Mockup Assignment – Automatic Watering Elephant Project

Concept and Intent

This project proposes a playful, functional design for a portable automatic watering system tailored for indoor plants in Norway, using an avocado plant as the test case. The system integrates soil moisture sensing, ambient temperature and humidity monitoring, and time-based control (RTC) to dispense water in short pulses, avoiding overwatering. To communicate the concept in an engaging way and conceal the electronics, the design takes the form of a sitting elephant watering can. A detachable top hat houses the electronics and user interface (LCD and buttons), while the elephant's trunk doubles as a water outlet.

1. How I Planned and Made the Mockup (Process)

Ideation and Research

The initial idea was to create a simple pot. After discussing with my daughter, I switched to a more playful elephant figure, which better communicates the project's friendly and interactive character, though it made the 3D modelling process more challenging. I researched microcontrollers (Arduino), capacitive soil moisture sensors, DHT11, RTC modules, LCD displays, and small water pumps to define electronic components and system layout.

Form Exploration

Due to the short delivery timeline and after conducting deeper research, I decided to generate the elephant concept using MakerWorld's MakerLab Image-to-3D tool, which converted the image generated in Gemini Nano Banana into a 3D mesh. This provided a solid starting point for further refinement.

Figure 1: the elephant and detachable hat generated in Gemini.

CAD Progress

I imported the mesh into Fusion 360 for geometric inspection and splitting. The elephant was separated from the top hat to allow modular assembly. Blender was used to create internal cavities for the electronics and to reduce mesh size (via decimation) so that Fusion could process it. Registration features ensure the hat aligns properly with the elephant's head.

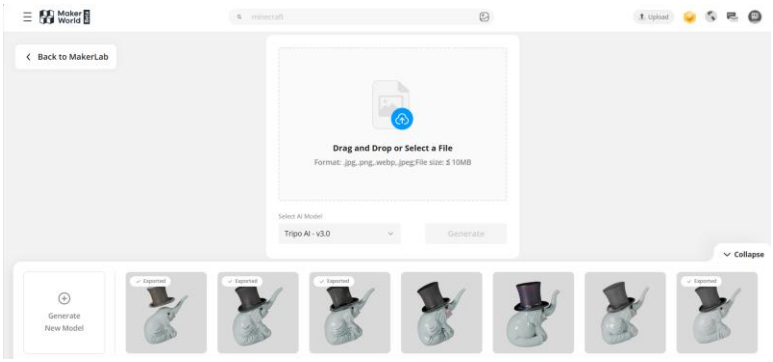

Figure 2: MakerWorld interface showing the generation of the elephant 3D model from an image.

Figure 3: Fusion 360 CAD progress – elephant body and hat separated for modular design.

Mockup Strategy

The mockup consists of non-functional shells showing assembly and internal placement. The elephant body includes a back cavity and cable grommet, while the detachable hat provides housing for Arduino, battery, LCD, and buttons.

2. Slicer Setup (FDM Printing)

- Material: PLA (for easy finishing)
- Layer Height: 0.2 mm (0.16 mm for hat brim)
- Nozzle: 0.4 mm
- Walls: 3
- Top/Bottom Layers: 4
- Infill: 15–20 % gyroid for strength and efficiency
- Supports: Tree supports for trunk underside and hat brim
- Orientation: Elephant body printed on its back; hat printed crown-down
- Bed Adhesion: Skirt, brim if required

3. Overcoming Physical Limitations

- Overhangs: The trunk and hat brim required tree supports and print reorientation to reduce steep angles.
- Build Volume: The model exceeded printer dimensions (Bambu printer, 256 × 256 × 256 mm). To solve this, I scaled the model to ~60–70% and split into two parts (body + hat).
- Hardware Limits: My laptop struggled with high-polygon meshes, so I used Blender for mesh simplification and booleans, exporting lighter STL files into Fusion 360 for precision edits.

4. Post-Processing Plan

- Sanding (220 → 400 grit)
- Filler primer application
- Wet sanding for smoother surfaces
- Metallic paint finish: aluminum or copper spray
- Optional: conductive copper/silver paint for light electroplating (hat only)

5. Outcome

The elephant body serves as a playful base with the trunk as the water outlet, while the top hat cleanly integrates electronics and user interface. This design is ready for the next step: integrating electronics and validating ergonomics before building the functional prototype.

Figure 4: 3D metallic render of the elephant and detachable hat.