Hydration Puck —Documentation

1. Overview

The Hydration Puck is a compact smart hydration tracker designed, modeled, 3D-printed, wired. It sits under any bottle and automatically tracks water consumption using weight-based detection. It displays data on a small OLED screen and also serves a clean phone dashboard through its built-in Wi-Fi hotspot.

2. Actual Work Done (Fact-Only)

• Designed the entire enclosure in Siemens NX CAD.

• Prepared all internal mounting geometry for electronics.

• 3D-printed all parts on Bambu Lab A1 using PLA.

• Installed and wired all electronics: ESP32, load cell + HX711, OLED, buttons, buzzer.

• Completed full physical assembly and functional integration.

• Verified that the system measures weight changes and logs sips correctly.

• Tested display modes, Wi-Fi dashboard, buttons, reminders, and achievements.

3. What the Hydration Puck Is

A weight-based hydration tracker that logs every sip by measuring the bottle's before-and-after weight. It shows real-time hydration status on a small OLED screen and a clean mobile dashboard running locally on the ESP32.

4. Core Idea

People forget to drink regularly. Instead of using a wearable or a complicated app, the Hydration Puck turns any existing bottle into a smart system. Every time the bottle is lifted and set back down, the puck calculates how much you drank and logs it automatically.

5. Hardware System

• Load Cell + HX711 amplifier – measures bottle weight with high resolution.

• ESP32 microcontroller – runs load-cell logic, stores data, serves dashboard.

• OLED display – shows progress, sips, bottle level, achievements.

• Buttons A & B – navigation, confirmation, reset.

• Buzzer – confirmations, reminders, achievement tones.

• USB 5V power input.

6. How It Works

1. When the bottle is lifted, the device records the 'before weight'.
2. When the bottle is placed back, it reads the new weight.
3. If the bottle is lighter: the difference = sip size.
4. If heavier: user refilled; no sip counted.
5. ESP32 updates the daily total, stores logs, and refreshes the display.
6. Achievements unlock automatically based on milestones.

7. What It Tracks

- Daily intake (ml)
- Bottle remaining (ml)
- Sip count
- Last sip size
- Weekly totals
- Achievements
- Reminder schedule

8. Achievements

Achievement	Trigger
First Sip	First drink of the day
250 ml	Reached 250 ml
500 ml	Reached 500 ml
One Bottle	Finished full bottle
Half Goal (1500 ml)	Reached 50% of daily target
Goal Reached (3000 ml)	Daily target completed

9. Daily Target

- Fixed daily hydration goal: 3000 ml.
- Auto-reset at midnight.
- Stores last 7 days in rolling history.

10. Reminder System

- Can be set from the phone dashboard.
- Puck beeps and shows 'DRINK!' when the time interval is reached.
- After drinking, next reminder auto-reschedules.

11. Phone Dashboard (Wi-Fi)

ESP32 hosts a local Wi-Fi access point:
SSID: HydrationPuck

Password: drinkwater

Open: http://192.168.4.1

Dashboard displays today's total, progress bar, sip count, last sip size, weekly graph, reminder controls, and achievement badges.

12. OLED Display Modes

BOOT → SETUP (tare, capacity, full) → HOME → REMINDER → EXTRAS (achievements, reset, week totals).

13. Buttons

Action	Button	Description
Confirm / OK / Decrease	A	Short press
Increase / Next Item	B	Short press
Confirm capacity	A	Hold during setup
Open Extras Menu	B	Hold ~1 sec from Home
Confirm Reset All	A	Hold 3 sec
Factory Reset	A + B	Hold 4 sec

14. Sounds

- Confirm tone: double beep
- Reminder tone: two beeps
- Goal tone: triple rising beep
- Achievement tone: cheerful chirp

15. Data & Memory

Uses ESP32 flash memory to store calibration, totals, week history, and achievements. Data persists through power loss.

16. 3D Printing Work

- Modeled entire enclosure in Siemens NX CAD.
- Printed on Bambu Lab A1 using PLA.
- Tested fitment for electronics and load cell.
- Verified button and screen alignment.
- Adjusted tolerances based on real print fit.

17. Assembly Work

• Mounted load cell inside the printed base.
• Wired HX711 → ESP32.
• Installed and wired OLED display.
• Soldered buttons and buzzer.
• Placed the ESP32 board securely.
• Completed functional testing after assembly.

18. Real Troubleshooting Notes

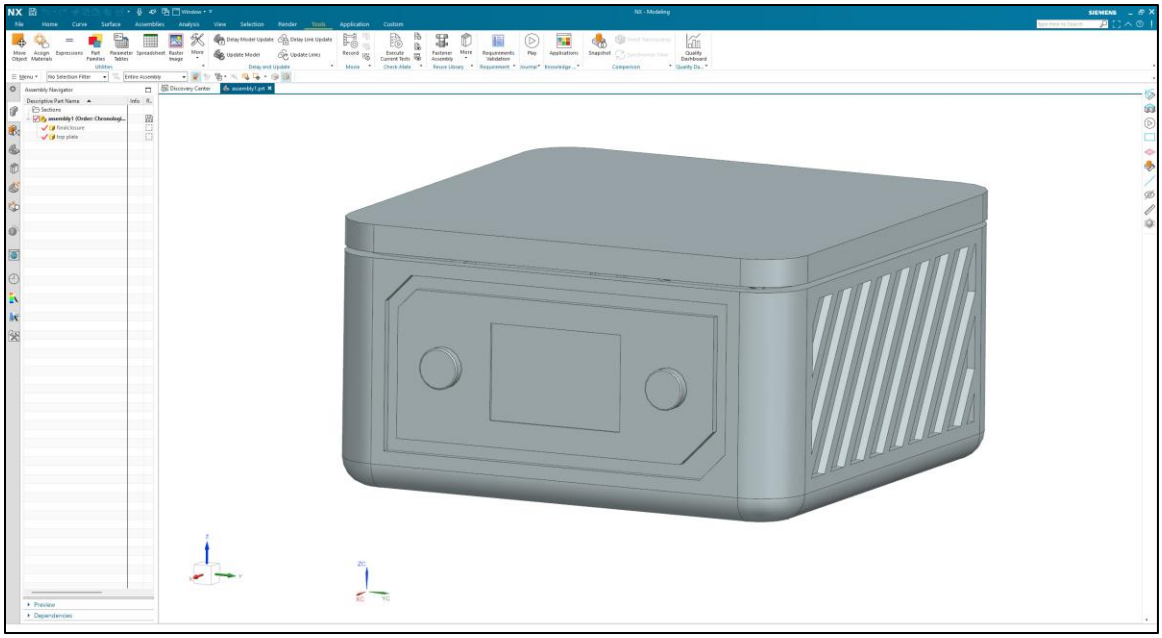
• If numbers froze → re-run setup (tare → capacity → full).

• If readings drifted → ensure bottle wasn't touching cables or edges.

• If Wi-Fi didn't connect → rebooted ESP32.

• If reminders were too frequent → increased interval on dashboard.

19. Image Placeholders





Gcode



Success

Project Name
hydration enclosure.stl

Plate name
Plate 1

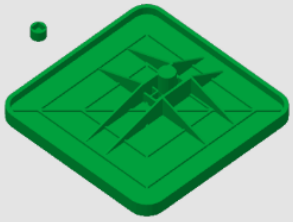
Printer
3DP-039-236(A1)

Build Plate
Textured PEI Plate

Time
2025/10/12 14:29 - 2025/10/12 17:17

Filaments
PLA | 61.85g

Gcode



Success

Project Name
top plate_modified.stl

Plate name
Plate 1

Printer
3DP-039-236(A1)

Build Plate
Textured PEI Plate

Time
2025/10/17 20:55 - 2025/10/17 21:42

Filaments
PLA | 26.88g






SETUP - TARE
Place EMPTY bottle
Press OK to tare