"*ASSISTIVE TECHNOLOGY SOLUTIONS™*": A New Paradigm for the Development and Dissemination of Assistive Technology

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ABSTRACT

The United Nations estimates more than 10% of the world's population is disabled. Assistive technology (AT) enables people with disabilities to lead more independent lives and increases their quality of life. Unfortunately, availability of AT is limited for a number of reasons. First conceived in 1988, this project, called "*ASSISTIVE TECHNOLOGY SOLUTIONS*", is designed to establish a unique and innovative AT transfer mechanism to make new or unique products and technologies available to people with disabilities throughout the world, and to do so without commercialization of the products. The project involves acquisition and dissemination, through the Internet, of engineering information necessary to duplicate and fabricate AT devices. Armed with sufficient engineering information almost any kind of AT device can be fabricated with appropriate local resources thus increasing the availability of assistive technology devices and fostering local enterprise in providing these devices.

INTRODUCTION

PEOPLE WITH DISABILITIES NEED ASSISTIVE TECHNOLOGY. An estimated 19.4% of noninstitutionalized civilians in the United States, totaling 52.6 million people, have a disability. Almost half of these people (an estimated 24.1 million people) can be considered to have a severe disability. There are an additional 2 million people living in nursing homes and other long-term care facilities. With the first of the baby-boomers reaching 60 years old the problem of disability and aging will grow significantly.

Assistive technology (AT) effectively increases the independence and the quality of life of people with disabilities. New devices, technologies and techniques of using existing technologies are continually being developed through assistive technology service delivery providers, student design projects, research and development projects and most importantly by people with disabilities and their families.

AVAILABILITY OF ASSISTIVE TECHNOLOGY IS LIMITED. There are a number of issues in making assistive technology available to those who can benefit from it. The availability of assistive technology is currently limited to those devices which can be purchased and those fabricated on a custom basis. Due to the limited size of the assistive technology market, it is estimated that only 5% of devices developed for use by people with disabilities become commercialized.

AN ABUNDANCE OF INFORMATION EXISTS ABOUT ASSISTIVE TECHNOLOGY DEVICES that are custom made and those that never get commercialized. New devices, technologies and techniques of using existing technologies are continually being developed through research and development projects, and simply fulfilling the needs of people with disabilities. Because these devices are often "custom-made," they are usually very effective. Assistive technology devices are often made by American engineering students as part of their senior design courses. Service providers, volunteers and most importantly people with disabilities and their families are constantly developing new devices that meet the needs of people with disabilities.

THE INTERNET IS BECOMING UBIQUITOUS and thus the transfer of information is becoming easier and less expensive all the time. There are currently approximately 274 million users of the Internet in North America representing 78.6 % of the population, a growth of 153% since 2000. Worldwide there are approximately 2.4 billion users representing 34.3% of the population.

OPEN SOURCE PORTENDS A NEW INNOVATION PARADIGM**.** As Thomas Goetz writes in **Wired**,*"Software is just the beginning ... open source is doing for mass innovation what the assembly line did for mass production. Get ready for the era when collaboration replaces the corporation."* "Crowd innovation" is revolutionizing how innovation is being accomplished. The innovation of new assistive technology has, up to now, depended on traditional methods of innovation and development, i.e. the commercial design practice or programs such as the NIDRR RERC program. These mechanisms are limited in a number of ways, including who gets to participate in the process and how ideas are protected and constrained from dissemination. The development of new assistive technology devices will benefit remarkably from the collaboration of people interested in designing, fabricating and using assistive technology within a virtual community.

FABRICATION RESOURCES EXIST LOCALLY but require the engineering information in a suitable format to fabricate assistive technology devices. There is a growing do-it-yourself spirit as evidenced by such companies as Home Depot as well as the "Maker Movement". Linked to the early amateur electronic

hobbyists who built their own radios and Heathkits, the new generation of do-it-yourselfers are building things such as computers and robots. In most communities there are resources, although not usually associated with assistive technology, available to fabricate products on a "one-of-a-kind" basis. The growth of new technologies such as 3D printing portends a revolution in product development and fabrication. The office supply company Staples has announced their "Staples 3D Easy" 3D printing service. Fabricating devices will be as easy as going to your neighbourhood office supply store. Often, fabrication resources can be obtained through family members and volunteers. Shop resources of vocational and engineering schools can be utilized. If the engineering information about the products is available to these people, products can often be easily fabricated.

METHODS

We have created ***Assistive Technology Solutions™*** (ATS) in order to enhance the availability of assistive technology to people with disabilities**.** A preliminary website has been created that will achieve three primary objectives:

- **Create an environment** that will foster the innovation of new assistive technology.
- **Archive information**, particularly engineering information, about assistive technology devices.
- Be a **source of engineering information** and fabrication instructions sufficient to replicate assistive technology devices with local fabrication resources.
- Create an enterprise functionality that will enable ATS users to sell assistive technology devices that are not likely to become more widely commercially available.

THE TARGET POPULATION of ***Assistive Technology Solutions™*** is ***any*** person with a disability that can benefit from the use of assistive technology. Most importantly, people with disabilities will be the ultimate beneficiaries of this project. There is no constraint as to the functional limitations a person has as long as he or she can benefit from the use of assistive technology that can be fabricated for them. Similarly, there is no constraint as to the purpose of the device. Assistive technology meant as a job accommodation can be developed and fabricated as well as a device that will enhance the recreational opportunities for a person with a disability. This is apparent from the descriptions, currently on the web on such sites as ABLEDATA, of do-it-yourself devices.

EXPECTED RESULTS

The ATS website is currently being tested and should go live by the end of January. We will present quantifiable measures at the RESNA conference such as the number of plans/instructions on the site as well as web analytics.

We expect ***Assistive Technology Solutions™*** to significantly expand the availability of assistive technology devices to people with functional limitations in order to increase their quality of life. Assistive technology provides people with the means to get around independently, communicate, be employed, enjoy recreation activities and generally lead more independent lives.

ATS will enable engineering students and others who have developed and fabricated assistive technology devices as part of their design projects to share their ideas and make their innovations more widely available to people who can benefit from them. Students will be encouraged to participate in the ATS community where they will be able to find advice and guidance as well as an outlet for their designs. ATS will, thus, contribute to making engineering students' experience with assistive technology more fulfilling and practical.

By creating an enterprise functionality, ATS will become a marketplace for assistive technology devices that are often considered "orphan technologies" because the market is generally too small for full scale manufacturing and marketing. These products will then become available on a small scale creating opportunities for developers, particularly students, to create an enterprise and thus market their devices at minimal cost and risk.

In addition to the obvious benefits to people with disabilities as described above, ATS will impact engineering students and others, including clinicians and volunteers, working on assistive technology design projects by enabling them to be part of a community they can interact with to enhance their experiences in design, fabrication and working with people with disabilities. ATS will create a forum enabling people with disabilities to not only interact with inventors and designers of assistive technology but to assume the role of innovator themselves. ATS will test the feasibility of using crowd sourcing to develop, manufacture and disseminate assistive technology devices, something that has not yet been done. New and innovative ways of fabricating devices such as 3D printing, will likely lead to the creation of new types of assistive technology devices that will be easy for people to acquire. While the current assistive technology market is dominated by large companies with the engineering and manufacturing capabilities necessary to participate, ATS will democratize the market enabling small companies and individuals to participate in creating and disseminating assistive technology devices.

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