ARC Slide

Team #7

Sarmad Ahmad
Hillary Doucette
Stephen Kustra

National Science Foundation
Katrina Toce
djtkmt@cox.net
(860) 621-8616

II. Alternative Design Two

Track

This design will consist of the slide being made with wood beams for support and polyethylene U-channels (3” x 1”) will be installed on the track surface to serve as the path for the cart so it does not go off track. Again no indents in the track and the U-channels will be bolted down with stainless steel bolts. A polyethylene sheet will be used for the top surface of the platform, roughly ¾” thick. Steel will not be used in this design as well, keeping the costs of the product low. Also, a lift motor will not be installed but the winch cable will automatically disengage, hence the operator will only be required to push the car to the bottom of the slide and pull out the cable and attach it to the car and to allow the winch to retract. There will be a winch timer, tower light and sensor combination that will indicate that the car has reached the top platform safely. There will also be an on/off push button on the slide for emergency stopping of the winch. A visualization of track two can be seen in figure two below.
**Car**

In the second car design, the head rest/support will be adjustable to desired levels as in an automobile seat headrest. This will accommodate for the user’s trunk growth and development and permit the adaptability for different users, as well. The seat recline angle will be set at 15 degrees, an additional five degrees than design one. In order to account for the shift in the center of gravity towards the rear of the car, the seat position relative to the frame will be set at a distance closer to the front of the vehicle. The headrest will sit on two adjustable notched pins that can be moved up or down to match the user’s head level during use. Additionally, there will be foot holders in the front of the car to keep the legs from shifting to the left or right in the car during use. In figure three, the restraint straps are not depicted.

In this design, the frame will be made of ¼” thick circular steel tubing 304 grade. The wheels will be 6” in diameter with a steel hub and rubber tread. The width of the tires will be 2”. The attachment site for the winch hook will be spring loaded such that when the car is retracted to the top of the slide, a mechanical trigger on the top platform will release the connection pin from place and allow the winch hook to disengage.

![Figure 2: Track design #2.](image)

**Controls**

The controls of this design are slightly more advanced than design one. The 12V DC winch motor used to bring car back up the slide will be turned on and off by an RF wireless remote control and by a safety switch on the back of the motor itself. In order to operate the winch, the safety switch will need to be in the on position. The rope of the winch may extend further than the length of the slide, and the remote will have one button, on. When this switch is pressed, the motor will turn on, and when the button is released the motor will turn off again. A photoelectric sensor will be installed at the top of the slide to detect when the car has been fully pulled back to starting position. When this sensor is triggered, the motor will turn off and stay off, regardless of whether the start button on the remote is pressed. When the winch motor is on, a red LED light located on the top of the slide will illuminate, signaling that the
winch mechanism is in use. When the car reaches the top of the hill and the photoelectric sensor is triggered, the red signal light will turn off and a green signal light will illuminate. Once the car travels down the hill and the sensor is no longer triggered, the green light will turn off again. Lastly, if the battery is under 20% charged, a yellow LED light will shine instead of green when car is at the top of the hill. A microcontroller will be used to program all of the controls.