as any other projects created through the ATRC. This update required working with past MQP reports and other appropriate documentation to provide necessary details, which was achieved by reviewing both the physical reports themselves, as well as those found online through the WPI Gordon Library Website. The database was created using Microsoft Access. The WPI ATRC's website was then updated to include this database of past projects. In addition to the online database, the website also had other significant updates, including revamped categories and tabs to include newsletters, journal publications, and projects sections, in an effort to make the website more 'user friendly.'

2.3.3 George and Kalluri Study (2010)

The most recent IQP completed regarding the ATRC was by George and Karlluri. This project emphasized the update of the completed project database, where they chose a format for documenting the projects. With the help of Professor Hoffman, they were able to document projects completed from 1991 to the present. This database not only included previous IQPs and MQPs, but also included Masters of Science theses and projects done by students in related undergraduate design courses.

Finally, the group developed several documents; a marketing document, which includes descriptions of past projects, was created in an effort to reach out to other organizations and become more recognized in the community and a second document that included a summary of all past projects.

Chapter 3. Problem Statement

After the completion of the most recent project that focused directly on the ATRC, its directors, Professors Hoffman and Ault, realized the need to re-establish management and both internal and external communications between the ATRC and the WPI campus and outside communities, respectively. The goal of the present project is to correct the long outstanding issues that have in recent years hindered communications between the ATRC and the rest of the WPI community, and outside stakeholders. By addressing these issues in the Rehabilitation Laboratory, in the ATRC office, and on the ATRC website, the group sought to institute a management structure and procedure for establishing contact between the ATRC and potential collaborators. By re-establishing these procedures and regular communication, the ATRC will be in contact with more outside organizations and people, and will have increased ability to provide assistive technology solutions to the local area that the WPI ATRC serves.

Chapter 4. Methodology

In this project many key processes have been identified and performed in an effort to keep the WPI ATRC active and current. These processes include providing essential publications for communication, maintaining a proper level of organization within the lab, and creation of a Standard Operating Procedure to ensure that these processes continue. These processes have been put forth in an effort to sustain the ATRC for future activity and expansion.

4.1 Publications

The primary source of establishing a presence within the community as well as communication with clients and other parties is through communications. There are two main, printed publications that have been essential to the WPI ATRC and its communication; the ATRC Newsletter and the ATRC Informational Brochure.

4.1.1 ATRC Newsletter

Maintaining current information and publications are an integral part of maintaining contact with organizations and outside stakeholders. A major component of communications is the ATRC newsletter. When the project began, the last newsletter that had been sent out was over 2 years ago. In order to maintain a presence in the community, it is important that a newsletter be sent out at least once per year, however ideally a newsletter would be produced and sent out twice per academic year; one newsletter sent out during the fall, and another sent out in the spring.

A newsletter template has been created and placed on the Sharedrive for future lab staff to use. The template is designated such that staff can simply fill in new information

and stories into the template to create future newsletters. The intention is to have the template be standardized and to allow for an efficient and simple method to create and send out regular newsletters. The newsletter template has also been expanded to feature 4 pages of information, as it has been modeled similarly to that of other existing organizations' newsletter layout. The newsletter template can be found in Appendix F.

4.1.2 ATRC Informational Brochure

The informational brochure is also another means of publicizing the ATRC. The brochure is available at WPI open house sessions for future students, as well as available on campus for any other interested persons. The existing brochure template was updated to include more recent publications, and subsequently saved for future ATRC staff to update. Updates made for this project included updated publications, current staff listings, and updated contact information for the ATRC. This template can be found in Appendix E

4.2 Administration

A notable goal of the project was to clearly define a management structure and set of responsibilities for students working with the ATRC and acting as managers and assistants. To facilitate this goal, a Standard Operating Procedure (SOP) for the WPI ATRC was drafted. This document compiles all relevant and necessary information for students and other staff managing or operating the ATRC.

As a result of having a clearly written set of responsibilities, ATRC managers should be able to complete all of the tasks outlined in the SOP in a concise manner, and consequently, carry out all of the tasks outlined within it in a much more timely fashion than they were in the past. The SOP includes all necessary instructions, templates, checklists and other

resources to make administrative responsibilities of the Lab Managers require the least

possible time. By minimizing the time investment needed from the lab mangers, it will allow

the management to concentrate on making other improvements to the Rehabilitation Lab,

to the organization, and ideally to manage the EPICS program and expand its activity. This

SOP also outlines all of the primary responsibilities of the lab managers, and includes

tentative times in the academic year that each item should be completed.

4.3. Sustainability

One of the main goals of this project is to implement several procedures and allocate

resources in an effort to make the ATRC operate more efficiently, and to allow the organization

and lab to be self-sustainable in their operation. Ideally, future project students and lab staff

will be able to maintain and operate the Lab with minimal time investment. Future ATRC

manager will be able to focus on improving other aspects of the ATRC's operation, and will not

have to repeat any of the organizational tasks that have been carried out as part of this project.

Throughout the course of the 2011-2012 academic year, new tools for the laboratory have

been purchased and placed in the lab. Additionally, inventories of all tools and supplies

available in the Lab and office have been drafted. These inventories allow future managers of

the ATRC to know if tools are missing, or if levels of supplies are low, and whether or not those

supplies need to be reordered. These inventory checklists can be found in Appendix B and

Appendix C. The ATRC Standard Operating Procedure has been drafted to serve as an extensive

guide for future students and staff working with the ATRC. The Standard Operating Procedure

(SOP) will serve as a set of detailed instructions to future students and staff that will work with

the ATRC. The sections in this document include the responsibilities of the Lab managers, procedures on how to fulfill these responsibilities, lists of tools and recommended supplies, pertinent safety information, and diagrams on how to organize all of the lab's storage space. Templates for an ATRC newsletter and informational brochures are included in the SOP document and are also included in this report (see Appendix E and Appendix F). In addition to the material that relates primarily to the laboratory itself, and to the regular communications for the ATRC, a detailed set of instructions for the computer-based responsibilities of ATRC management are also included. Instructions on how to map computers on campus at WPI to the ATRC Sharedrive, how to manage the ATRC website, and how to navigate and effectively use WinSCP, the file transfer protocol that WPI websites utilize are all included. With all of this information compiled into one document as a reference, the amount of time that will be spent by future staff on completing the tasks outlined will be minimized. The SOP will sustain the progress that has been made over the 2011-2012 academic year in organizing the lab, reinstating regular communications and marketing for the lab, and updating and maintaining the ATRC website.

4.4. Reorganization

When this project commenced, the WPI ATRC was in need of reorganization in both the physical and figurative aspects. The WPI ATRC lab and office had fallen into physical disorganization, while the EPICS program and website needed to be reorganized and updated to fit the current needs of the program.

4.4.1 ATRC Office

Prior to the commencement of this project, the ATRC office had not been occupied by any staff for about a full academic year. In order for the ATRC to function to its full potential, the office had to be reopened and reorganized. Since one of the main media established to contact the ATRC for any inquiries and information is via phone, the office must be active and the office phone's voicemail must be checked regularly.

The office itself had to be properly set up. While the office functioned rather successfully in the past with either staff or interns operating the ATRC out of the office, some small but necessary changes had to be made in order to ensure that students would be able to take over the role of managing the ATRC with ease.

In the past, there was one copy of the key available to unlock the office door, and the ATRC Lab Manager kept it in his/her possession for the duration of their work in the office. However, if multiple students were entrusted with managing the lab, they too would need to be granted access to the office. While having more copies of the key produced seems logical, this also could pose a security issue. The decision was made to purchase and install a

Figure 1: A key storage box with a programmable access combination was purchased from Home Depot

programmable locking key box directly next to the office door. This key box, as seen in Figure 1, features a (reprogrammable) code which unlocks the box for access for the key. This allows the code to be changed from year to year or whenever necessary, to only permit certain persons access to the office.

Another item which needed to be assessed was the computer within the office. While the computer is a somewhat outdated, it was determined that it was sufficient for Lab Managers to use, as typically the only functions needed are word processing, file transfer protocols, and internet access.

While the computer was not a major issue, the printer was determined to be not entirely functional and was replaced by one generously offered by Professor Ault. It features fax and copying modes among other functions.

4.4.2 Rehabilitation Engineering Lab Reorganization

While the Rehabilitation Engineering Lab has been continually used for project-based classes, MQPs, and graduate theses, the lab had fallen into a state of disorganization. There were several main focus points that needed to be addressed in order to bring the lab back to an acceptable state of organization. One of which was to evaluate which past projects and prototypes were worth keeping in the lab for future use and which were better suited to be disassembled, for the sake of making more storage and work space available in the lab. Many projects were disassembled; however any parts that were deemed of value were saved for potential future use.

Another important task was to organize all of the drawers and cabinets in the lab. While past IQPs and lab managers have labeled and attempted to standardize areas, the lab was nonetheless in a state of clutter when this project began, and the contents of the drawers were not well organized. While the drawers and cabinets had been labeled, it seemed as though users of the lab had a disregard for returning items to their proper place. To combat this issue, schematics of the lab were developed to show the layout of the room, and accurately depict

what each drawer and cabinet contains. These schematics were developed using Microsoft PowerPoint to allow for the future updates to be easily made if the lab is reorganized in the future. (See Appendix G)

Another item necessary to aid in organization of the lab is a means of assigning space for storage of project materials. The issue in the past has been that while drawers were allotted for storage of project materials, there was never any consistent method to keep track of details such as when the project would be completed, who to contact about the project, and contact information for these people. The Washburn Machine Shop has successfully implemented a method for keeping storage space organized. Implementing a similar method in the ATRC should proceed as follows; when a student or project team approaches either one of the ATRC Lab Managers or is assigned space in the lab by one of the professors involved, they must fill out a lab space assignment sheet (See Appendix H). This sheet allows the managers and professors to know what project occupies the space, who the primary contact for the project (and how to contact them) and when the project will be completed, thus allowing for any remaining contents to be removed. This sheet is essential for efficient operation, as in the past it has been difficult to discern whether or not a project is complete and whether or not the items occupying the storage space are being currently used.

4.5 Surveying Stakeholders

While working to develop a management structure and administrative procedure for the lab to facilitate the reinstatement of communications for the ATRC, the need to develop a survey for the WPI campus presented itself. Since there had not been a newsletter since 2009,

or any notable exposure for the ATRC since the EPICS video award in early 2010, it was deemed necessary to survey WPI's undergraduates. This was performed to find out what they knew about the ATRC, if there was any existing interest in the lab and in EPICS, and to promote the fact the lab is indeed still active and seeking students to work with the EPICS program.

The survey was developed, created on www.surveymonkey.com, and sent out to WPI's undergraduates via Exchange webmail. Around 100 responses were recorded, which was roughly the expected response; however it could be estimated that over 4,000 undergraduates received the email. There appeared to be a sizeable amount of interest in EPICS among several engineering majors, and the fact that respondents didn't know much about the ATRC alluded to the already established need for the ATRC to reinstate regular communications and management.

4.6 Reinstating EPICS at WPI

In years preceding this project, the EPICS program has been active with several faculty members and a notable number of students. Many assistive devices have been completed by the EPICS program's participants, including several that have been chosen for use by outside clients. The program has become instrumental in taking 1st generation prototypes produced in project-based courses (ES1020, ME2300, ME3506) and bringing them to a more sophisticated and refined level of completion. Several projects from these design classes have been continued, such as a multisensory board for children with cognitive disabilities and a Frisbee Throwing device. Progress on these projects is directly correlated to student involvement as it is mainly up to the students involved who decide how to go about designing and executing these

projects. As an incentive, course credit is offered to students who have extensive involvement during the academic year.

However, in recent years, the EPICS program at WPI has become dormant. The process of re-establishing the EPICS program at WPI has begun with this project. Over the course of B and C terms, attempts were made to recruit students to work on completing an existing Frisbee Thrower project that has been stored in the Rehabilitation Lab. Several students began coming to meetings and several more contacted the project group about joining and working with the EPICS program, but the inability to make the time commitment from all parties hindered progress and the updates to the device remain incomplete.

However, most of what has been accomplished over the course of this project for the ATRC will be of considerable benefit to the EPICS program. The establishment of a Standard Operating Procedure for ATRC managers clearly outlines their responsibilities. Thus, they will have much more time to devote to reinstating, expanding, and improving the EPICS program. Additionally, with all of the improvements made to the Rehabilitation Lab, EPICS will have a more organized work-space; more tools to use that will likely be helpful in creating assistive devices, and perhaps a more focused direction.

4.7 Updating the ATRC Website

The WPI ATRC website is the primary way to display and publicize the ATRC's accomplishments and current activities and provides a way for persons outside the WPI community to find out more about the ATRC. The main concern for communications regarding the ATRC at the beginning of the project was the status of the website. The last update to the

main ATRC webpage was in 2004, with some subsections updated in 2008. In order to reinstate regular communications and publications for the WPI ATRC, the website needed a substantial update. Therefore a new website was created using Adobe Dreamweaver. A template was created from which all pages could be created. This template provides a sleek and visually appealing design and uniformity. It was also decided to use a simplified webpage design to allow for easy navigation and information transfer. The website features sections entitled: About Us, Contact Us, EPICS, Personnel, Projects Page, Publications, Recent News and Resources.

With the help of Sia Najafi, the group was able to take the old website's contents from the WPI server. With existing information, directories, and images, the group was able to start working with the existing contents as a starting point. All of the files were placed into the WPI ATRC Sharedrive in order to properly document iterations of the website and archive the changes made. These files are located in a folder named "ATRC" within the Sharedrive.

One of the items that the website lacked was an updated list of personnel and contact info, which listed members involved from 2008, and inaccurate contact information for Professors Hoffman and Ault. The updated website featured a personnel list with updated contact information for Professor Hoffman and Professor Ault, along with Student Assistants Anthony Begins and Stephan Zeveska. Since this website is crucial to establish contact between outside persons and the ATRC staff, it was important to list contact information for all of the staff members, including both the Professors and the Student Assistants.

The previous website also contained many links to outside websites which either no longer existed, or are otherwise no longer available. To correct this issue, a Resources Page

was created which listed a host of links, ranging from Massachusetts-based websites to nationally-based websites.

Finally, a section dedicated to EPICS was created to allow for the independent EPICS site to be deactivated, and thus consolidated into one website with the ATRC. This decision was made in order to make sure that both EPICS and the ATRC websites would stay up-to-date and current, since they will be both on one website.

Chapter 5: Results/Discussion

Due to the nature of this particular IQP, the project group has deemed it appropriate to combine results and further discussion into one chapter that accurately reports the outcomes and intellectual value of this project. Due to inactivity, disorder, and clutter in the laboratory, much of the work accomplished there cannot be measured as quantitative results, but can be more accurately explained as qualitative results.

This project was initially formulated to reinstate regular communications for the WPI ATRC. Addressing this need led the project group to discovering a great number of other details the required attention in order for this to happen, including revamping the ATRC website, reorganizing the lab and office, creating a management/administration plan and structure, and creating tool and supply inventory documents. The end results of the work in each of these areas broadly can be described as a reorganized laboratory, office, computer network website, and management structure that is ready to enlist student managers to expand the operations and publicity of the laboratory, reinstate the EPICS program, and maintain the ATRC.

The WPI ATRC used to regularly publish informational brochures and newsletters but had not done so for several academic years. In a direct effort to correct this condition, templates for new brochures and semester newsletters were created for the use of ATRC manages to enable them to quickly and efficiently put together new publications. An ATRC brochure for the 2011-2012 academic year was produced and distributed, along with a 2012 newsletter the detailing the ATRC program.

Using Adobe Dreamweaver, a new website for the ATRC was also created from scratch, to replace the previous ATRC website. The previous site had no updates to the main page after 2004, and the most recent update to anything at all on the site was in 2008. In order to reinstate any form of regular outside communications from the lab to other Assistive Technology and professional resources, a sleeker looking, more informative, and most importantly more recent website was needed. Although the new page hasn't been publicized and there are no statistics or information about its web traffic, its future value in the coming academic years will be paramount to the success of communications involving the ATRC.

The Rehabilitation Engineering Laboratory and accompanying office both underwent reorganization during the course of this project. Lab drawers were cleaned out and rearranged, old projects that were occupying valuable storage space were dismantled and removed and an inventory sheet to better indicate the usage of lab storage space was developed. Additionally, a new tool chest and a number of tools useful for projects in the laboratory were purchased and places strategically in the lab. The drawers of the tool chest were labeled appropriately and an inventory of all tools was published. Obsolete equipment was removed from the office adjoining the Rehabilitation Engineering Lab, and some tools found in the office were rearranged and replaced. The computer became connected with a special drive, which is the ATRC Sunpower Drive that is mapped mapped to the computer's Z: drive. This drive is located on the WPI computer network's server strictly for the purpose of backing up all files that are located on computers within the Mechanical Engineering Department in Higgins Laboratories that relate directly to the ATRC. The drive is intended

for use by all professors, faculty, and students working with the ATRC and/or EPICS and allows all relevant and related information to be archived in one centralized location that can be easily accessed by any person that would need to do so.

A Standard Operating Procedure (SOP) for operating the ATRC was crafted to create a reference for future ATRC managers to operate the lab/organization. This SOP outlines the duties of the Lab managers and other students/staff working with the lab, and includes all necessary materials carry out these responsibilities. Those materials include the templates for publications, instructions for mapping WPI computers to the ATRC Sharedrive, tool and recommended supply inventories, and other reference materials that will assist future student managers efficiently operate the ATRC. This manual will reduce the time investment required for directly lab related duties and will give the managers more time to focus on other areas of expansion, including re-establishing contact with other AT centers and professional societies, restructuring and reinstating the WPI EPICS program, and other activities that will expand the use and activity of the ATRC.

All of WPI's undergraduate students were sent a survey via Exchange WPI webmail that asked about the presence and perception of the ATRC on campus and the potential interest in being involved in EPICS and other Assistive Technology related activities. The results showed that approximately 100 students took time to answer, but that of those 100, very few were aware of the lab and its activities. Surprisingly there seemed to be notable interest in working with the lab for IQP/MQP projects and joining the EPICS program. The results of this survey don't exactly point out any particular issue that couldn't be inferred from other sources, but these results reinforced the need for the ATRC lab to become more

prominent and for WPI's EPICS program to become active in Assistive Technology projects again.

Attempts to re-establish the EPICS program were made in B and C terms by assembling students together in teams to finish the Frisbee Launcher EPICS project. The device remains incomplete in the lab, as a majority of time spent on this project was invested in other areas that would be vital to continued operation of EPICS in future academic years. Additionally, the students that were interested in working with the program also had other time commitments that made their involvement in the project very limited. This should not be viewed as a failure however, but should be viewed as a valuable piece of information to be used in producing a thoughtful and feasible set of recommendations for the ATRC's future, found through analyzing all of the project's components and creating an effective plan of action for future ATRC managers. These recommendations appear in detail in chapter 6 of this report.

Chapter 6: Recommendations

6.1 EPICS-based IQP

The ATRC Communications IQP group first recommends to the university that another IQP, to manage the ATRC and build the presence of EPICS at WPI on campus should be formulated and carried out. The current problem with EPICS at WPI is that it lacks the student involvement necessary to efficiently operate and expand the program. If there is an IQP group to run EPICS in the future, it should provide a team of two or three persons who would dedicate their time to organizing meetings, recruiting members and contacting outside resources for EPICS, along with overseeing the progress and completion of projects that the organization has taken on. This IQP would be very helpful to retaining members and making the EPICS program at WPI completely active. It is important to note that in past years, student involvement was significantly higher than the current academic year, with the program becoming nearly dormant due to lack of student involvement. In order to keep WPI's EPICS chapter active and productive, it is necessary for a person or team to be responsible for recruiting and retaining members and managing the organization's operation. This group or team should also be able to maintain the ATRC Laboratory and Office using the Standard Operating Procedure that has been created as part of this IQP. Completion of this proposed project would have a defined management structure for EPICS created, an expanded number of students participating, outside contacts for WPI's chapter established, and several assistive devices completed and sent out of the laboratory to their respective users. Offering academic credit for these duties in the form of an IQP will ensure that the responsibilities are not only fulfilled, but also that a scholarly approach under the direction of professors will be undertaken to facilitate further growth and expansion

of the WPI EPICS chapter and allow the students to build professional and management skills through the experience.

6.2 A Work Study student to maintain the Rehabilitation Engineering Laboratory

Another recommendation from the ATRC Communications IQP group to the university is to possibly hire a work-study student to work in the ATRC lab. The lack of routine maintenance and personnel is a persistent issue with the lab. Due to all of the use the lab receives, disorganization and clutter occurs regularly and practically every time that a course or project group uses the lab. A work-study student in the ATRC lab could work to keep the lab in an acceptable state of use by sweeping floors, organizing the cabinets and drawers, periodically running through checklists outlined in the new ATRC SOP, and assisting students who need to use the lab for their various projects. The student employed in this position could be an alternative to having another IQP group work with the ATRC, or ideally, could work alongside (and perhaps be part of) the IQP group that would work to expand the operation of EPICS and maintain the ATRC. Having a fully staffed lab would most likely increase the exposure of and interest in the lab on campus, along with making projects in the lab proceed more efficiently and make the lab more productive on all levels.

6.3 Re-establish Campus Wide and Outside Contacts

In addition to recommending that a student or project group maintains the Rehabilitation Engineering Laboratory in the future, the group recommends that regardless of which route the ATRC directors take in staffing the organization that steps are taken in re-establishing regular communications on campus and with outside organizations, collaborators

and clients. When the ATRC newsletters and Informational Brochures are ready to be

published, they should be sent to entire student and faculty population of WPI via email in an

effort to re-create the mailing list that was in place previously. By sending these campus-wide

emails, the ATRC will potentially gain the attention of interested students and let faculty know

that the organization is indeed still active. The ATRC staff should also research other

organizations that the WPI ATRC has worked with previously and work to re-establish contacts

that have been lost as ATRC personnel has changed.

6.4 Website Updates

It is recommended the ATRC website should be updated 2-3 times per academic term,

more specifically, the "Recent News" section on the website. The "Recent News" section

currently has information regarding the EPICS video entry into the Engineers Week contest.

This will be outdated in the next academic year and will need to be updated frequently.

Information about current projects being designed and news regarding other AT centers

nationally should be placed on the "recent news" section to help garner interest.

The "Personnel Section" also will need to be updated (at least) at the beginning of each

semester. Students may join in working in the ATRC at different points of the years, especially

in B term, as ES1020 typically occurs in A term. ES1020, "An Introduction to Engineering

Problems" is a project based course in which, generally freshmen, students receive firsthand

experience designing and building a prototype for a course, and on occasion, for an outside

client. It is for this reason that the "Contact Us!" section of the website will need to be updated

in the same timeframe as the personnel section, in order to provide visitors to the website the most up-to-date contact information as possible.

The section for "Resources" should be updated at least once per term to ensure that the current links provided are still correct and pertinent, and whether more should be added. New resources can be found by doing a search online, referring to other AT Centers' newsletters and websites, and by working with the librarians at the WPI Gordon Library to find relevant resources regarding AT centers and news in AT.

Finally, the "Publications Section" will need to updated, however this can only be updated as publications are produced, so no specific time frame can be determined necessarily. The new SOP recommends that an informational brochure be updated at the beginning of each academic year, and that the two newsletters be produced in that time period, one each corresponding to the middle of fall and spring semesters.

6.5 Plan of Action for 2012-2013

In addition to the previously stated recommendations, emphasis needs to be placed on the necessity of a dependable ATRC staff to oversee the organization's operations throughout the course of the entire academic year. The staff, whether they are IQP students, volunteers, or work study students, need to ensure that updated newsletters, brochures, and an updated website are all ready in the opening weeks of A-term. In order to recruit students to work with the ATRC and in the EPICS program, these need to be in place to coincide with the curriculum of ES 1020 in A-term, and ME 2300. Most of the students that expressed interest but were unable

to make time for EPICS during this project were upperclassmen that have prior obligations to project based courses and therefore were unable to take on another project. EPICS projects are ideal for first and second year students who don't have as many obligations as their upperclassmen counterparts, and also would provide valuable experience that could benefit the students in future endeavors, as well as benefit the organization.

Additionally, the staff needs to be sure that the tasks in the Standard Operating Procedure for the ATRC are carried out in the timeframes described within the document in order to accommodate for the previously mentioned goal. This will also to allow the organization to be in an adequate position to re-establish contact with outside assistive technology organizations, and outside collaborators and clients that the WPI ATRC has had in recent years. Improving communication was a general goal of this project that broadly speaking was met, but the continued success of the WPI ATRC rests upon continued work in the area of communication between the lab and the rest of the WPI campus, and the outside community.

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Appendix A: Instructions for Mapping Sunpower Sharedrive

HOW TO MAP NETWORK DRIVE TO WPI ATRC NETWORK SHARE

- Click the Start Orb
- Right-click the "My Computer icon" (or the name of the computer you are using)
- Click "Map network drive.."
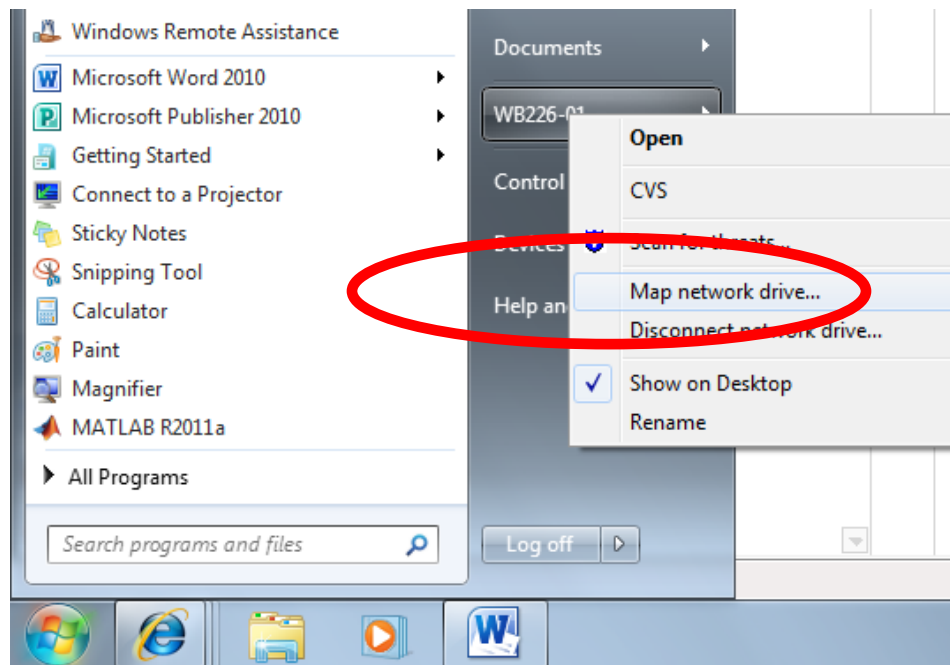
- Type "\\sunpower.wpi.edu\ATRC" (without quotes) in to space labeled "Folder"
- Click "Finish"
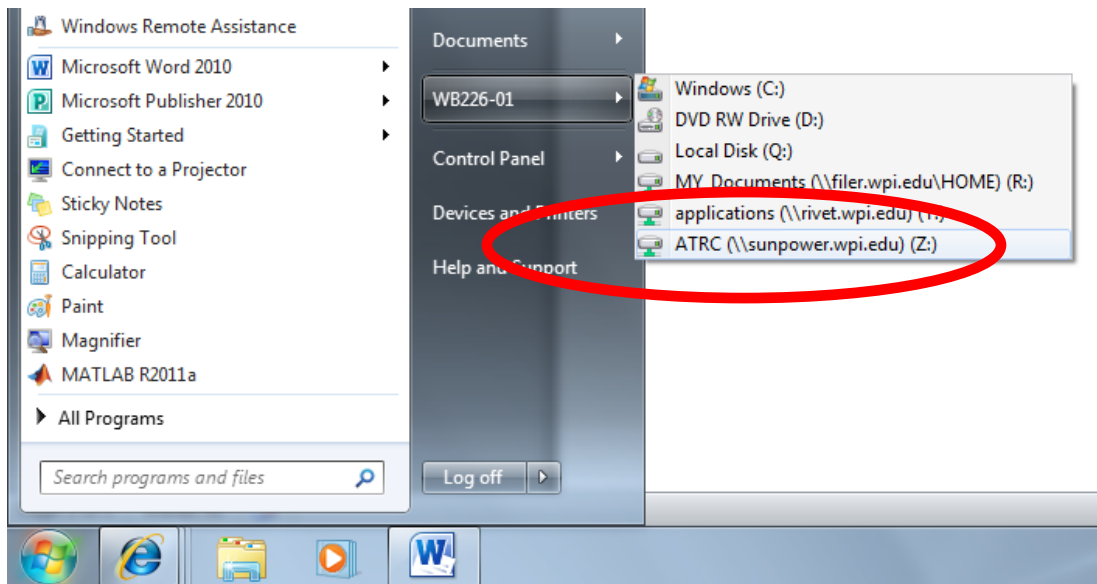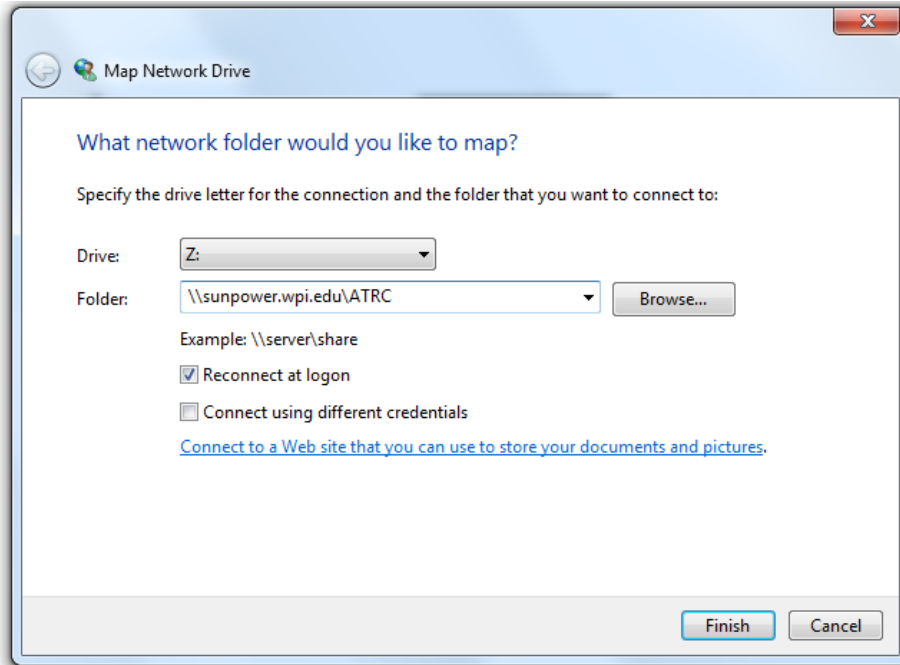
The WPI ATRC Sunpower Network Share is now mapped and ready for use!

Appendix B: Tool Inventory

Tools In office:

Saws (Circular saw, jigsaw)
Rigid R2500 Palm sander
Metabo keyless chuck, corded drill (no reverse)
Irwin vice
(3) Force gauges
Dial indicator
8 piece Black and Decker jigsaw blades

Tools Recently Purchased:
(2) Storage bins
(2) 6" calipers
Protractor
13 piece screwdriver set
7 piece pliers set
60 and 100 grit sandpaper
10 SAE, 17 piece (mix) hex key sets
(2) Tape measure- 25'
Utility knife
Multimeter
9 piece SAE and Metric wrench set
3 adjustable
Coping saw w/ (3) blades

Tools in Lab Space:
12' Taskforce tape measure
2 soldering stations
Drills (Ryobi 18V cordless, keyless drill (no reverse); Milwaukee corded, keyless chuck drill; Skil cordless, keyless chuck drill)
Small channel lock pliers
(3) Wire cutters
(2) Caulking guns
Incomplete Black and Decker driver set
Hammers (Rubber mallet, claw hammer)

(2) Hot glue guns
 (2) Combo squares
Wire strippers
C clamps
(3) Tin snips
Craftsman locking pliers
Riveting tool

T Square
2ft level
Wire brush
Small pry bar
Fiskars cutting pliers
Adjustable wrench (6")
Screw Drivers (11+ Phillips, 20+ Flat blade, Flat/Phillips double 90*, Square head driver
Files (3 round files, 4 triangular files, 8 flat files)
Scraper
2 chisels
30ft tape measure
Utility knife
Vice grips (Needle nose vice grips, large vice grips
Cat's paw crow bar
Ratchets (3/8" drive ratchet, ¼" drive ratchet)
Incomplete Allen wrench set
Incomplete socket sets
Needle nose pliers
3 nut driver handles
        Nut driver attachments (3/8", 11mm, 7/16", 7/32")
Wrenches :(5/8-9/16, 1/2-9/16, (2) ½, 7/16, 3/8, 11/32, 11/16, (2) ¾, 7/8, (2)9/16, 5/8, (4) Very small, misc. sizes)
Nut Drivers: (2) 7/16,   (2) 3/8, (2) 5/16, (2) 11/32, ½, (2) ¼, 3/16
90* dental pick
Block plane
Punch
Saws (Coping saw, circular saw, (4) wood saws, Hack saw)

Tools just bought:
Drill Index
(2) Driver Sets
Tool Box
Standard and Metric Wrench Sets
Socket Set
Hammers (Claw, (2) Dead Blow)
(2) Vice Grips
(2) Needle Nose Vice Grips
Corded Engraver

Appendix C: Supply Inventory

Needs:

- Trash cans
- Spools of various wire gauges
- Safety Glass Rack
- Tape: Duct, Electrical, Masking
- Blades, cutting consumables/accessories for current tools
- Cleaning Supplies: Simple Green Spray, etc

- Misc nuts, bolts, hardware
- Staples, nails, woodworking
- Circular saw blades
- Safety Glasses, misc PPE
- Surgical Supplies
- Misc cables and wiring
- Transformers
- Power supplies
- Foam Padding
- Wheel Chair parts
- Misc Pipe fittings
- Sprockets
- Hydraulic supplies
- Rubber feet for walkers, etc
- Resistors
- Op amps

- Capacitors
- Fuses
- Transistors
- Bar weights
- Chain, both roller and link
- Marbles
- Threaded rod
- PVC tubing, fittings, elbows
- Springs
- Misc sizes of wood
- Misc sizes of PVC tubing
- Rubber Tubing
- Paints and stains
- Various metal stock (steel, copper, aluminum, etc.)

Appendix D: Survey Responses

Question 1

What is your major?

Engineering	77
Sciences	20
Other	3

Question 2

What year are you?

Freshman	32
Sophomore	17
Junior	26
Senior	25
Graduate	0

Question 3

Through what means have you heard about the ATRC at WPI?

Class	9
Friend	2
IQP	4
MQP	0
I have not	76
Other responses:	12
Passing by it in Higgins	5
Advisor	
Friend/Friend's Project	2

Question 4

In what capacity have you used the ATRC/Rehabilitation Engineering lab?

Course work	9
EPICS	1
IQP	0
MQP	1
I have not	91

Question 5

The Lab is currently available during normal business hours (9am-5pm). If you have used the lab, would 'off hours' access to the lab been useful?

Yes	24
No	25

Question 6

If yes, which extended hours would have been most beneficial?

6pm	8
7pm	10
8pm	11
Fine with reg. business hours	10
Weekend?	22

Question 7

How have you heard of EPICS (Engineering Projects in Community Service) at WPI?

IQP	0
MQP	0
Course	4
Friend/word of mouth	6

I have not   86
other: (Activities Fair, Advisor)   3

Question 8

How would you rate the visibility/ how well known is the ATRC on campus?

1	64	(Not Visible)
2	25	
3	6	
4	0	
5	0	(Highly Visible)

Question 9

Are you interested in issues such as accessibility, inclusion, design for assistive technology or assisting Persons with disabilities?

Yes   46
No   50

Question 10

Would you like to receive general information, such as newsletters regarding the ATRC or EPICS? If so,
 Please enter your name and email address. In addition, there is space to enter specific
Questions/ comments for which you would like to receive an individual response. Thank you for your time.

(11 responded yes)

Appendix E: ATRC Informational Brochure

About the ATRC

- Serves as a central information source for Assistive Technology (AT).

- Provides education about AT devices

- Provides networking between organizations and agencies serving persons with disabilities

- Provides technical resources from the selection, modification, design, and development of assistive devices.

Goals:

- The ATRC strives to disseminate technical information regarding the availability and use of electromechanical assistive devices for individuals with disabilities.

WPI graduate and undergraduate students participate in ATRC activities through class projects, interdisciplinary student projects, major design projects, and graduate thesis research.

Prototype:
One arm drive wheelchair

Spray can holder for man with partial finger amputations

Single switch dice roller

Elevating leg rests

Assistive T Resource

Mailing Address:
Worcester Polytechnic
100 Institute Road
Mechanical Engineering
Worcester, MA 01600

E-mail address:
atrc@wpi.edu

WPI ATRC Newsletter

Assistive Technology Resource Center

Summer 2012
Volume 11, Issue 1

Summary of 2011-2012 Activities

The 2011-2012 academic year was a very active time for the ATRC and the associate Rehabilitation Engineering Laboratory. A number of student projects from undergraduate design courses are highlighted on pages 2 and 4 of this newsletter. In addition, two provisional patent applications were filed for devices completed in the spring of 2011. The first was for an attachment for a walker that aids in preventing lateral falls. The second application was for an electromechanical reacher/gripper device. Additionally, a student team comprised of Anthony Begins and Stephan Zeveska developed a plan to improve the operation and external communications associated with the ATRC.

These improvements include:

- Updated Website with future updates scheduled (http://www.me.wpi.edu/ATRC/)

- Reinstatement of the newsletters

- Newsletters expanded from two to four pages

- Updated mailing lists

- Reorganized the Rehabilitation Engineering Laboratory

- Updated the tools and supplies associated with the laboratory.

What's Inside:

Recent News

Recent Projects: 2 & 4

About EPICS : 3

About Us/Contact : 4

Do you have an idea for a student design project?

History and Mission of the ATRC

In 1999, the Rehabilitation Engineering Laboratory at Worcester Polytechnic Institute received a grant from the Fairlawn Foundation to develop an Assistive Technology Resource Center (ATRC). The mission of the ATRC is to foster the use of assistive technology through collaboration with professionals associated with local and regional clinical, educational, governmental and social service organizations that serve persons with disabilities.

The ATRC at WPI disseminates technical information regarding the availability and use of assistive devices. When an appropriate commercial device is not available, the ATRC will collaborate with cooperating organizations in developing modifications to existing devices or the design of a custom device. The ATRC focuses on mechanical and electro-mechanical devices. (http://www.me.wpi.edu/research/ATRC/About/)

The ATRC actively accepts ideas for potential projects from agencies that provide services to persons with disabilities. In the past, WPI students have worked in collaboration with agencies such as the Massachusetts Hospital School, the Seven Hills Pediatric Center, the Massachusetts Department of Developmental Services and various other programs.

Recent Course Projects

WPI students develop prototypes of assistive devices as part of three undergraduate design courses. The following paragraphs highlight some of the devices that were developed during the 2011-2012 academic year:

Introduction to Engineering Problems (ES 1020) is a design course developed for entering first-year students. In the fall of 2011, students developed wheelchair mounted painting devices to enable children with various disabilities to paint large murals while an attendant pushed their wheelchair over a paper canvas. Another project developed an attachment to a wheelchair that allows an attendant to negotiate a curb by independently raising and lowering the front and rear of the wheels. (Figure 1)

Figure 1. Operation of the wheelchair lifting device seen lifting the front and rear wheels of the chair.

Another project designed a device to help persons with hemiplegia resulting from a stroke to stabilize a bowl so that they can independently eat with one hand (Figure 2).

Figure 2. Device to enable eating from a small bowl only using one hand.

Introduction to Engineering Design (ME 2300) is directed toward 2nd and 3rd year mechanical engineering students. One project completed in this year's class was development of a device to assist persons to get into or arise from a bed. The device consists of a walker mounted on a locking, rotating platform, mounted to a wooden base. (Figure 3)

Figure 3. The rotating walker device to assist persons arising from a bed is seen as modeled using Computer Aided Design.

Another project was to create a new design for a reacher/gripper that allows the gripper portion to be rotated up to 90°, independent of the position of the handle. The 90° rotation assists people in picking up cylindrical objects from a shelf.

Figure 4. Reacher/gripper device. with the gripper rotated 90° .

Rehabilitation Engineering (ME 3506) is directed toward 3rd and 4th year students in mechanical and biomedical engineering. The students in this class must develop the need for a new or significantly improved assistive device and build a working prototype.

One project developed a child's toy called the "Play Therapy Biome" that can be used by children with disabilities as well as able-bodied children. The Biome features lights and a fan that can be operated using various switches, one of which is a buddy button.

EPICS at WPI

EPICS (Engineering Projects in Community Service) was founded at Purdue University in 1995. The creators of this program saw a way to combine student work with the needs of local community service organizations so that all could benefit. Undergraduate students solve engineering and technology-based problems for partnering organizations so as to create solutions that can be used by the organization.

WPI joined the EPICS program in 2004, with a focus on developing devices to assist people with disabilities. Students in the EPICS program often take prototypes produced in courses and refine them so they can be used in the outside community. A recent example is a dice rolling device operated by a single (buddy button) switch. A Frisbee thrower is also nearing completion.
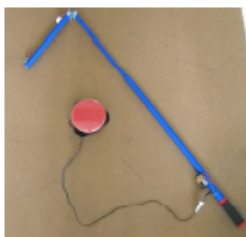
Fishing Assistant

WPI EPICS Group Places in National Video Contest

Lindsay Mullins, left, and Katelyn Perkins, right, stand with the "Frisbee Launcher"

To read the full story online: http://www.wpi.edu/news/20090/vcontest.html

The online video can also be found at: http://www.youtube.com/watch?v=4XXZGf5Kp4g

Four students, Jeffrey Gorges, Lindsay Mullins, Katelyn Perkins and Ethan Warner, created a video submission to a national contest sponsored by the American Society of Civil Engineers (ASCE), as a part of "National Engineers Week." The video contest coincided with an effort to promote engineering that is associated with such ideals as community service. The contest was judged by middle school students. The WPI submission placed second and was presented with a poster for WPI EPICS, as well as funding for a party to recognize the achievement.

Middle School Teachers Develop Board Game

In 2009, middle school teachers, Jared Quinn and Veronica Tate, worked in the Rehabilitation Engineering Laboratory as part of a NSF program involving research experiences for teachers (RET). They developed a single switch operated reaching device that could be used to pick up and place game pieces and educational cards on horizontal and inclined surfaces. The Fishing Assistant has an extendable pole with a hinged arm. An electromagnet at the end of the hinged arm is activated by a single latching switch which can also activate a buzzer if auditory feedback is desired. The device can be used to pick up and move a game piece or card to which a paper clip has been attached. A two-sided game board was developed for users to play a fishing style game or tic-tac-toe.

Contact Information:

Allen H. Hoffman, PhD
Professor of Mechanical Engineering
ahoffman@wpi.edu

Holly K. Ault, PhD.
Associate Professor of Mechanical Engineering
hkault@wpi.edu

Find Us Online!

http://www.me.wpi.edu/ATRC/

Recent Course Projects (continued)

The fan propels paper butterflies within the toy to give the illusion that they are live butterflies which are actually flying. The toy was evaluated by 6 children, ages 3-6, 3 with disabilities and 3 without, all of whom attend the same preschool. Both groups of children enjoyed playing with the device, as the average play time was approximately 24 minutes. (Figure 5)

Figure 5. The "Play Therapy Biome" pictured with a buddy button for operation.

Another project developed a prototype device which allowed a woman with an above the knee amputation to move about her kitchen without donning her prosthetic leg. The device is a 5-wheel stool-type device with a padded top. The stool has employs a friction brake which can be lowered to contact the floor and hold the stool stationary (Figure 6).

Figure 6. Stool designed to assist a person with an above the knee amputation.

A third group developed a modified jar opener specifically for persons with arthritis. Opening a jar requires both hands, one to stabilize the jar and one to twist the lid. The design consists of a custom base which grasps the jar and holds it stationary and uses an existing product which grasps the lid. The force to open the jar was substantially reduced.

Figure 7. Prototype device used to stabilize the jar pictured on the left next to an existing product used to grasp the lid.

Appendix G: WPI ATRC Lab and Toolbox Layout Schematic

Front Room, Right Side

1	2	3	4	5	6	7	8
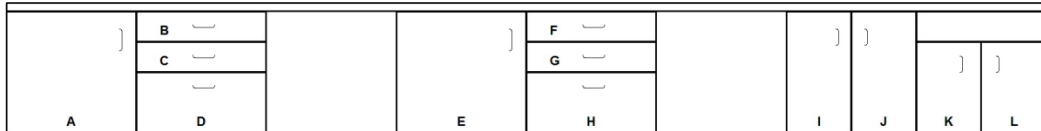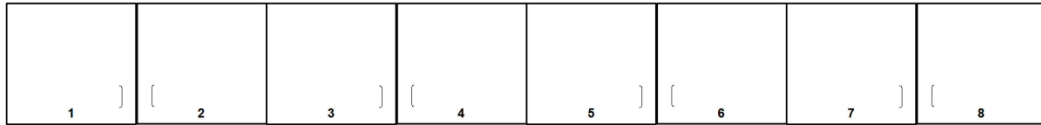
A: Lap Trays
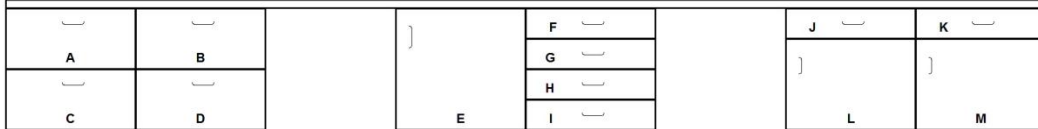B: N/A
C: PVC Piping
D: PVC/Brass Pipe Fittings

1: Glues/Paints
2: Painting Supplies

E: Misc Wood
F: Rope/Fabric
G: Springs, chain, elastics
H: Plastics/Sheet plastics

3: Cordless (Ryobi) Tools
4: ES1020 Reverse Engineering
5: Prosthetics

I: Art Cart/Misc Projects
J: Tubing
K: Cleaning Supplies
L: Cleaning Supplies

6: Past Projects
7: Voltmeter
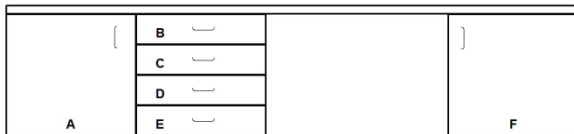8: Power Supplies

A: Syringes
   Microscope slides
   Surgical Tubes
   Petri Dishes
B: Files
C: Personal Protective
Equipment
D: Files

E: Switch and Balance Units
   Electrometer
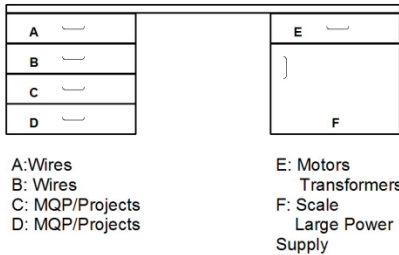F: Cables
G:
H:
I:

J:
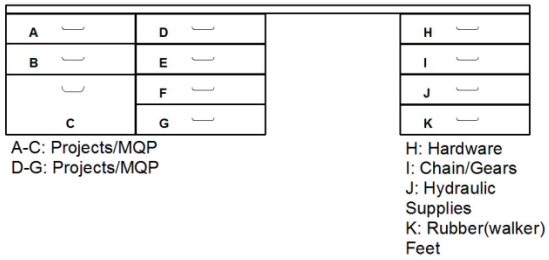K: Electric Pump
L:
M:

Front Room, Window Area

A: Replica Bones
B:
C: Catheter Transducer
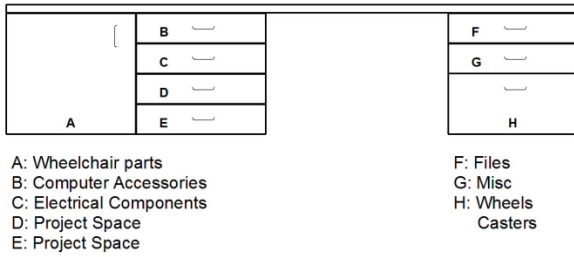D: Project Space
E:

F: Student
Projects

Front Room, Right Side, Center

A
B
C
D

E

F

A:Wires
B: Wires
C: MQP/Projects
D: MQP/Projects

E: Motors
    Transformers
F: Scale
    Large Power
Supply

Front Room, Right Side, Center

A   D   H
B   E   I
        F   J
    C   G   K

A-C: Projects/MQP
D-G: Projects/MQP

H: Hardware
I: Chain/Gears
J: Hydraulic
Supplies
K: Rubber(walker)
Feet

Front Room, Right Side, Right Corner

    B   F
    C   G
    D
A   E   H

A: Wheelchair parts
B: Computer Accessories
C: Electrical Components
D: Project Space
E: Project Space

F: Files
G: Misc
H: Wheels
    Casters

1	2	3
4		
5		
6		
7		
8		

9
10
11
12
13
14
15
16

US GENERAL

Locations:

(Top): Rotary tooling
        Drill bits
        Socket Set
1:
2: Tape Measures
3: Measurement
4: Screwdrivers
5: Vice Grips
    Adjustable Wrenches
6: Pliers
7:
8:
9:
10:
11:
12: Standard/SAE
13: Metric
14: Hammers
15:
16: MISC

Appendix H: ATRC/Rehabilitation Engineering Lab Space Assignment Sheet

ATRC/REHAB LAB SPACE ASSIGNMENT:

Project type: (Circle one of the following)

MQP   IQP   EPICS Project   Other:_____

Group members' names: _____,_____,_____

Advisor's Name: _____

Date at which project will be completed: ____/____/____
(and contents may be removed)

(Please tape to the bottom of drawer when completed)