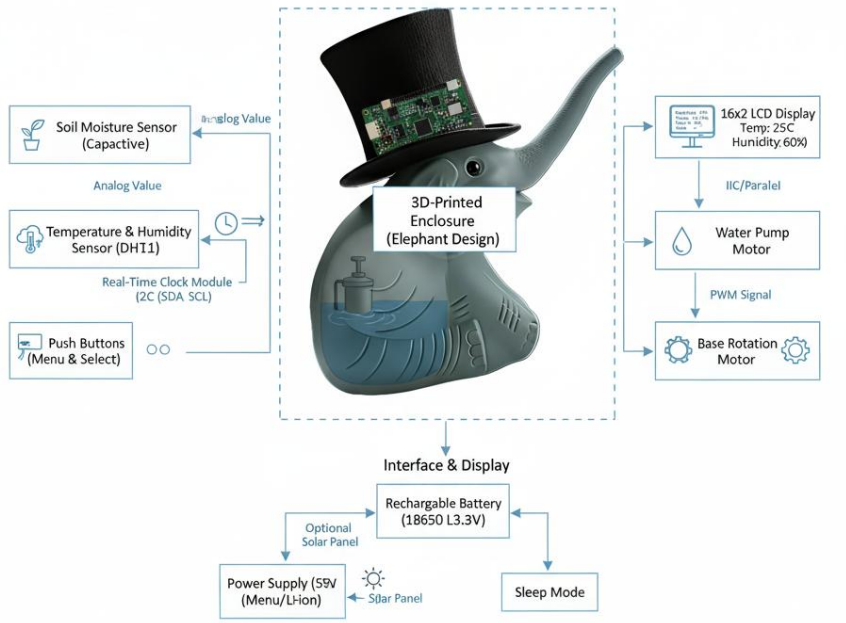
Project proposal

Automatic plant watering system for indoor use

1) What is it and what does it do?

A compact automatic irrigation system for home plants that reads soil moisture, ambient temperature, and humidity, and then decides when to pump water using a simple sensor fusion controlled by an Arduino Uno. It will record data, display readings on a small LCD screen and allow the user to activate or adjust the desired time and temperature with two buttons.

Figure 1: Hardware Architecture

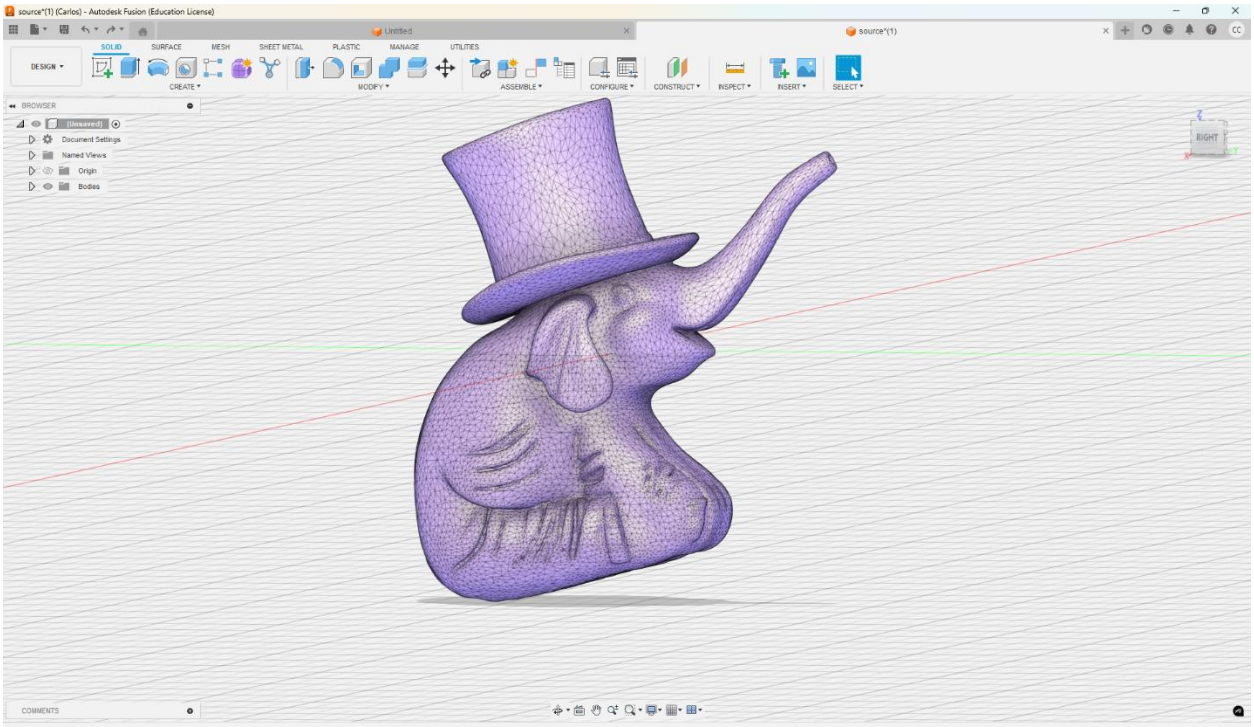


2) Why do I want to do this?

Given Norway's busy pace of life, even those who take care of their houseplants often overwater or underwater them due to demanding routines and seasonal variations in light. The device aims to keep humidity within a healthy band while reducing water use and user effort. It functions as a learning platform that connects course modules in sensing, embedded systems, user interface, sustainability, and manufacturing.

3) How big is it?

Target enclosure size of approximately 18 to 22 cm high, 12 to 16 cm wide, and 12 to 16 cm deep. It's a 3D printed housing inspired by an elephant watering can with internal brackets for electronics, pump, and piping. The final dimensions will be established by placing the pump and battery.



4) Is it portable?

Yes. It is powered by a rechargeable battery and can be charged from a small solar panel or a five-volt supply. The energy-efficient suspension keeps power low between sensor readings. The circuit will be inside the hat while the water and motor will be inside the elephant.

5) What material is it?

The elephant will be created with 3D filaments. Fasteners are screws instead of glue to support repair and recycling.

6) Where do you live?

Inside next to a potted plant. The reservoir and tube are inside the printed body, so the device looks like a decorative object rather than laboratory equipment.

7) Does it move?

Only the actuators move. A miniature pump drives the water and a small servo acts on a pinch valve for more precise dosing. The base can optionally rotate for alignment, but the default layout is static.

8) How do I interact with him?

A 16-by-2 LCD display shows humidity percentage, temperature, humidity, and menu items. One button activates manual watering and the other navigates settings such as thresholds, watering window and display logs.

9) Can I divide the challenge into sub-challenges?

Yes. The work is naturally divided:

- **Electronics & SensingCapacitive floor probe, DHT11, real-time clock, safe pump drive, servo control.**
- **Firmware & ControlProbe calibration, sensor fusion with a moisture band using dry and wet thresholds, safety cuts, and data logging.**
- **Norwegian and English UXLCD interface and menus with two-button navigation.**
- **Power & SustainabilitySleep mode strategy, choice of battery, optional solar input, material selection.**
- **Mechanical DesignPrinted housing that hides the reservoir and pipe, seals and mounts for the plate, pump and servo.**

10) What does a first prototype require?

- Arduino board with analog input and digital outputs
- Capacitive Soil Moisture Sensor
- DHT11 Temperature and Humidity Sensor
- Real-time clock module
- Mini pump with relay controller or MOSFET and flyback protection
- Small servo for a pinch valve
- 16-by-2 LCD and two pushbuttons
- 18650 cell and single load plate

- Breadboard Wiring and Vinyl Tubing
- PLA or PETG test housing for adjustment and routing
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11) What is the shortest path to a tangible prototype?

1. Build a breadboard with Arduino, soil sensor, and pump. Implement a simple dry and wet threshold with hysteresis to prevent rapid changeovers.
2. Add DHT11 and adjust the watering decision using temperature and humidity.
3. Integrate real-time clock for timestamps and an optional watering window.
4. Add the LCD screen and two buttons.