

# 3D Archery Target Robot

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CONTROLS

wavelength reflected back

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# BACKGROUND

### The Company:

Quality of Life+ serves wounded veterans and first responders by challenging engineering students to create new technology that improves the lives of their clients

### Problem:

Archery shooting involves stationary targets that do not model hunting scenarios

### **Objective:**

Implement a 3-D target with a mobile base to replicate realistic hunting shots

# DESIGN OBJECTIVES

- Broadside shielding must withstand a 450Gr. fieldtip arrow delivered from a 70lb compound bow
- Dust and water resistant to IP-52 standard
- Replaceable external components if struck by arrow
- User must control device via RC transmitter
- Must move on programmed paths
- Must move in an autonomous mode that avoids objects
- Shall be loaded into vehicle by 1 able-bodied person and setup <15 minutes
- Shall have 1-hour of active battery life

# DESIGN OVERVIEW

RECIEVER HOUSING

### **MAGNETOMETER** HOUSING

shielding angle

PROXIMITY SENSORS (3X) Emits ultrasonic waves and calculates proximity of an object based on



# **RC RECEIVER**

Reads input from RC controller and outputs corresponding PWM signals

**MAGNETOMETER** 

Reads Earth's magnetic field

and outputs device's

orientation in degrees

### **MICROCONTROLLER**

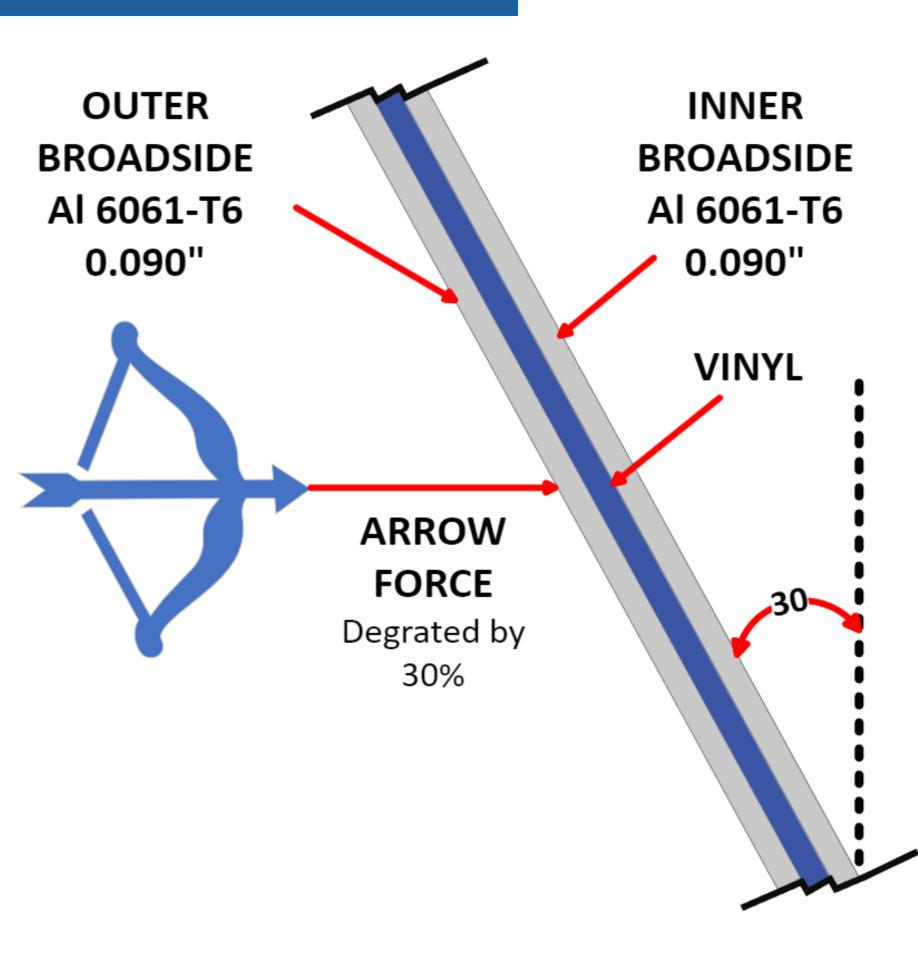
Reads outputs from sensors and receiver, executes all logic, and outputs signals to motor drivers

### **MOTOR DRIVERS (2X)**

Receives digital HIGH or LOW signal to control motor direction and analog PWM signal to control speed

# SHIELDING DESIGN

### Shielding Weight vs. Cost Al 7075-T6 0.125" Lexan 0.750 (\$) Al 5052-H32 Al 6061-T6 0.250" 0.160" 4130 Annealed 0.080 30 20 20 **Broadside Weight (lbs)**



80/20 FRAME

Easy to assemble and attach

external components

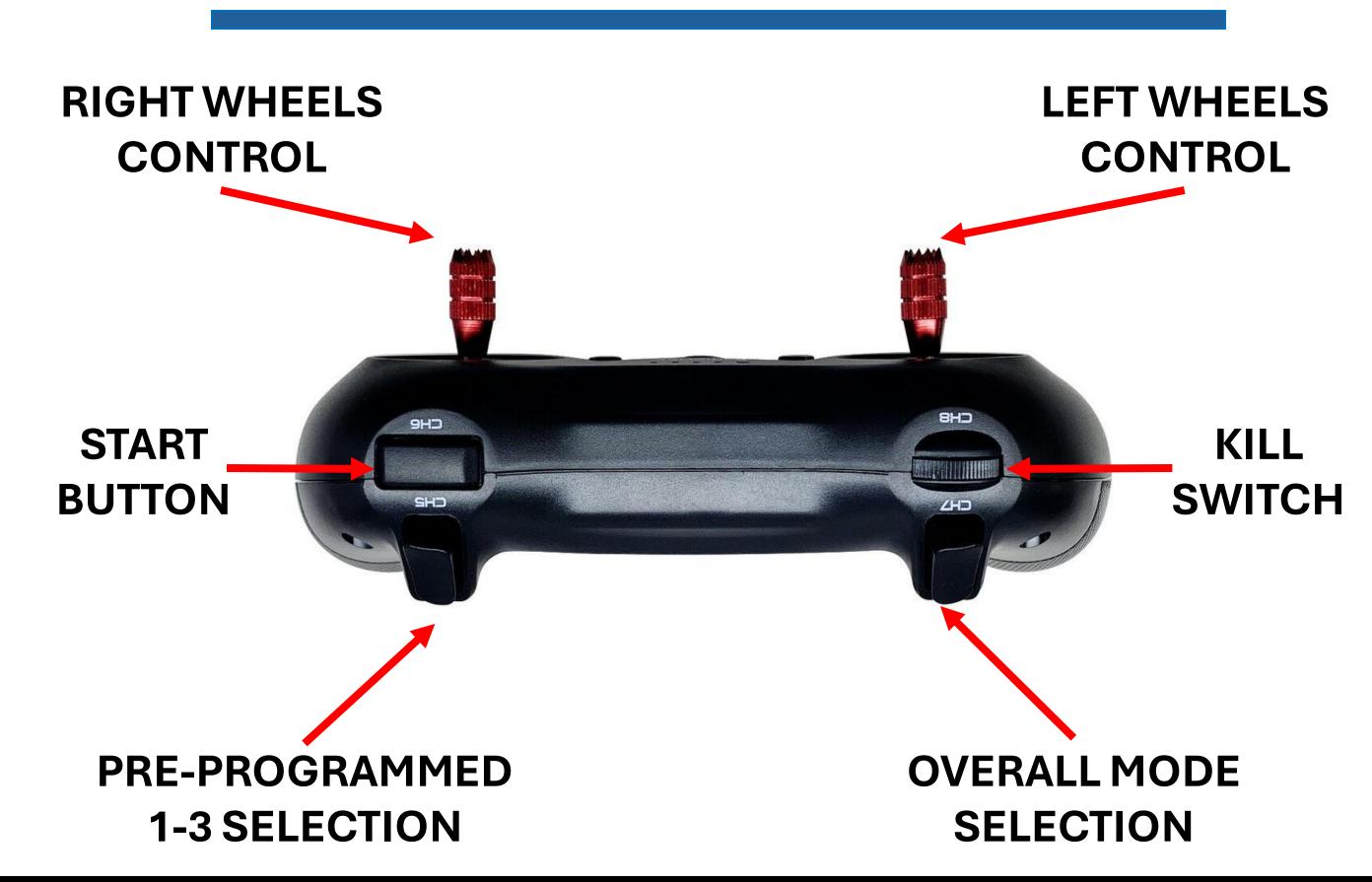
deer target

**HANDLES** 

For ease of transport

### **GAS SPRING** PLANETARY GEAR **MOTOR** Compresses when subjected to 25lb force DC brushed motors, provide 6.8 lb\*ft of max torque HINGES Allow actuation of suspension, frame takes full impact **HUB ADAPTER** Interface between motor shaft and wheel hub

# **CONTROLLER LAYOUT**



### **ELECTRONICS** HOUSING

IP-52 rated to protect internals

### **SHIELDING** Prevents damage from

**ALUMINUM** 

arrow shots

# DRIVETRAIN DESIGN