University of Idaho

SHOCK THE NATION

EXPO Presentation

ERIC HEDINE, WYATT KING, TIM MATTSON, DANNY PIERCE, JULIA ROACH

VALUE PROPOSITION

Provide an alternate safety device for preventing access to a room or house via the door handle, using a tesla coil design. This design should electrically shock intruders with the a high voltage, low current, with the intent to hurt intruders but not injure. This shock is a directed electrical arch out of the handle.

PRODUCT REQUIREMENTS

Electrical

- Ability to arm and disarm security system
- Warning system (LEDs)
- Produce an electrical shock to intruders from the handle of a door
- Sense an approaching intruder

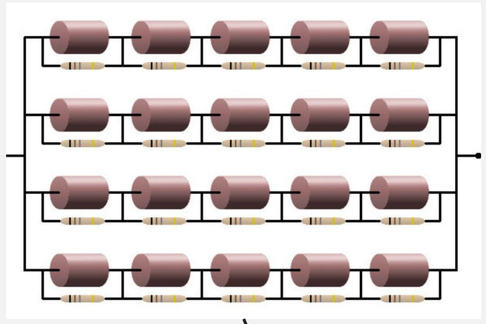
Mechanical

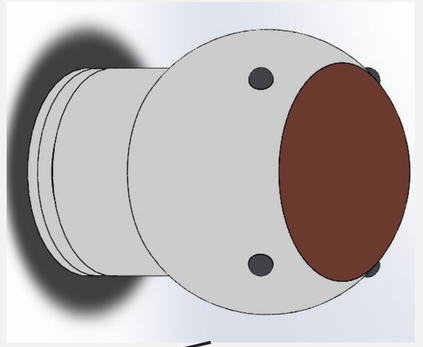
- Use probe attached to hand model for testing/demonstration
- A closed environment for display/demonstration
- Retrofitted door/door handle

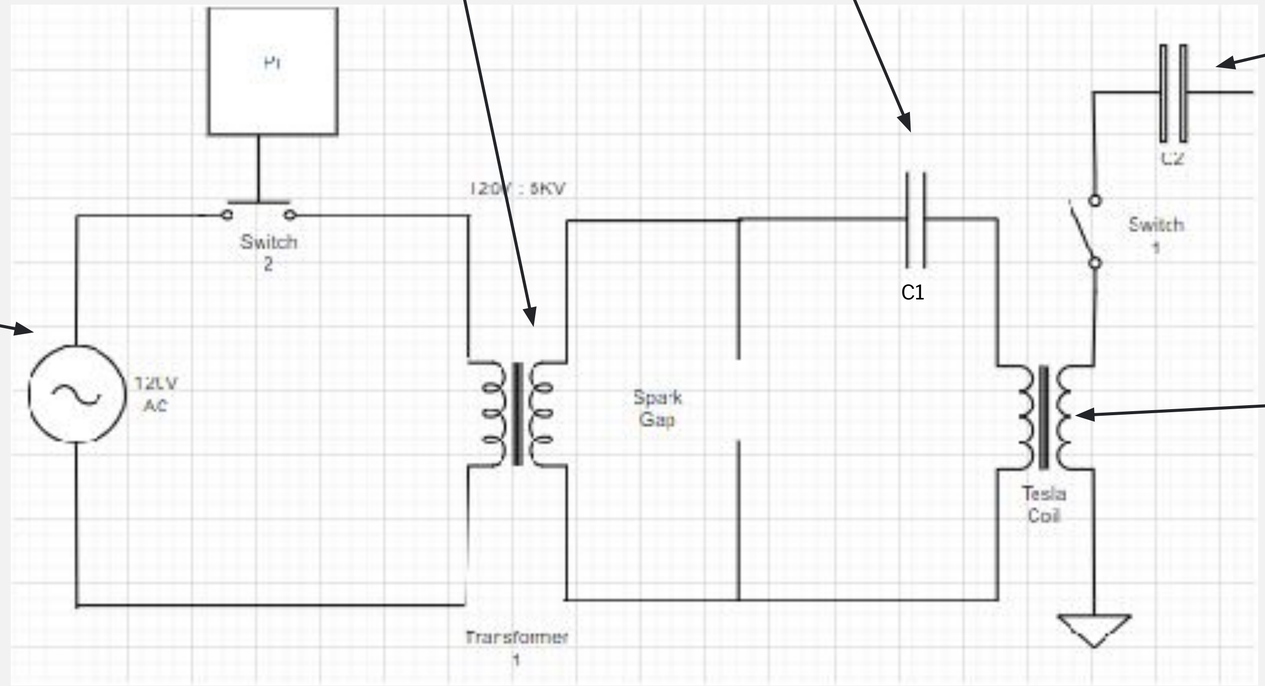
Cost

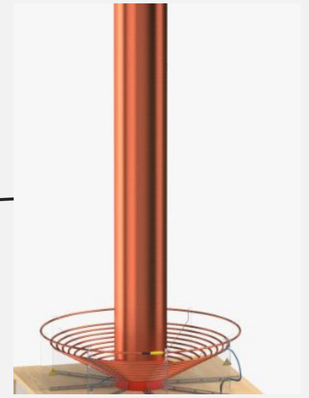
- Maximum cost to build proof-of-concept prototype
  - - $1000

Circuit Design



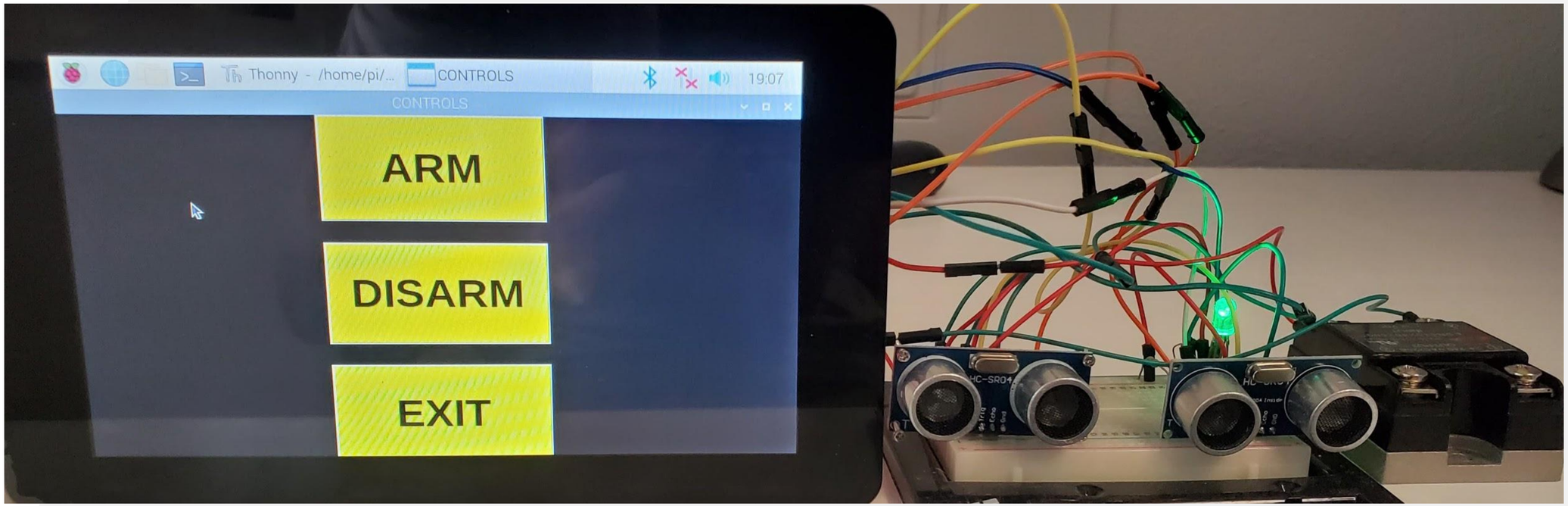






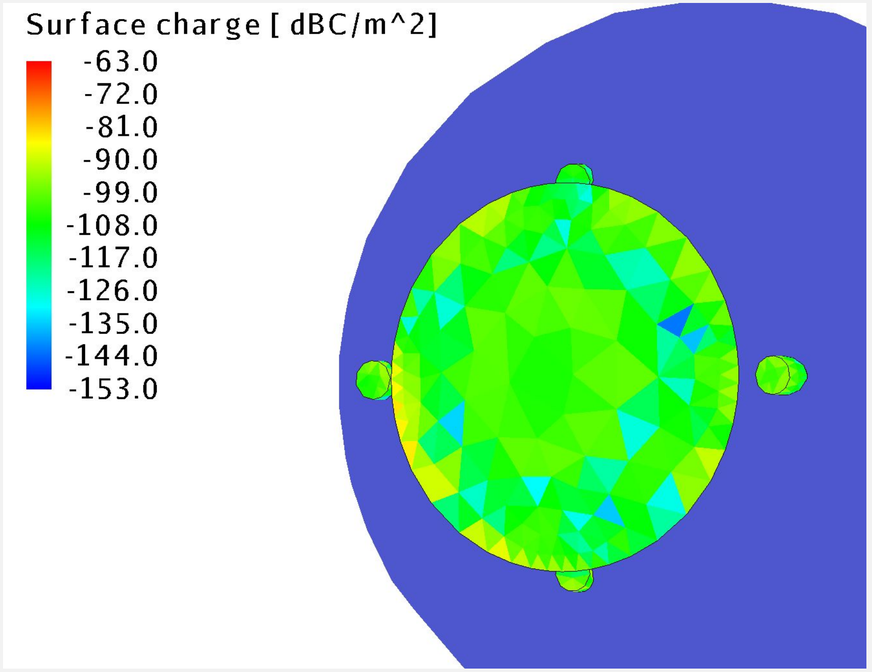
System Controls

- Raspberry Pie / Touch screen
- Ultrasonic sensors
- Relay
- LEDs

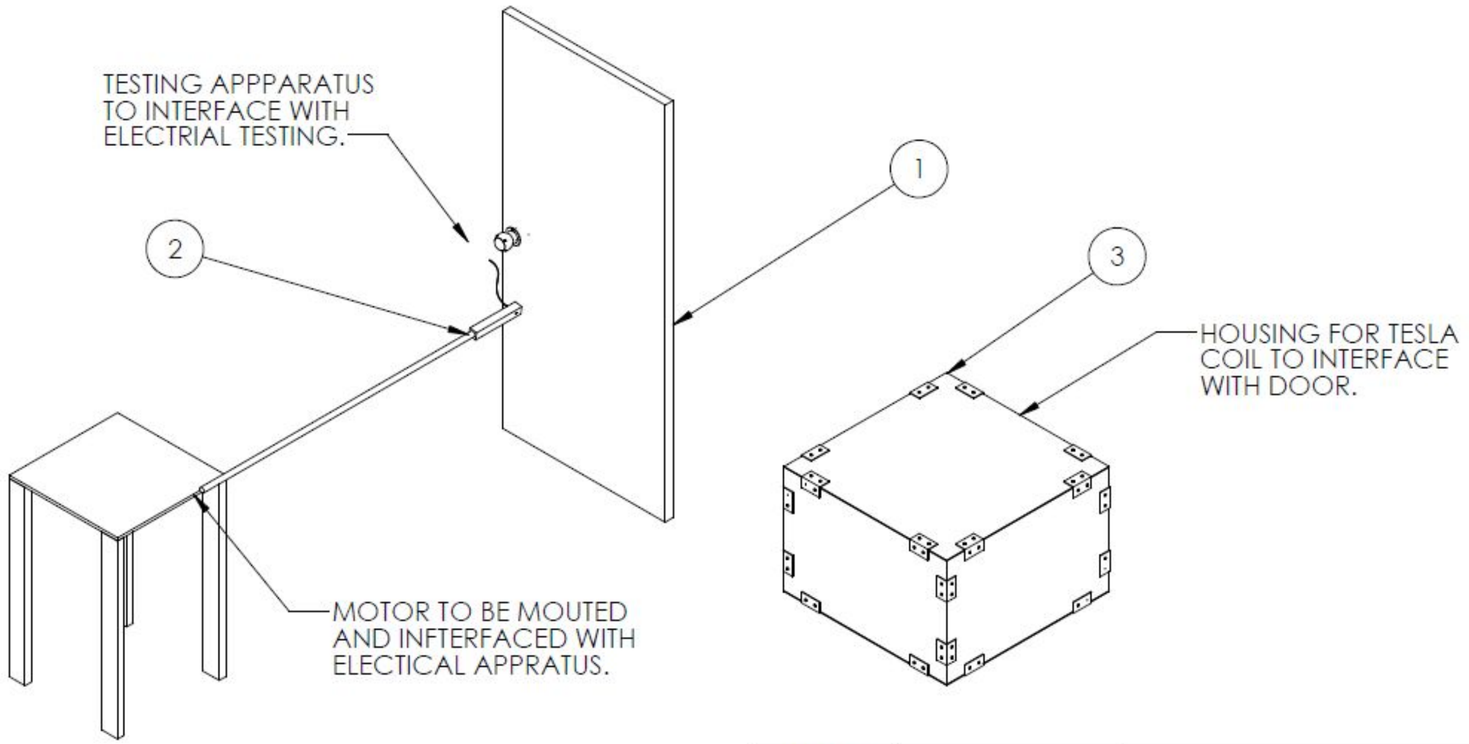


DOOR HANDLE SIMULATION

- Surface charge on the end of the door handle.
- Aiming to be able to control the arc.



Main Assembly



ASSEM. NO.	PAGE NUMBER	DESCRIPTION	QTY.
1	2	DOOR ASSEMBLY	1
2	9	TESTING APPRATUS ASSEMBLY	1
3	10	INSULATED BOX ASSEMBLY	1

DIMENSIONS ARE IN INCHES
THIRD ANGLE PROJECTION

SHOCK THE NATION

MATERIAL: N/A

DEFAULT TOLERANCES:
LINEAR: X. ± .25, X.X ± .1, X.XX ± .01, X.XXX ± .002
ANGULAR: X. ± 2, X.X ± 1, X.XX ± 0 30'

DESCRIPTION: MAIN ASSEMBLY
CHECKED BY: WYATT KING DATE: 3/6/2020
DRAWN BY: WYATT KING DATE: 3/25/2020
FILE NAME: FULL ASSEMBLY.SLDPRT

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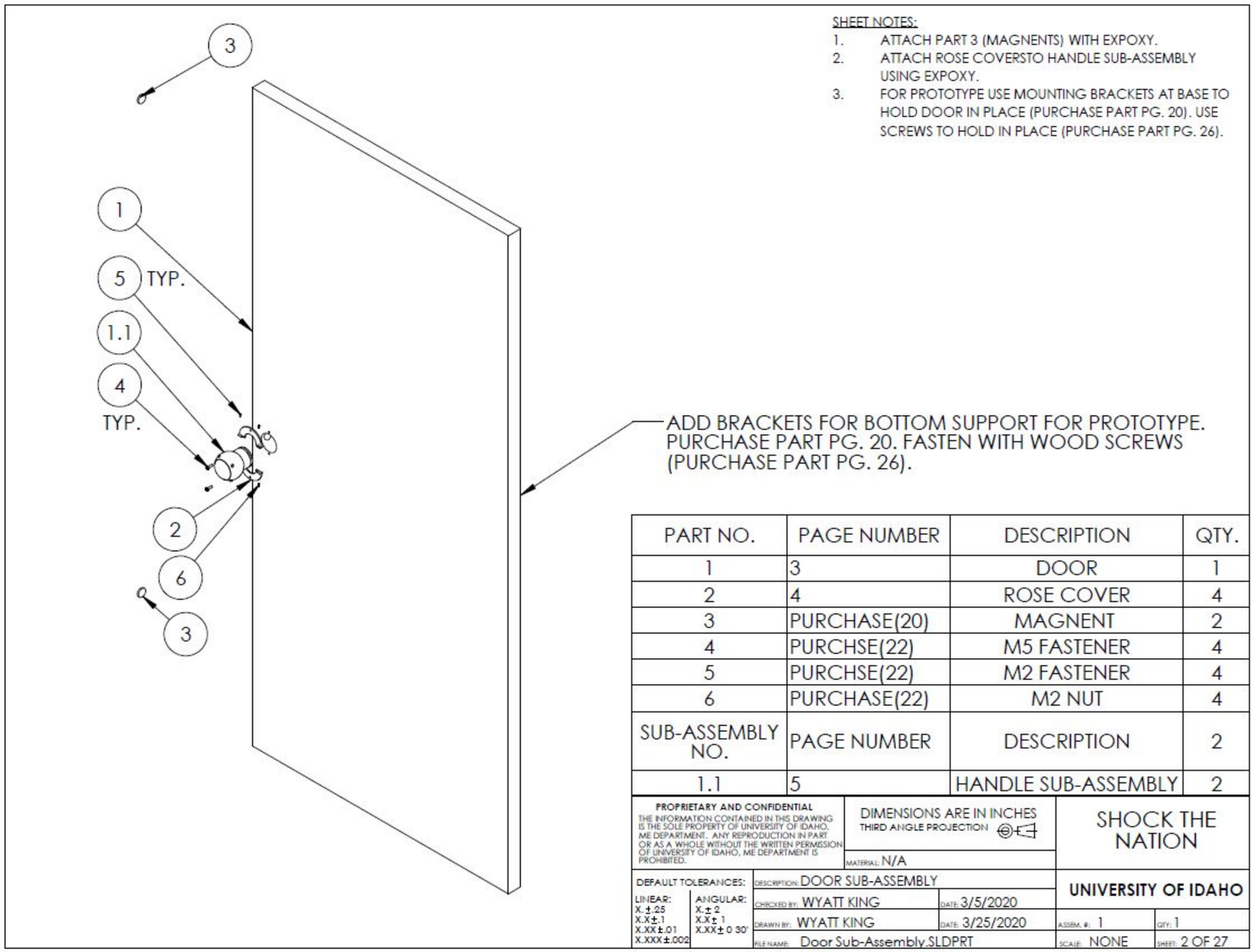
PART #: N/A QTY: 1
SCALE: NONE SHEET: 1 OF 27

Door Assembly

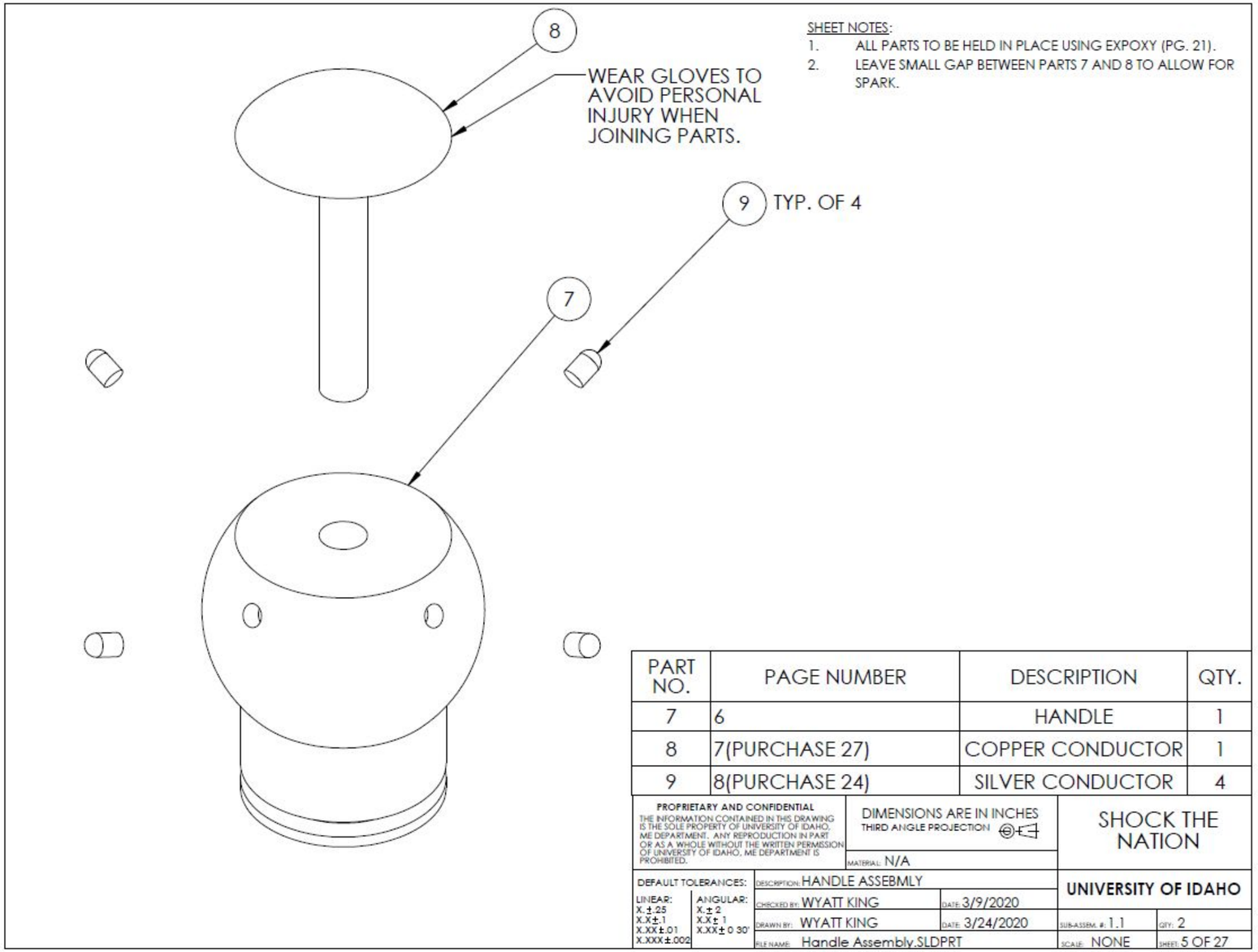


PART NO.	PAGE NUMBER	DESCRIPTION	QTY.
1	3	DOOR	1
2	4	ROSE COVER	4
3	PURCHASE(20)	MAGNENT	2
4	PURCHSE(22)	M5 FASTENER	4
5	PURCHSE(22)	M2 FASTENER	4
6	PURCHASE(22)	M2 NUT	4
SUB-ASSEMBLY NO.	PAGE NUMBER	DESCRIPTION	2
1.1	5	HANDLE SUB-ASSEMBLY	2

Components:

- Magnets
- Mounting Brackets for prototype.
- Rose Covers
- Handle Sub-Assembly

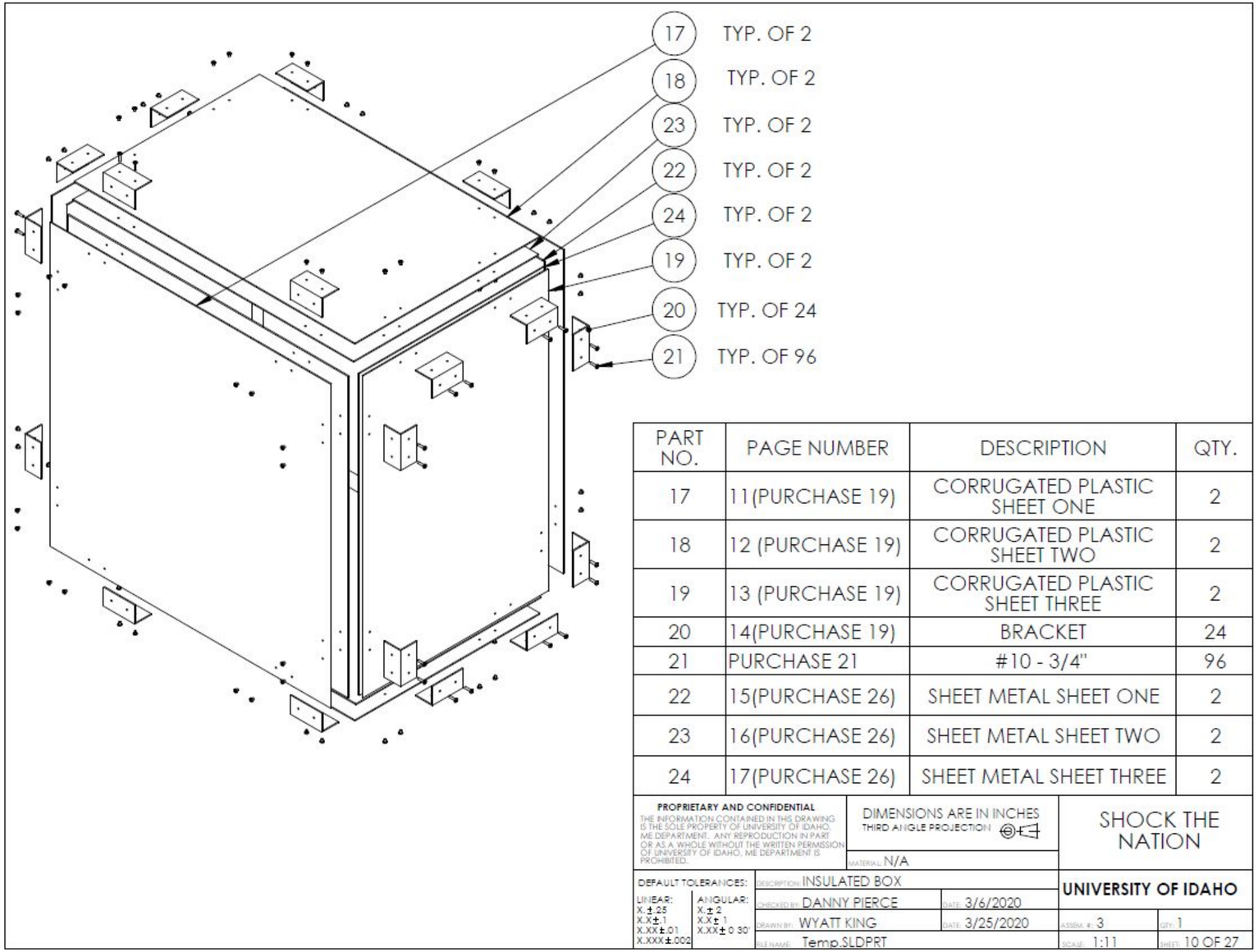
Handle Sub-Assembly



Components:

- Copper Conductor
  - Electroplated Aluminum
- Silver Conductor
  - Electroplated Aluminum
- Handle
  - 3D Printed

Insulated Box



PART NO.	PAGE NUMBER	DESCRIPTION	QTY.
17	11(PURCHASE 19)	CORRUGATED PLASTIC SHEET ONE	2
18	12 (PURCHASE 19)	CORRUGATED PLASTIC SHEET TWO	2
19	13 (PURCHASE 19)	CORRUGATED PLASTIC SHEET THREE	2
20	14(PURCHASE 19)	BRACKET	24
21	PURCHASE 21	#10 - 3/4"	96
22	15(PURCHASE 26)	SHEET METAL SHEET ONE	2
23	16(PURCHASE 26)	SHEET METAL SHEET TWO	2
24	17(PURCHASE 26)	SHEET METAL SHEET THREE	2

DIMENSIONS ARE IN INCHES
THIRD ANGLE PROJECTION

MATERIAL: N/A

SHOCK THE NATION

DEFAULT TOLERANCES:
LINEAR: X. ± .25, X.X ± .1, X.XX ± .01, X.XXX ± .002
ANGULAR: X. ± 2, X.X ± 1, X.XX ± 0 30'

DESCRIPTION: INSULATED BOX
CHECKED BY: DANNY PIERCE DATE: 3/6/2020
DRAWN BY: WYATT KING DATE: 3/25/2020
FILE NAME: Temp.SLDPRT

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ASSEM. #: 3 QTY: 1
SCALE: 1:11 SHEET: 10 OF 27

Components:

- Corrugated Plastic (Outside)
- Sheet Metal (Inside)
  - Magnetic Field Interference

RISK MANAGEMENT

- Place Tesla coil in non-conductive box
- Low current on the secondary of the Tesla Coil
- Testing prior to implementation with mock hand

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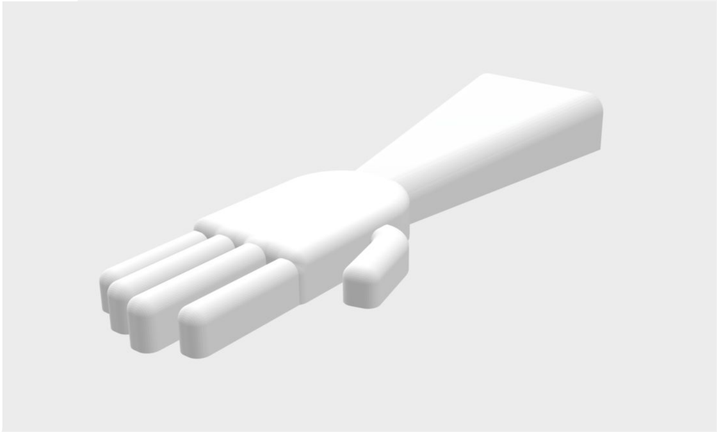
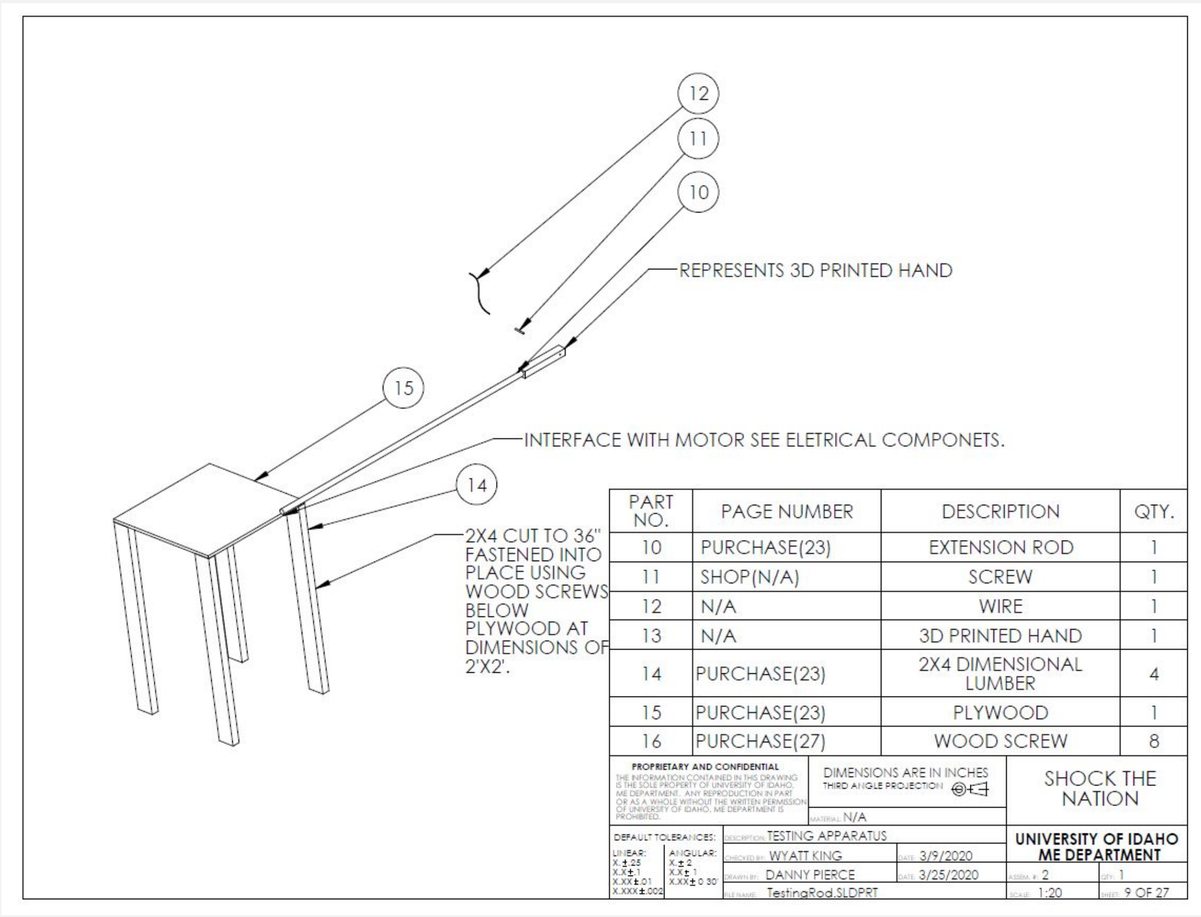
Future Testing

- Mock hand attached to testing assembly
- Tesla Coil inside plexiglass box container
- Extend hand to distance of approximately 5 inches from door handle
- If no arc appears, shut down tesla coil and move hand closer until desired result





PART NO.	PAGE NUMBER	DESCRIPTION	QTY.
10	PURCHASE(23)	EXTENSION ROD	1
11	SHOP(N/A)	SCREW	1
12	N/A	WIRE	1
13	N/A	3D PRINTED HAND	1
14	PURCHASE(23)	2X4 DIMENSIONAL LUMBER	4
15	PURCHASE(23)	PLYWOOD	1
16	PURCHASE(27)	WOOD SCREW	8

PROPRIETARY AND CONFIDENTIAL
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DIMENSIONS ARE IN INCHES
THIRD ANGLE PROJECTION

MATERIAL: N/A

SHOCK THE NATION

DEFAULT TOLERANCES:
LINEAR: X ± .05, X.X ± .1, X.XX ± .01, X.XXX ± .002
ANGULAR: X ± 2, X.X ± 1, X.XX ± 0 30'

DESCRIPTION: TESTING APPARATUS
CHECKED BY: WYATT KING — DATE: 3/9/2020
DRAWN BY: DANNY PIERCE — DATE: 3/25/2020
FILE NAME: TestingRod.SLDPRT

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ME DEPARTMENT

SCALE: 1:20 — SHEET: 9 OF 27
DRAWING #: 2 — QTY: 1

THANK YOU

QUESTIONS?