

# EZ Strike Bowling Ball Matthew Lueck and Jacob Otto Faculty Mentor: Dr. Puteri Megat Hamari ECET Department, Minnesota State University, Mankato

## BACKGROUND

### Why did we choose this project?

Recreational considerations for handicapped individuals is often overlooked which consequently leads to a poorer quality of life in comparison. To combat this, we focused on a form of recreation that we are passionate about, making bowling more accessible to more people.





#### What is the Goal?

Even though bowling is one of the more accommodating sports, we feel there is still room to help these individuals feel more involved.



#### We wanted to create a remotecontrolled bowling ball that a handicapped or disabled person can control through the use of a joy-stick. This will allow for user feedback and interaction making it a more enjoyable Figure 2- Assistance Ramp experience. Although it is understood that this product would never fully comply with USBC specifications, we would like to be as close as possible.

### **Current solutions?**

The only current solution for many handicapped bowlers is a ball ramp, which takes away most of the users' interaction and often feels rudimentary at best.

## **PROPOSED SOLUTION**

In order for the ball to be controllable, we need to heavily modify the internals of existing equipment. This bowling ball will contain a servo motor which manipulates a weight block to promote side to side movement. The user will be able to control this system wirelessly with a remote and joystick.



Figure 3 – Servo Motor and Weight

### Weight System

Our weight system consists of a wooden arm holding a 14.5 oz steel weight (seen in Figure 3). This functions as a counterweight which both stabilizes the platform and is controlled by the servo motor. The motor is programed for a range of 30 degrees of movement.

### **Power Supply**

Power is supplied via a 4x AA battery harness that delivers current to both the servo and Arduino UNO R3 via the Vin power pin. These had to be kept in parallel as to limit the current draw through the Arduino board, which causes a system reboot.

### **Radio Transmitters**

The radio system in this design consists of two nRF24L01 shielded radios that allow for communication up to 360ft which has been verified in testing. These radios tie together the communication between the remote controller and the receiving weight system inside the ball as the connection is strong enough to penetrate the shell material.

### Core

The core of this bowling has been hollowed out to facilitate the modification and allow the implementation of our design. The outer core maintains a thickness of 1-1 1/4" to allow for increased durability on impact.

### System Wiring

As seen in Figure 5 to the right, the project is split into two modules, a controller and a receiver. Each requires an independent power source and an antenna to communicate. Each module has a similar wiring scheme as many of the connections are the same. For the receiver, the power supply supports both the board and servo externally to increase stability of the system.

 USBC Official Rulebook Detailing Proper Equipment Specifications https://bowl.com/rules/usbc-playing-rules

## SYSTEM DESIGN







