Easelectric: An electrically controlled easel for patients with limited dexterity and mental disabilities.

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INTRODUCTION
The Easelectric is a unique electrically powered easel capable of assisting an artist with the placement and positioning of a canvas. Using a single joystick, the artist is able to move the canvas horizontally and vertically as well as tilt the easel towards and away from them. In addition, a linear tracking system allows the entire easel to slide along its base and be moved closer to the user. The easel (shown in Figure 1) was designed to be simple and compact, yet sturdy, and was created for a client with cerebral palsy and limited dexterity who had difficulty reaching all areas of a large canvas. Using the easel an artist is able to remain stationary and bring the inaccessible regions of the canvas within their range of motion.

Figure 1: The Easelectric.

SUMMARY OF IMPACT
The project specifications required that the easel be able to safely operate within a community of individuals with mental retardation and developmental disabilities (MRDD), and every aspect of the easel was designed to meet those specific needs. Due to the limitations that individuals in this community experience on a daily basis, art has become a very influential part of their lives and allows them to express themselves in beautifully imaginative ways. This is one of the defining characteristics of the Passionworks program which describes its vision as follows: “To create and live out a best practice model for collaborative art making between artists with and without development disabilities. This new mindset demonstrates that creativity is innately a part of all people and recognized that art enhances the quality of life and strengthens communities.” The Easelectric project was significantly influenced by this vision and undoubtedly helps these talented artists achieve the goal of the Passionworks program.

TECHNICAL DESCRIPTION
The design for the easel is involves a square base that is attached to a series of aluminum frames which are then attached to the table that the easel is seated on. The base of the easel is clamped to the table with an adjustable
screw clamp assembly (Figure 2). This provides added stability to the device, sturdily attaching it to the table while the client is painting. The adjustability of the clamp allows for the accommodation of different sizes and shapes of tables. Besides providing stability, the base of the easel also allows for the canvas to be manually adjusted closer to the user by means of aluminum extrusion and ultra high molecular weight polyethylene linear bearings (UHMWPE). Additionally, using a joystick, an artist can control the tilt and vertical placement of the canvas which is controlled by two 165 lb force, 12 volt DC linear actuators which each have a stroke length of 6 inches. The horizontal placement is controlled by a small 12 volt DC gear motor connected to a 24 inch screw drive.

Figure 2: Easel Base and Table Attachment

Aluminum was chosen as the ideal building material due to its low weight, high strength, relative inexpensiveness, and resistance to corrosion. As a result, the easel is extremely strong and weighs only about 50 lbs. To further reduce corrosion and also increase the aesthetics of the easel, portions were painted blue using a corrosion-resistant paint.

The joystick used for the easel was custom made for the project and included four microswitches activated by the joystick’s position as well as a large thumb rocker switch mounted in the top of the handle. The large joystick and rocker switch make moving the easel simple for a person lacking fine motor skills. The joystick connects to the easel via a standard 9 pin serial cable (see Figure 3) and the switches activate a number of relays on the easel. The actuators and screw drive that the relays power control the movement of the easel and operate at around 1 in/s, allowing the artist to safely and accurately move the canvas to its desired position.
Exposed wiring was kept to a minimum in order to ensure the safety of the easel’s users. The relays, circuit breakers, and power supply are also safely housed in an enclosure designed to isolate any potential electrical dangers. The device plugs into any grounded 120 volt AC wall outlet.

The approximate cost of parts and materials was around $815.