

# Prototype Overview

ESC204 — Prototyping Skills Assignment

Group #\_\_

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## 1 Prototype Purpose & Scope

This prototype demonstrates *[brief description of function]*, focusing on *[specific aspect of the design concept being explored]*. The primary objective of the prototype is to *[what success means]* while operating within constraints related to fabrication, materials, and system integration.

This prototype is not intended to represent a final product, but rather to validate key assumptions regarding *[interaction / enclosure / control / usability]*.

## 2 System Overview

The prototype system consists of three integrated subsystems: electrical, software, and structural. User input is provided through physical buttons, processed by a microcontroller, and reflected through system outputs.

### 2.1 Subsystems

**Electrical Subsystem:** Describe components used (e.g., microcontroller, buttons, LEDs) and their role.

**Software Subsystem:** Describe control logic, input handling, and output behavior.

**Structural Subsystem:** Describe the enclosure, mounting strategy, and user interface elements.

## 2.2 Control Architecture



Figure 1: Abstract control architecture of the prototype system.

## 3 Design & Fabrication

### 3.1 Key Design Decisions

Several critical design decisions were made during development:

- **Decision 1:** Brief description and justification.
- **Decision 2:** Trade-offs considered and rationale.
- **Decision 3:** Constraints that influenced the choice.

### 3.2 Structural Design

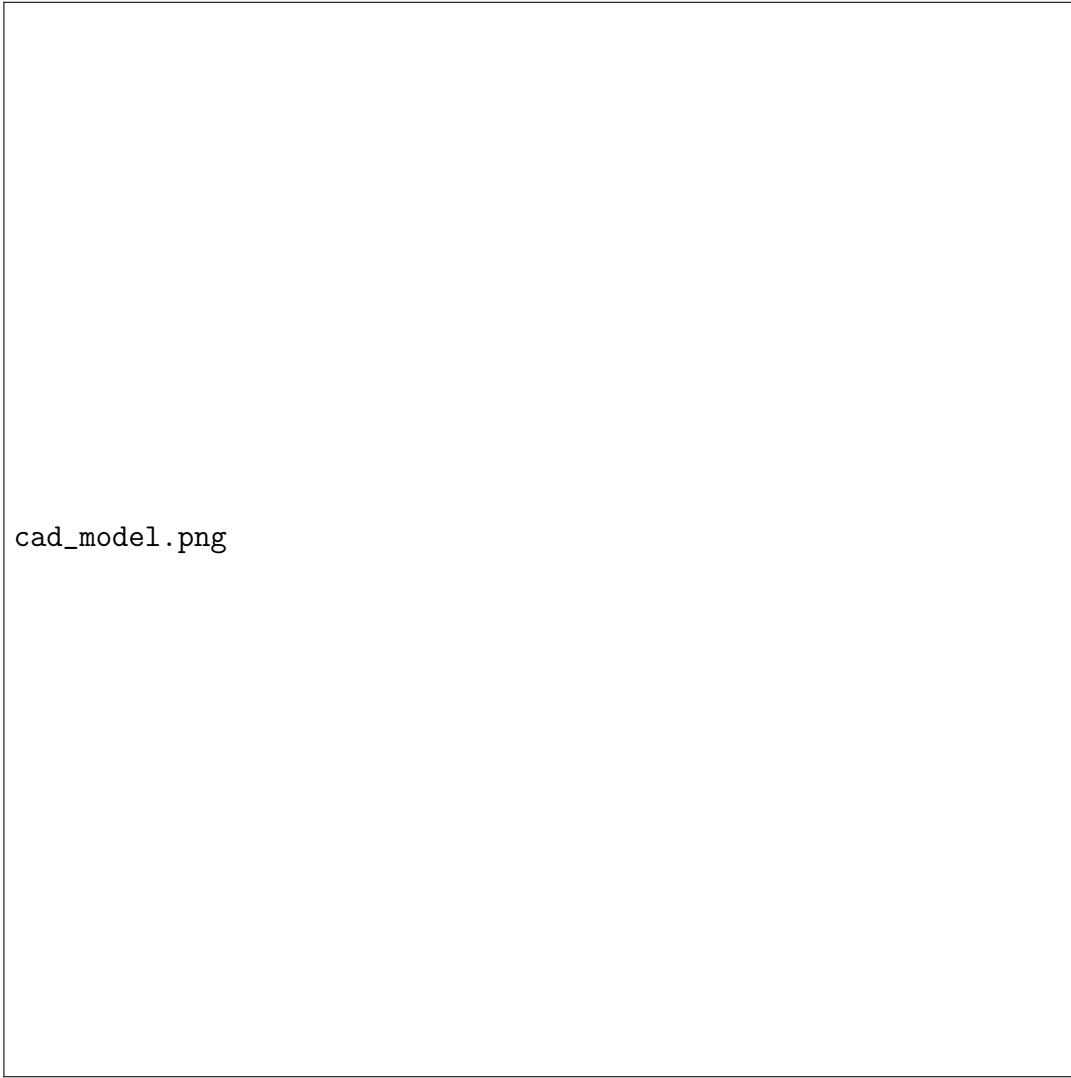
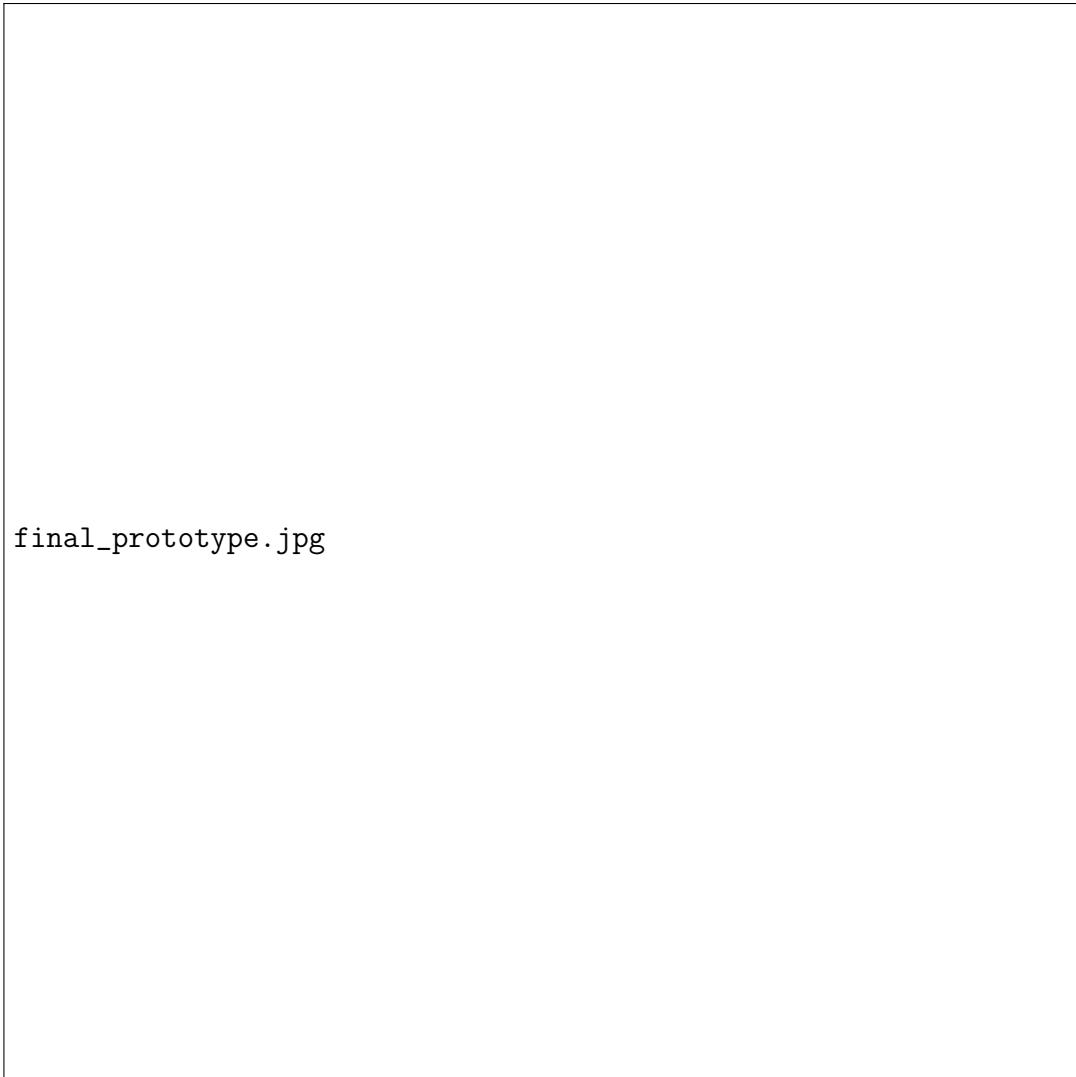


Figure 2: CAD model of the structural enclosure and button actuation mechanism.

The structure was digitally fabricated using [*3D printing / laser cutting*], with geometry chosen to ensure proper alignment, accessibility, and protection of electronic components.

## 4 Build & Integration

The prototype was assembled by first constructing each subsystem independently, followed by incremental integration. Particular attention was paid to component clearances, wire routing, and user interaction points.



final\_prototype.jpg

Figure 3: Final integrated prototype system.

## 5 Challenges & Iteration

The most significant challenges encountered included:

- Mechanical alignment between the enclosure and button actuators
- Tolerance issues arising from digital fabrication
- Integration constraints between subsystems

These challenges were addressed through minor design adjustments and informed recommendations for future iterations.

## 6 Performance & Verification Summary

The prototype was evaluated against the provided specification through inspection, demonstration, and testing. Overall, the system successfully met the majority of functional requirements, particularly *[key success]*.

Limitations were observed in *[specific area]*, which would require further iteration to fully resolve.

## 7 Reflection & Next Steps

This prototype effectively demonstrates *[what it proves]*. Future work would focus on improving robustness, refining the enclosure design, and expanding system functionality based on verification outcomes.