

## Description

The Ball Target System was the 2009-10 student cRE/Ate Project. Students worked with an Adaptive PE teacher to develop an instant positive feedback ball target device that offers visual and auditory feedback to the user. Sensors detect when a ball passes through the target and control the light and sound output. The system uses a MP3 circuit board with a micro SD card to store music and sound effects that are selected using an Octal Johnson counter.



## Goals

A portable ball target system offering instant visual (light) and audio (sound) feedback to the user. The system is to be designed for use by students with disabilities. The audio and visual components of the system will stimulate the senses of students with disabilities.

## Device Design

The target needed to be able to provide sufficient audio and visual feedback to stimulate the senses of students with disabilities of all ages, while also being versatile enough to allow multiple functions for the teacher to use the target with a variety of students. In addition to the leveling feed to stand upright on flat surfaces, it was desired to increase functionality by being able to hang it upright on a pull up bar, bleachers, or basketball hoop, in order to accommodate various use environments. However, because the teacher travels frequently by car to different schools, the device needed to be lightweight and compact, without sacrificing the size of the active target area, to carry and fit inside of his vehicle. The device will be used in places with access to common power outlets. Therefore it was designed to be operated by common 110V AC power.

## ***Sensors & Beam Concept***

This concept had the most potential and was capable of fitting all of the design parameters – A 36" x 34" Aluminum frame was constructed and one logic IR emitter/receiver unit each were placed at the upper and lower part of the frame. These units emit and detect constantly an IR beam and will switch from a low voltage signal (logic 0) to a high voltage signal (logic 1) when interrupted by an object (for example by a ball). These IR units are able to cover the complete width of the frame. Detection accuracy has been increased tremendously by adding a curtain of hanging webbing strips to the top part of the frame.

## **Results and Conclusions**

The final version of the ball target accomplished all the goals of the original concept. The student throws or kicks a ball through the frame, thus triggering the infrared sensor. This in turn activates the music and light components. The system is capable of playing 7 different music files in a loop, each activated consecutively by a detected hit through the target. The music files are easy accessible and exchangeable through a micro SD card. Speakers and volume control is integrated in the system, using disassembled Dell active PC speakers. To increase the portability, a removable common Notebook bag carry strap has been attached to the frame.

The device was tested by students at numerous schools and both they and the teacher declare it to be a success.

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