Smart Water Intake Tracker

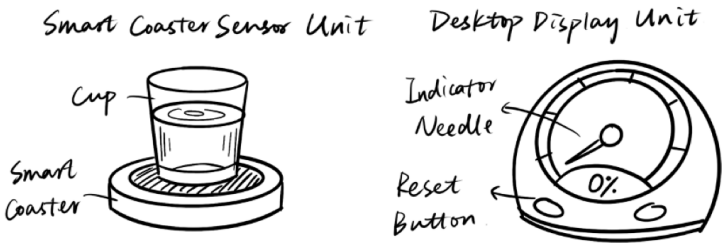
The Smart Water Intake Tracker is a physical, non-intrusive system that helps users track their daily water intake through passive sensing and dynamic feedback.

It consists of a smart sensing coaster and a desktop display gauge, allowing users to track hydration progress without relying on screens or manual input.

Smart Water Intake Tracker

A non-intrusive, physical system for tracking daily water intake through passive sensing and dynamic feedback.

- This project consists of a smart sensing coaster and a desktop display device that together track and visualize a user's daily water intake.
- By passively detecting drinking events through weight changes and presenting progress via a mechanical gauge, the system encourages hydration without relying on screens or manual input.



Sensor Device: Smart Coaster

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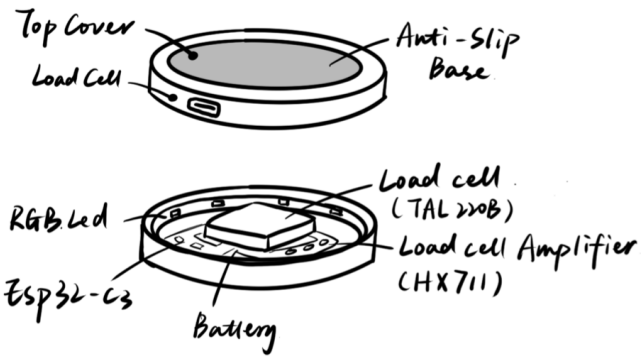

How it works

- The sensing device is a smart coaster placed under a cup or bottle that detects drinking events by monitoring weight changes.
- A load cell measures the applied force, and the signal is amplified, digitized, and processed by a microcontroller to estimate water intake from relative weight differences over time.

Key components

- RGB LED: NeoPixel
- Load Cell: TAL221 (100g)
- Load Cell Amplifier: HX711
- Microcontroller: Seeed Studio XIAO ESP32-C3
- Communication: Bluetooth Low Energy (BLE)

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Display Device: Desktop Hydration Gauge

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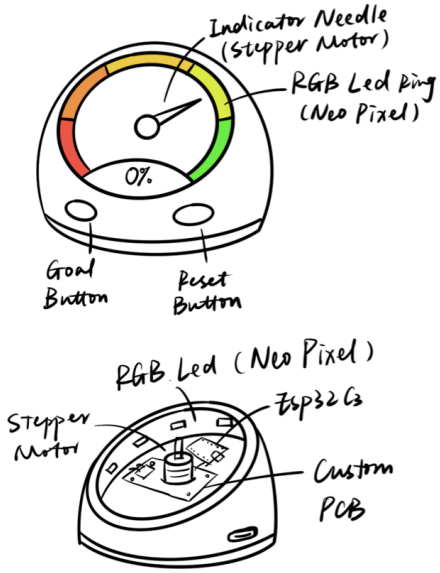

How it works

- The display device is a desktop hydration gauge that provides an ambient, glanceable view of daily water intake.
- A mechanical needle shows progress from 0–100%, an RGB LED ring gives color-coded feedback, and a physical reset button allows daily tracking to be restarted.

Key components

- Stepper Motor
- RGB LED Ring: NeoPixel
- Microcontroller: Seeed Studio XIAO ESP32-C3
- OLED: Show the number
- Rotary encoder: Set/Change the goal
- Reset button
- Communication: Bluetooth Low Energy (BLE)

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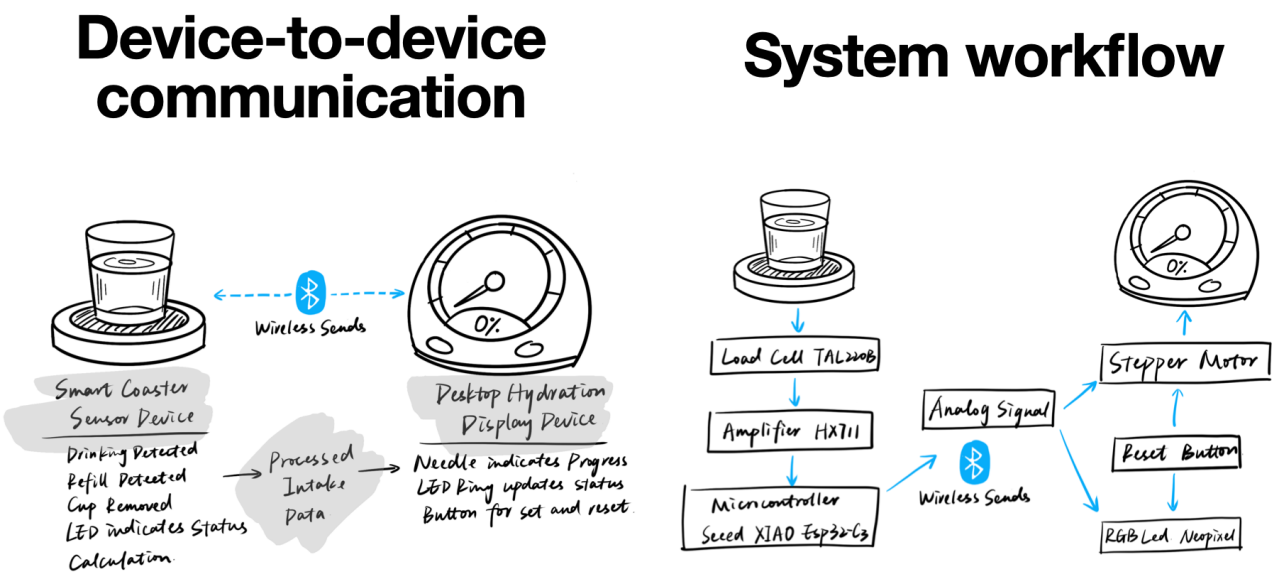
- **OLED** (Show the number)
- **Rotary encoder** (Set/Change the goal)
- **Reset button**
- **Communication**: Bluetooth Low Energy (BLE)

System Architecture



Device-to-device communication

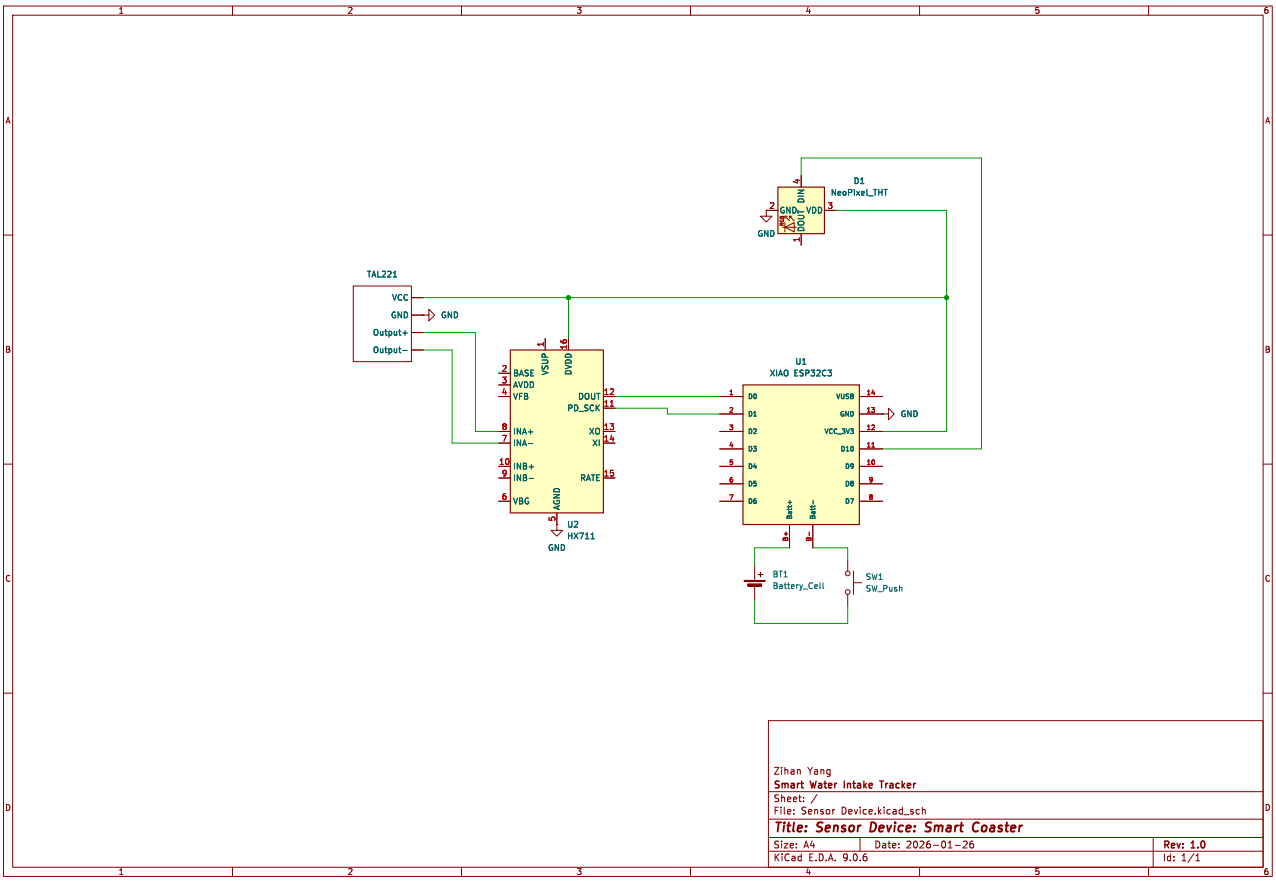
The smart coaster sends processed intake data to the display device wirelessly using Bluetooth Low Energy (BLE).
Only high-level intake events (e.g., estimated water consumed) are transmitted, minimizing bandwidth and power usage.

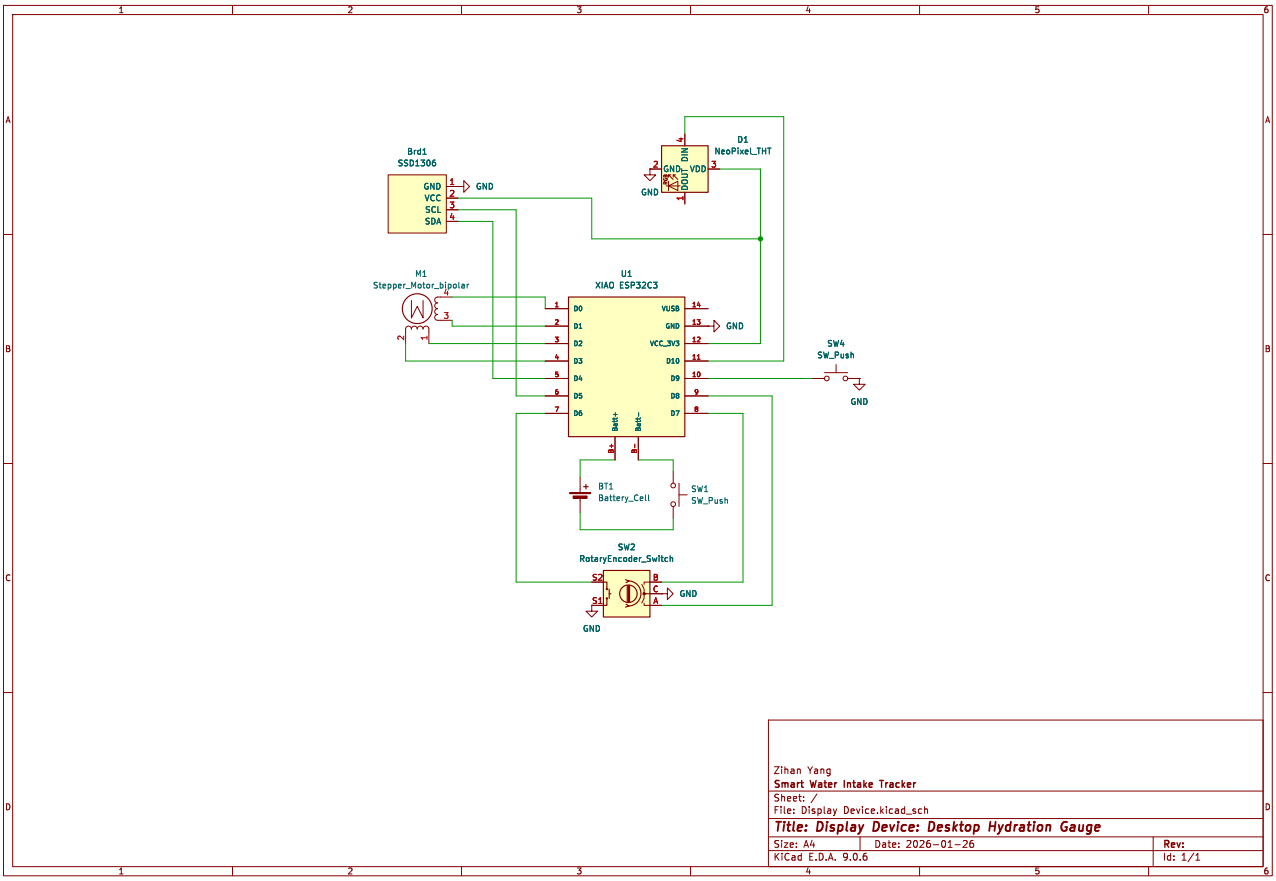
System workflow

1. The load cell detects weight changes when the user interacts with the cup
2. The HX711 amplifies and digitizes the signal
3. The microcontroller filters noise and detects valid drinking events
4. Estimated intake values are accumulated locally
5. Intake data is transmitted via BLE to the display device
6. The display updates the mechanical needle and LED ring in real time

This modular architecture separates sensing and feedback, making the system easier to debug, extend, and maintain.

Schematic


D1
NeoPixel_THT
GND
VDD
DIN
DOUT
TAL221
VCC
GND
Output+
Output-
U2
HX711
BASE
AVDD
VFB
VSUP
DVDD
DOUT
PD_SCK
INA+
INA-
INB+
INB-
VBG
AGND
XO
XI
RATE
U1
XIAO ESP32C3
D0
D1
D2
D3
D4
D5
D6
D7
D8
D9
D10
VUSB
VCC_3V3
Batt+
Batt-
BT1
Battery_Cell
SW1
SW_Push
Zihan Yang
Smart Water Intake Tracker
Sheet: /
File: Sensor Device.kicad_sch
Title: Sensor Device: Smart Coaster
Size: A4
Date: 2026-01-26
Rev: 1.0
KiCad E.D.A. 9.0.6
Id: 1/1


Brd1
SSD1306
GND
VCC
SCL
SDA
D1
NeoPixel_THT
M1
Stepper_Motor_bipolar
U1
XIAO ESP32C3
SW4
SW_Push
BT1
Battery_Cell
SW1
SW_Push
SW2
RotaryEncoder_Switch
Zihan Yang
Smart Water Intake Tracker
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Datasheets

All component datasheets are included in the `/datasheets` folder of this repository.

- TAL221 Load Cell Datasheet
- HX711 Load Cell Amplifier
- Seeed Studio XIAO ESP32-C3
- WS2812B RGB LED