

## **A Design Project Infusing Academic Service Learning**

Autistic children have an unusual way of responding to sound. They feel very uncomfortable with the loud level of sound generated from conversations in a public gathering and individual conversations. Although they are very annoyed by the high level of noise, they enjoy music, even at a high volume. Unlike a normal individual, their intolerance to noise can result in scratching, extreme physical discomfort and even self-mutilation.

This paper is proposing a design concept for an Electronic Engineering Technology (EET) Course that will infuse academic service learning for the EET students. Designing a filtered hearing aid for autistic children will built a link between community and university. A service learning integrated EET course will also benefit faculty as it enables teaching more process-oriented and engages all learners. Infusing such a service integrated course can benefit them through infusion of creativity and enthusiasm from college students and their contribution to community development. Through the process, faculties are also able to generate increased student civic responsibility by showing the need for their expertise in the community.

The purpose of this paper is to suggest a process to design and develop a head phone type filtered hearing aid for autistic children. This electronic device will filter a range of frequencies and a pattern of sound that irritate them. A closed-loop feedback control system will be able to identify the range of sound systems comfortable for a particular **autistic** individual. Then a filter can be designed and trained to convert an information input signal input into a specification of predetermined range of signals based on each individuals' comfort zone. Any random voice can be converted to an 'ideal' voice through the trained, filtered, and digitally converted sound system.

The paper will propose an approach where an input signal will be processed. Parameters of the signal can be trained to reproduce a predetermined signal at the output of the system. This test will provide a foundation for a more complex design process. Using Fourier analysis and the use of Bessel's functions, a practical on-line adaptive controlled filtered hearing aid could be designed, developed, and implemented.

Proposed filtered head phone will allow them to be more focused in the class room. Students will have to interact with autistic children and collect data regarding the need to suppress the unwanted spectrum of frequency and also identify the range of spectrum for which their hearing system is comfortable with. Such research in developing filter will allow students involve in academic service learning as they will be required to interact with the community and educate themselves about autism.

Normally, early intervention has enhanced recovery for many children effected by the spectrum of autism. Implementing such system at an early age can help them recover from autism by improving their communication skills, and consequently allowing them to stay focused in the class room. Even late intervention with such filtered headphone can improved learning. Enhanced recovery from autism can help them lead an independent life as they continue to grow as an adult.