02/04/25 Progress Presentation 1

ANTENNA POINTER

UNIVERSITY OF CENTRAL OKLAHOMA
SCHOOL OF ENGINEERING, COLLEGE OF MATHEMATICS AND SCIENCE

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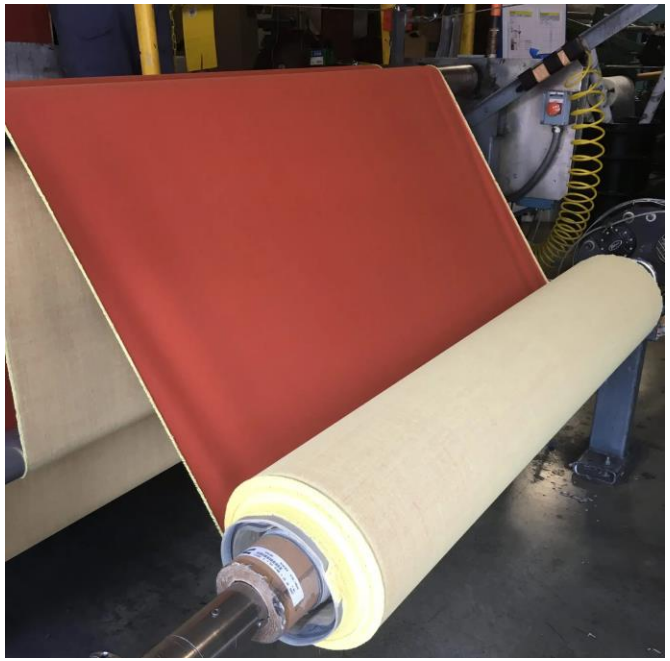
CONTENT

- Research
  - Shell materials
  - Button construction
- Design
  - Keypad PCB
  - Buttons
  - Shell
- Future Works
  - Current progress and problems
  - Rest of semester plan


RESEARCH

TYPE OF MATERIALS FOR SHELL



Ceramic Coated Fabric

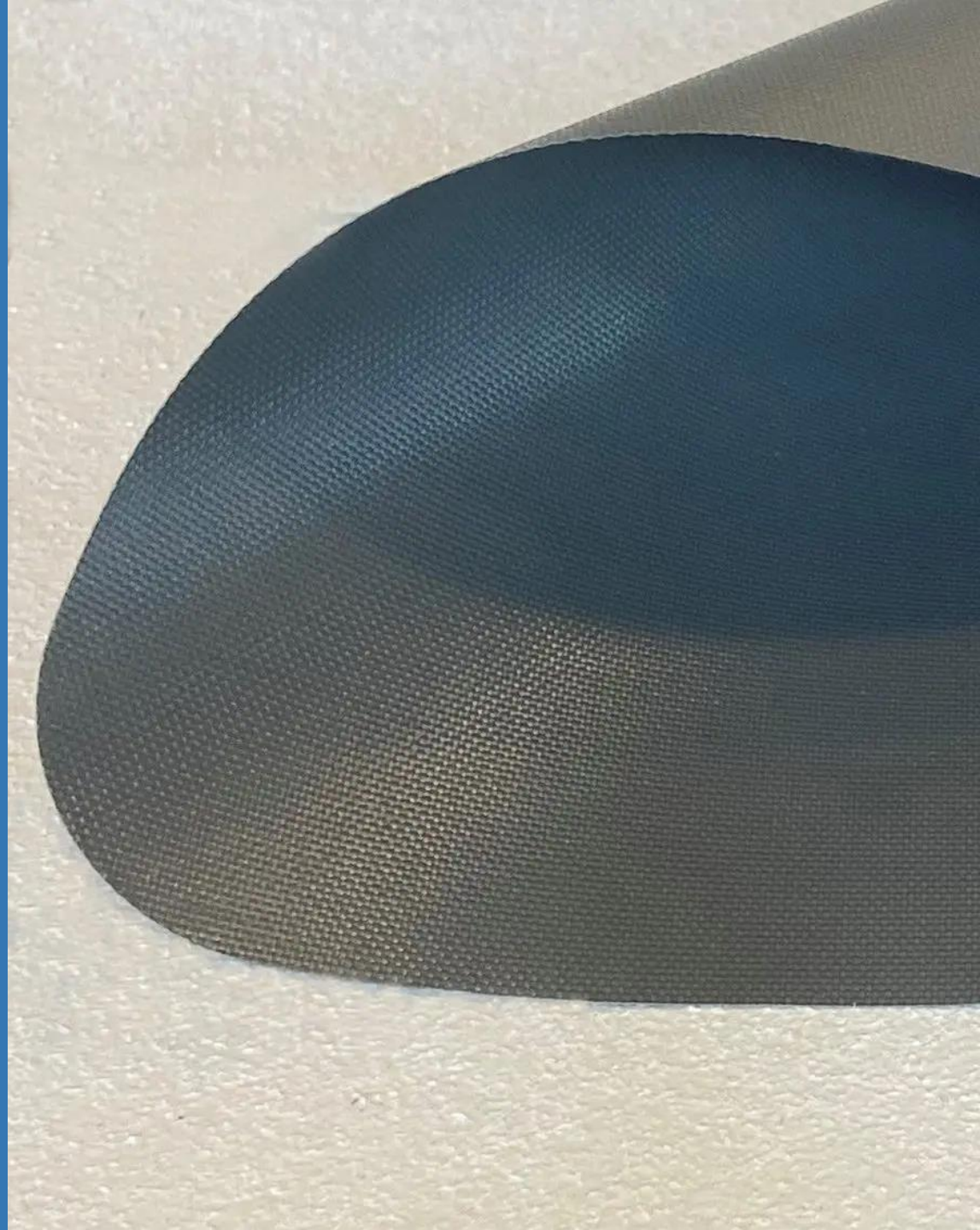
Polyurethane Foam

Polycarbonate with Teflon

Mid-Mountain Materials
INCORPORATED

- Ceramic coated fabric
  - Lightweight heat resistant
- Fire fighter material
- Sell roll by the yard
  - Required at least 25 yards
- Cost est. $100.00 per yard
  - $ 2500.00

- Too costly
- Need to layer and glue



Akfix

- Akfix 892 Black Foam Sealant & Adhesive
- Lightweight, UV-resistant polyurethane
- Fills in gaps
  - Need to make a cast to fill
- Cheapest option at $14.99
- Too brittle

3D FILAMENT PC+PTFE POLYCARBONATE WITH TEFLON

- Polycarbonate temperature -40°C to 120°C
- Teflon temperature - 200°C to 260°C
- Tensile modulus 2200 MPa
- Tensile strength 55 MPa
- $73.10 per roll

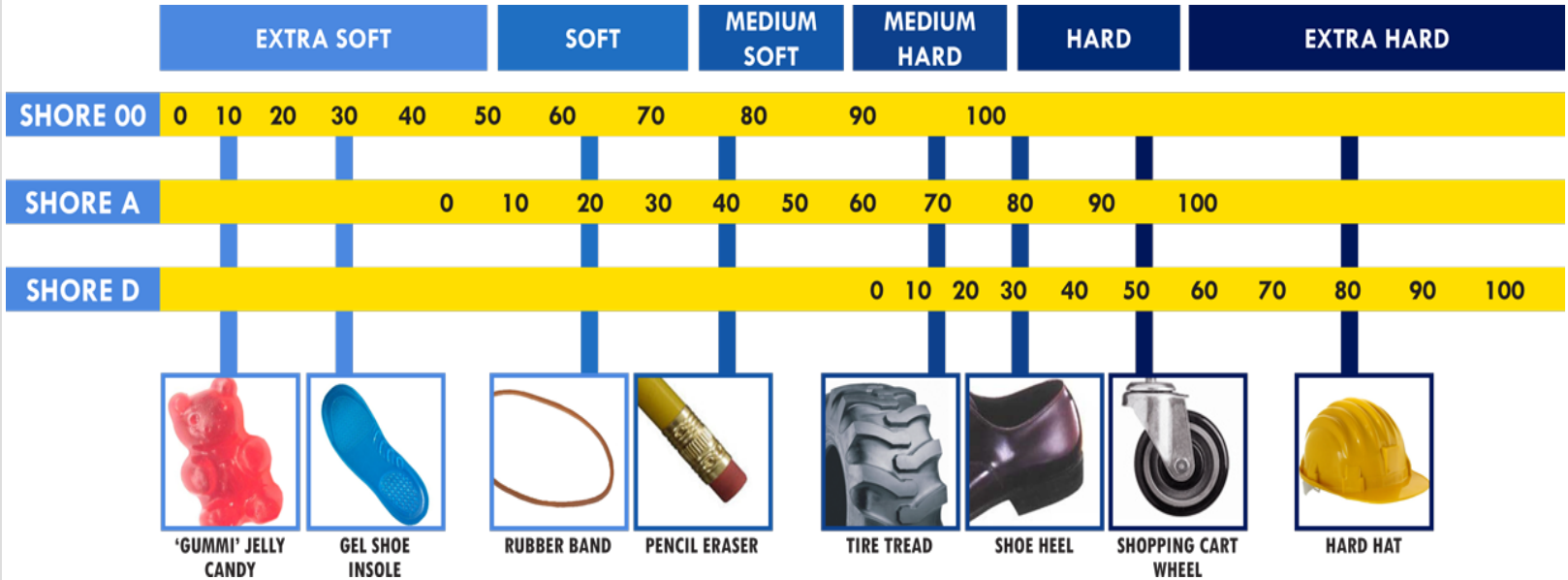
- 1.75mm filament
- Prints at 270°C - 300°C
- Plate at 90°C - 120°C
- Can be used in on Qidi X-MAX 3D printer

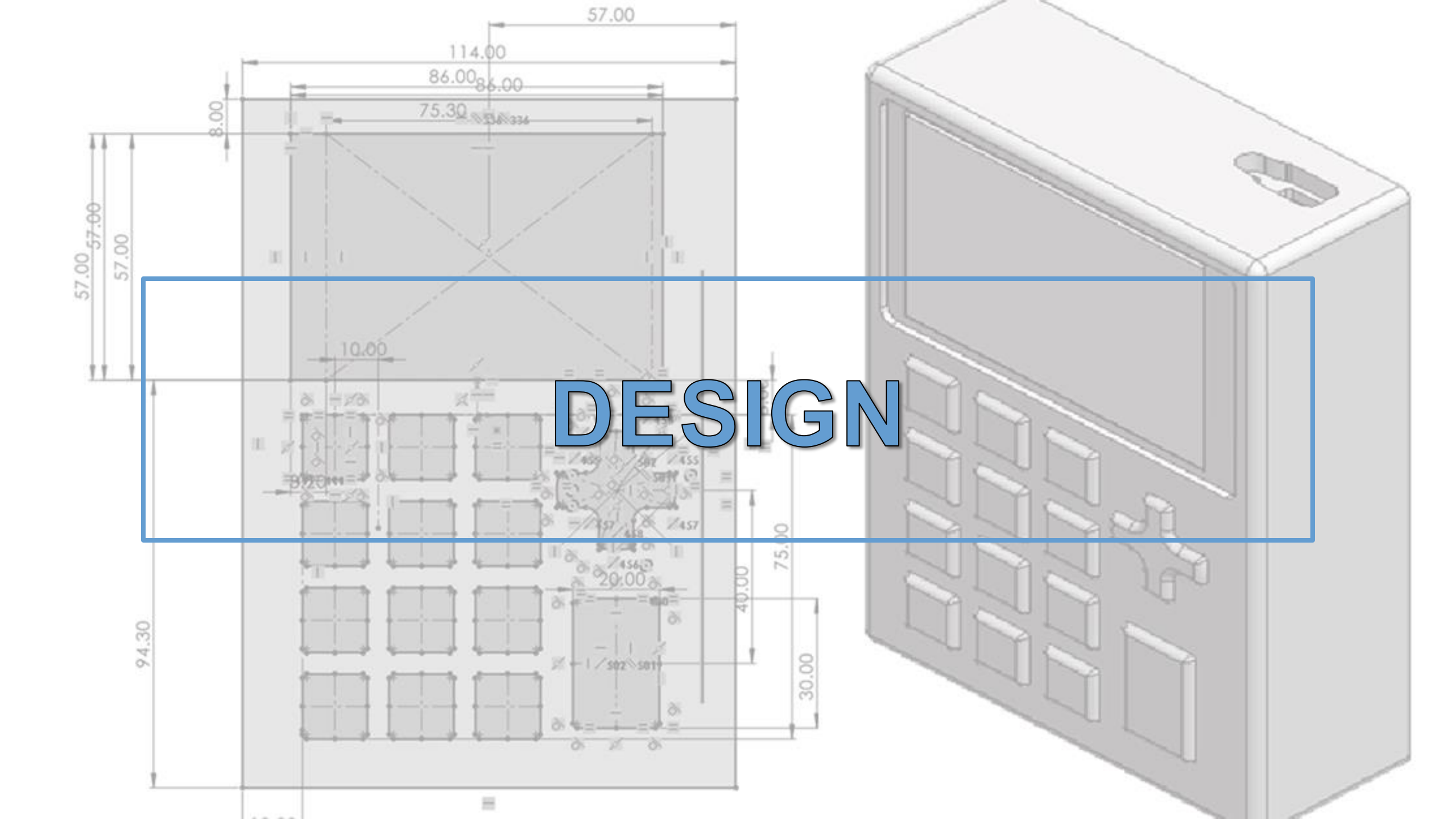
Silicon Research

- The molding and casting process
- Types of silicone mixtures and their properties
- Order necessary items to create mold and button cover

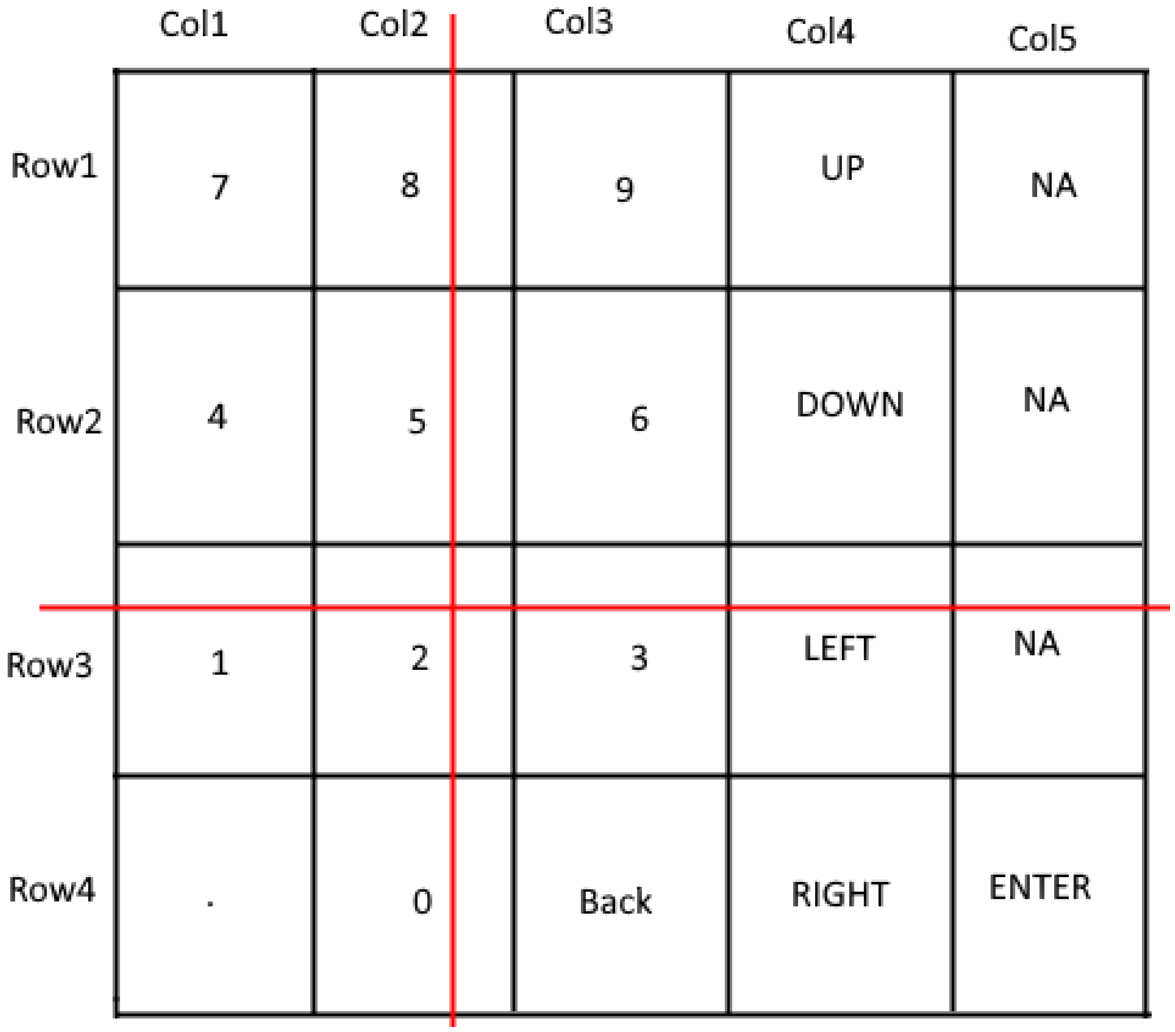
SILICONE BUTTONS COVER

- Ease Release 200
- Smooth-On REBOUND 40 Self Thickening Brush-On Silicone 2-pint kit

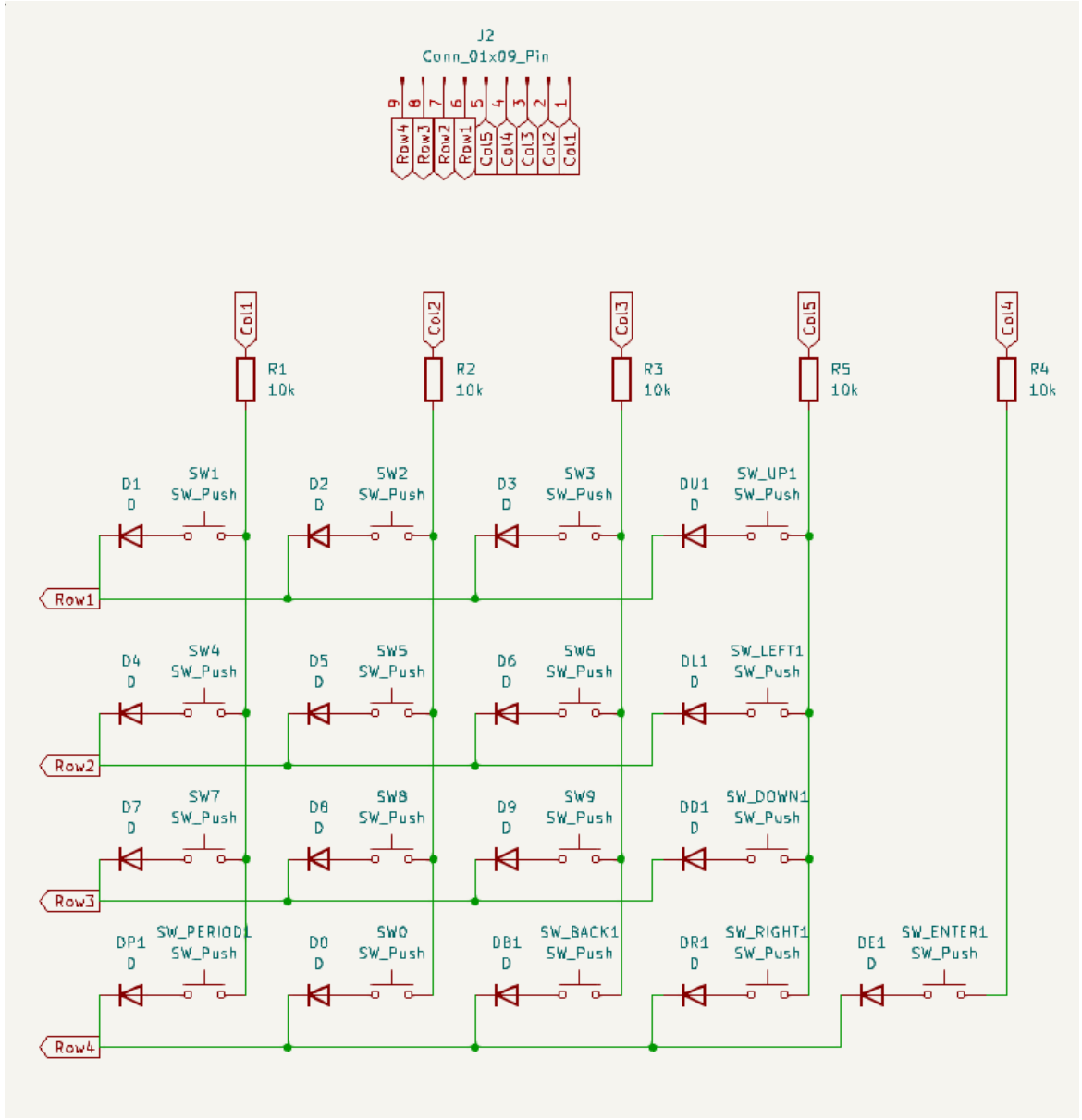



DESIGN

MATRIX KEYPAD

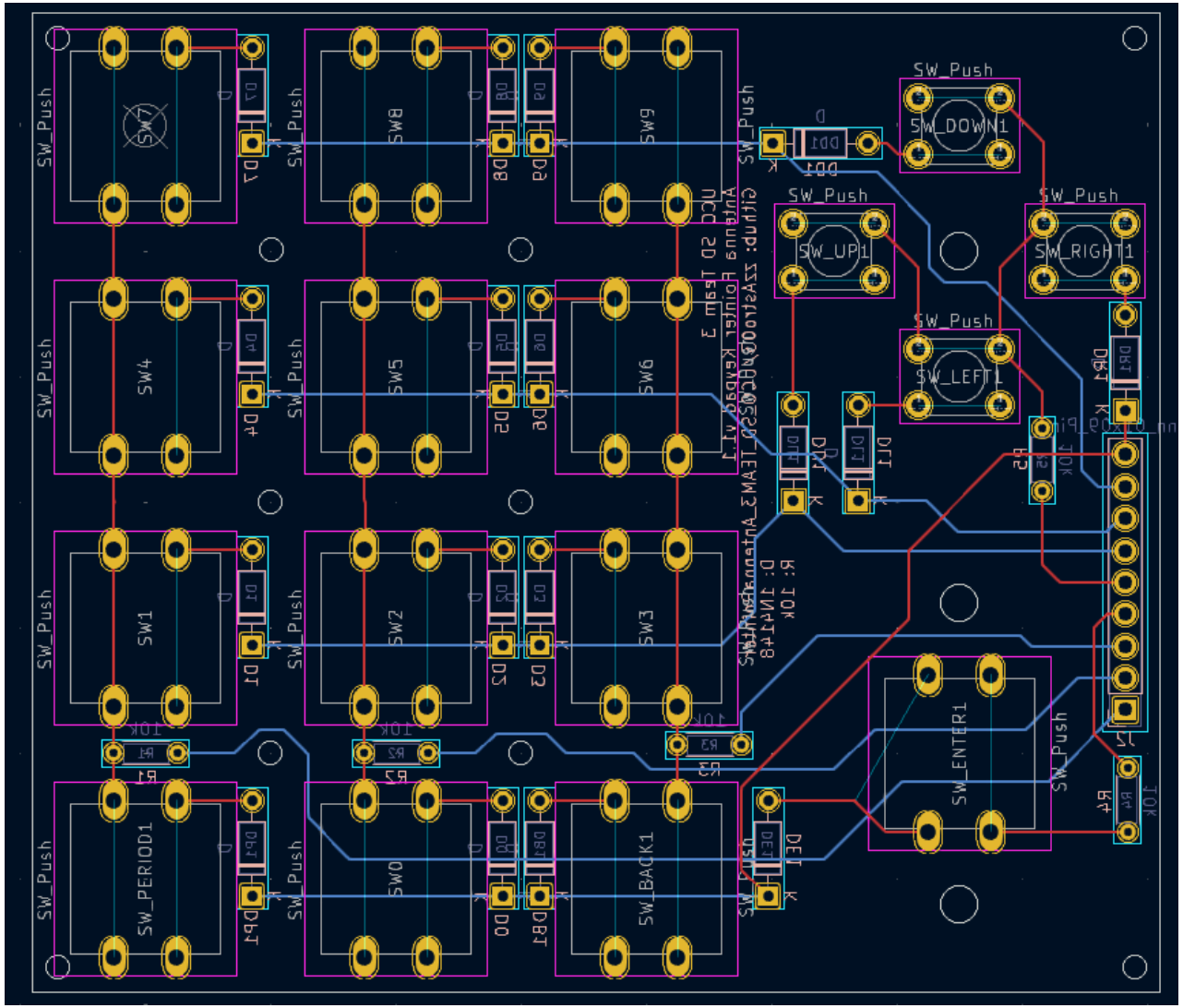


- Create grid of buttons
  - Set column high
  - Check rows
- Key is determined by intersection of column and row
- Uses less GPIO pins and simplifies circuit



KEYPAD CIRCUIT

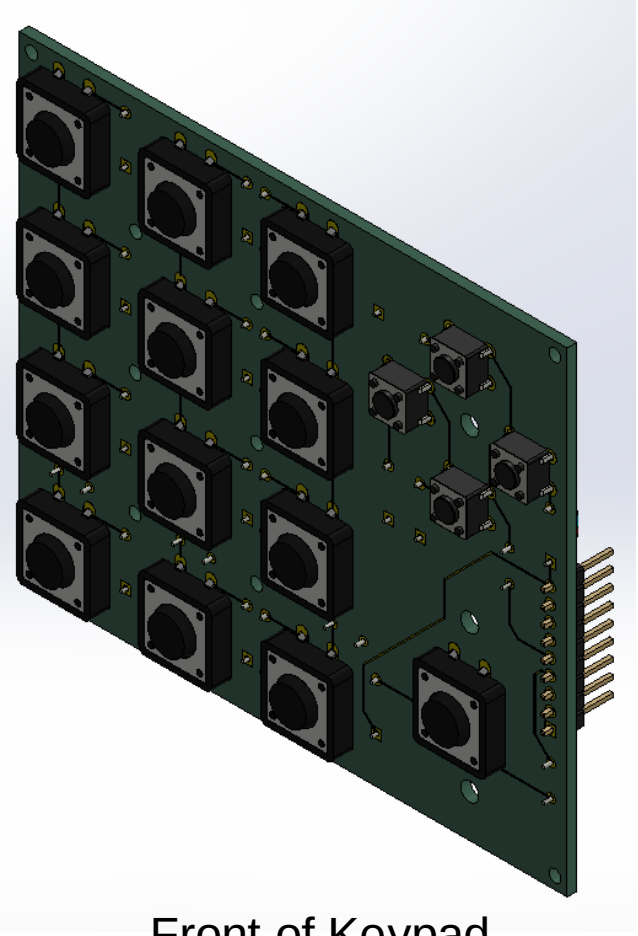
- Schematic created in KiCad
- Pullup resistors ensure logic HIGH to match with ESP32
- Diodes to prevent ghosting
- Circuit is directly referenced to create PCB in KiCad PCB creator



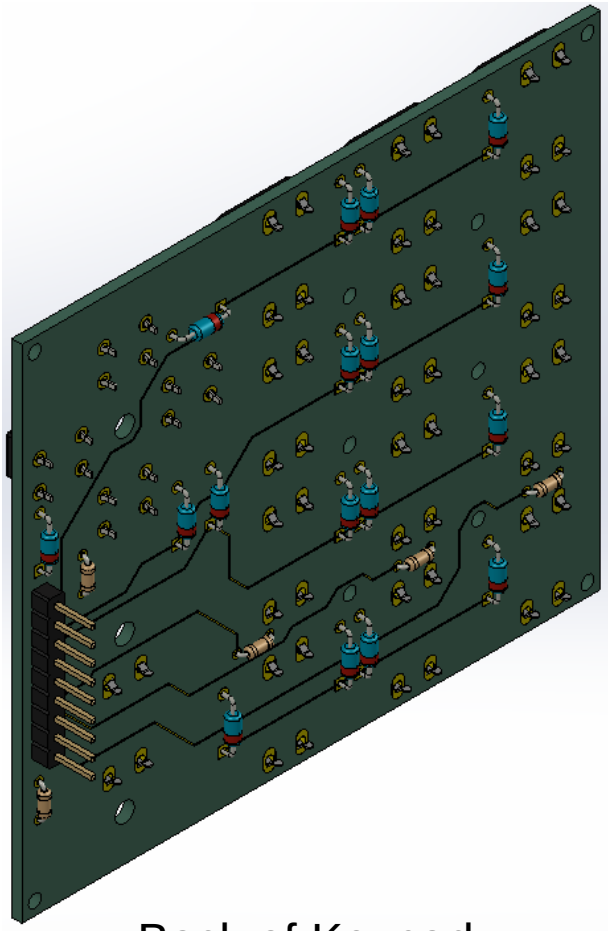
KEYPAD PCB

- Place components on board
- Route traces to make connections the same as circuit schematic
- KiCad shows lines to visualize what needs to be connected

KEYPAD MODEL



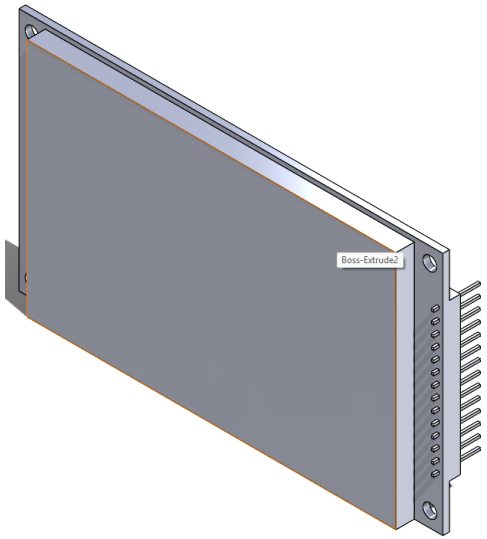
Front of Keypad



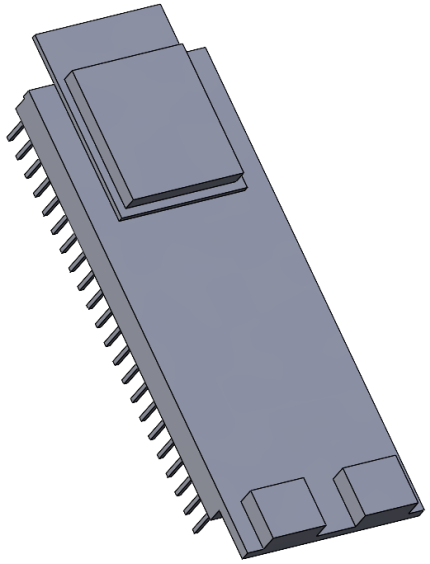
Back of Keypad

- KiCad allows PCB to export as step file
- Used in Solidworks to design keys and mounts
- Keypad ordered from PCBWay

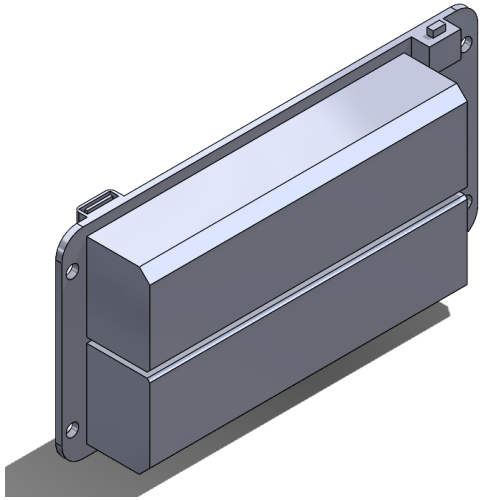
ELECTRICAL MODELS



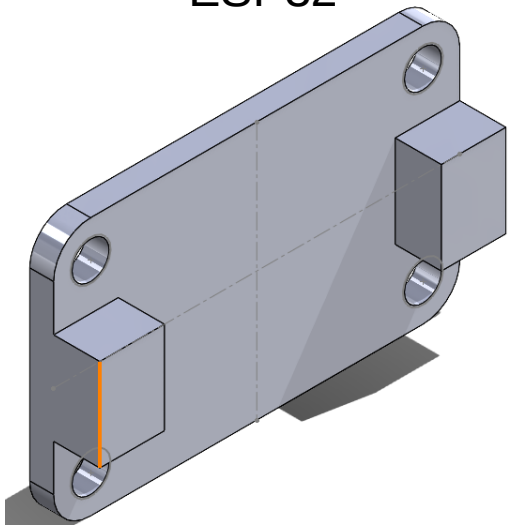
Screen



ESP32



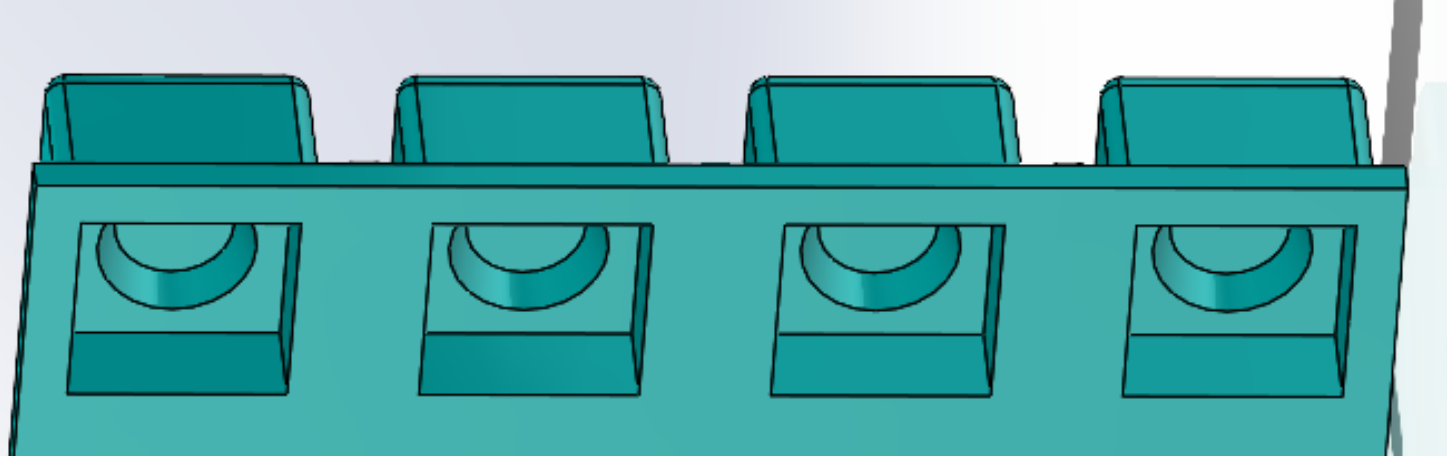
Battery Cradle

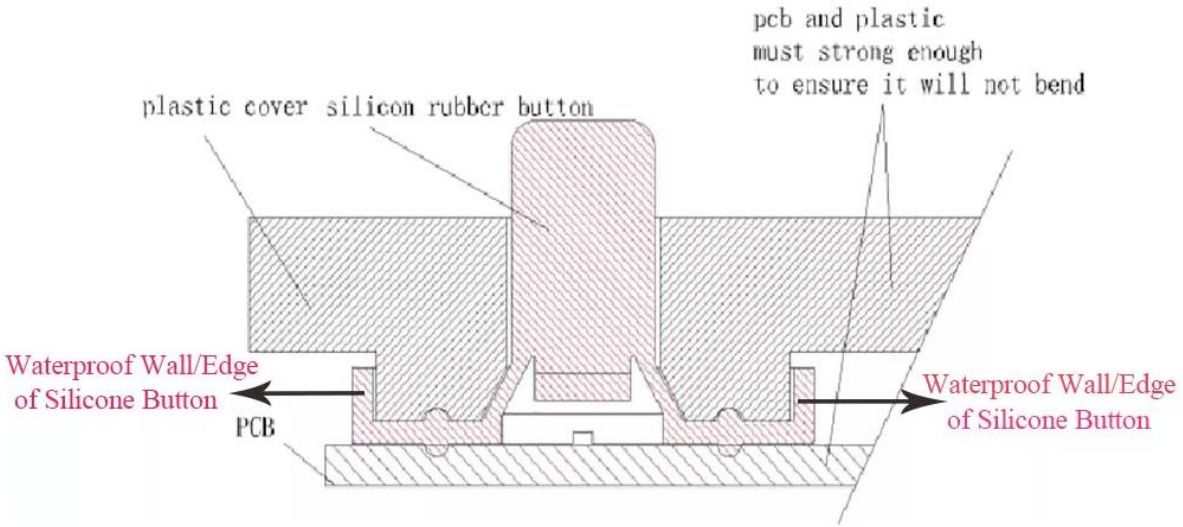


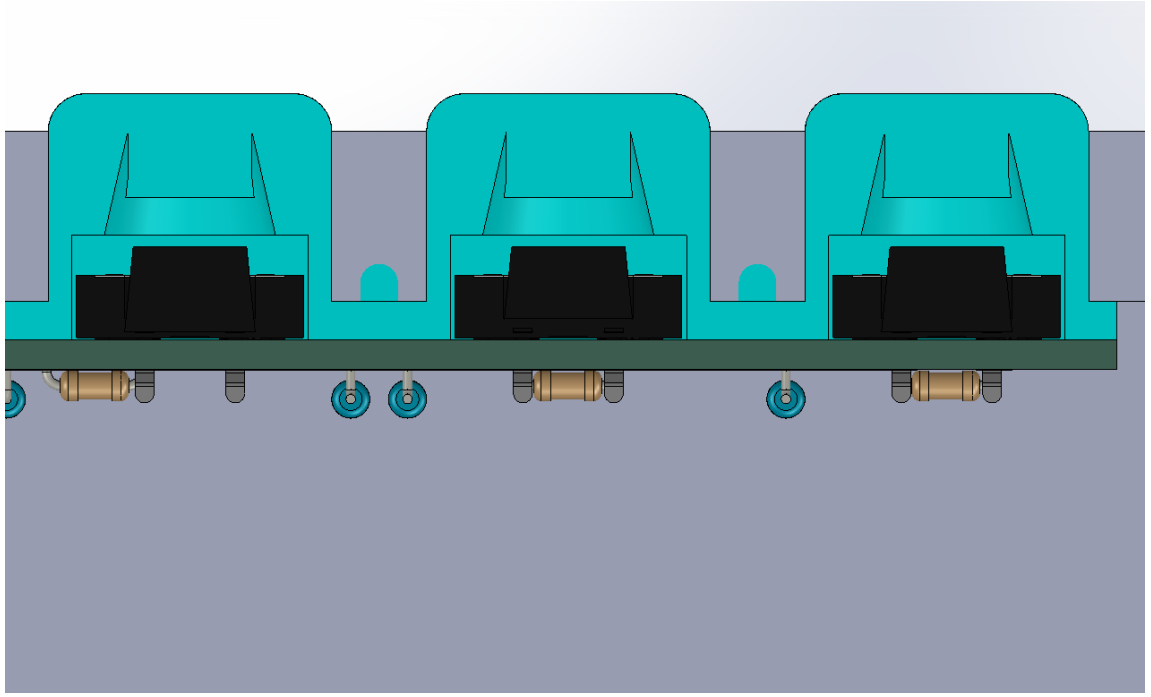
Orientation Sensor

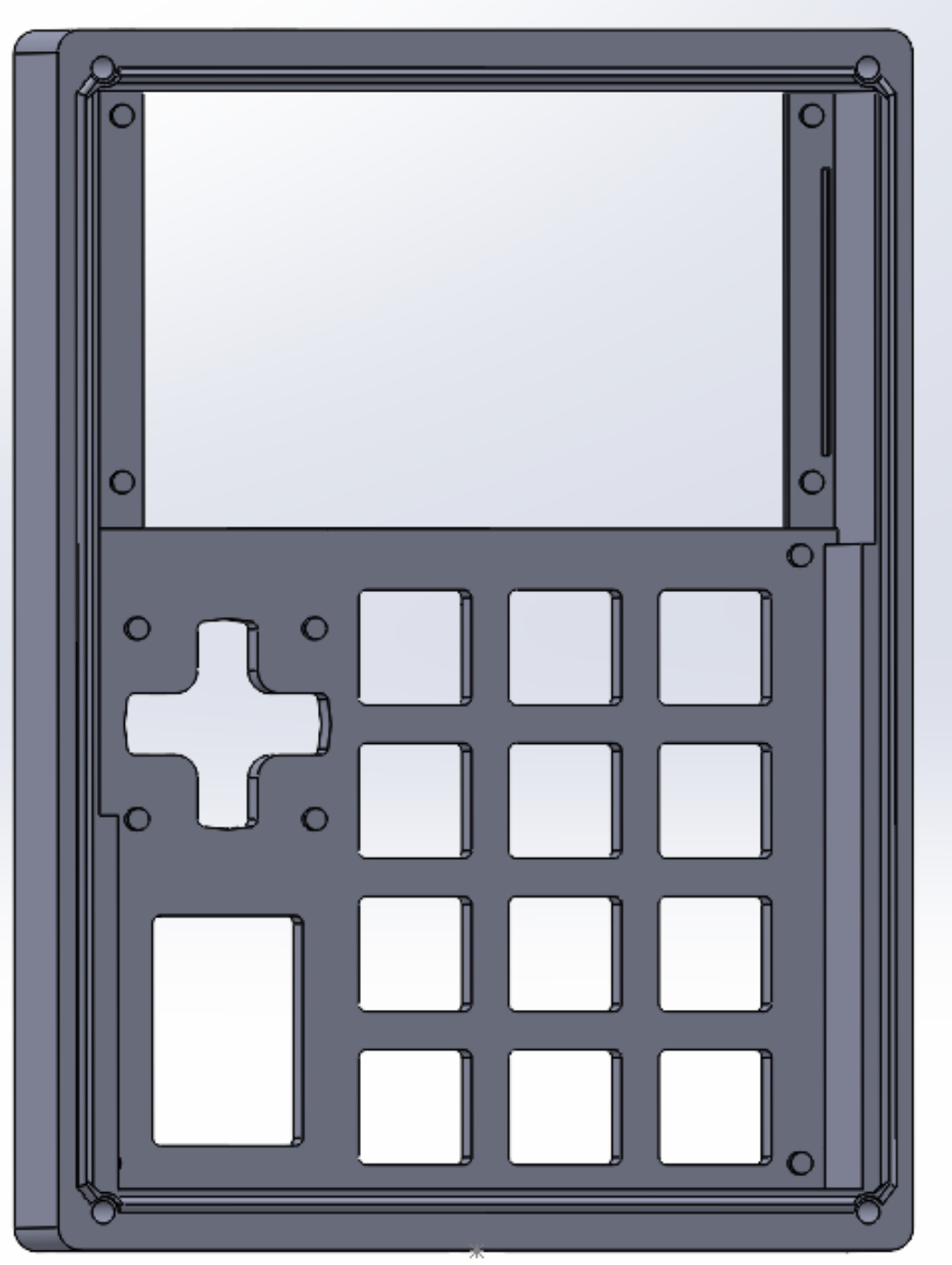
- Modeled all electrical components
- Used to finalize final layout

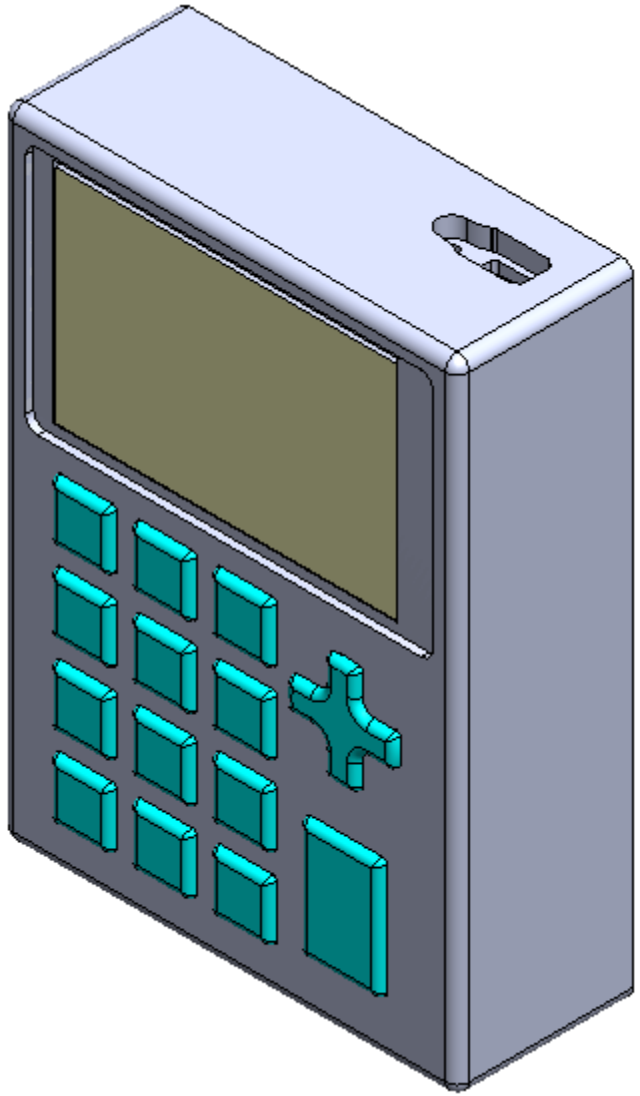
WATERPROOFING BUTTONS

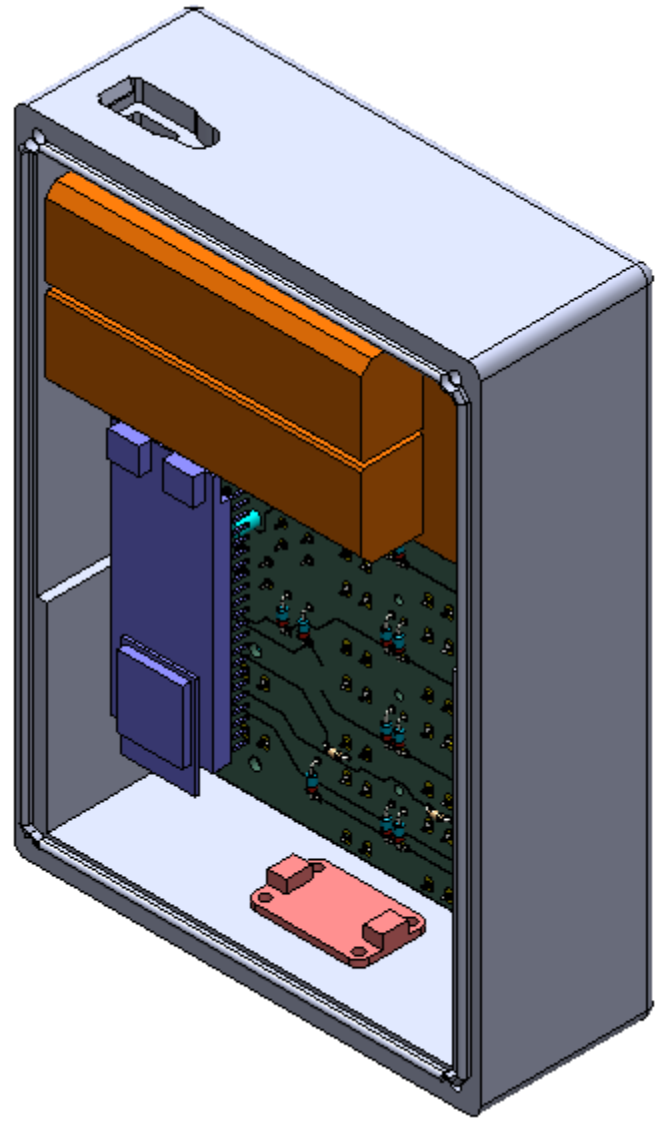


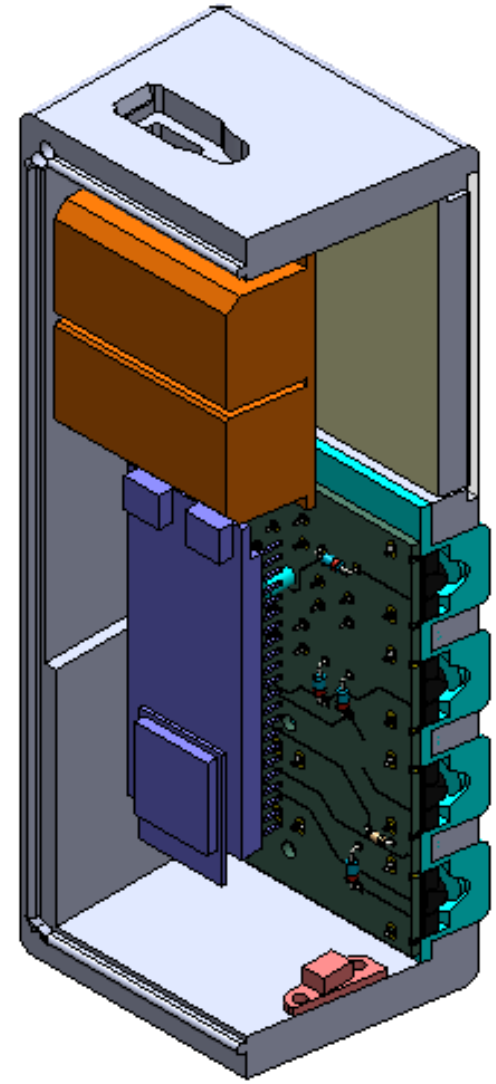












PROBLEMS

- Polycarbonate filament needs a safety data sheet
  - Denied from UCO
  - Need to get from approved vendor list

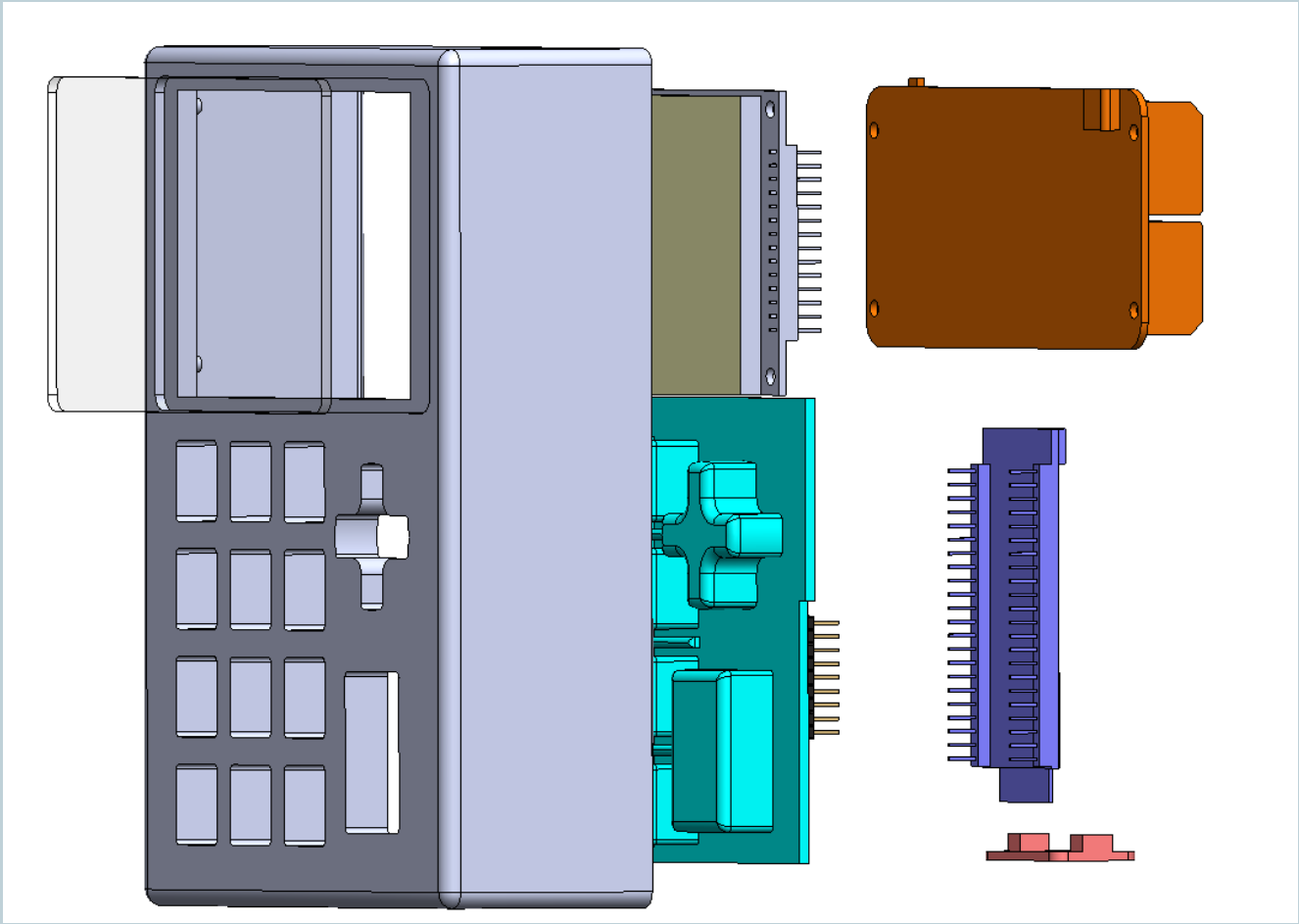
FUTURE WORK

Mechanical:

- Create final shell
- Create silicone buttons
- Create clamp

Electrical:

- Build PCB
- Create GUI
- Calibrate data




QUESTIONS?