PROJECT IDEAS · IOT

IoT projects for final *year*

The best IoT projects for final year **measure something real, send it to a dashboard and act on it**, using hardware you can afford and explain.

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Most need only an ESP32, two or three named sensors and a free dashboard; a Raspberry Pi is worth it when you need a camera or on-device AI. Below are 33 IoT project ideas, each with the hardware, a dashboard, a difficulty level and a rough cost band, plus safety rules for anything that touches 230 V mains.

KEY POINTS

- **33 IoT project ideas,** each with the board, named sensors, a dashboard, a difficulty level and a rough cost band.
- **An ESP32 is the default board:** Wi-Fi and Bluetooth are built in, and you program it from the Arduino IDE. Choose a Raspberry Pi when you need a camera, heavier on-device AI or a local server.
- **Cost bands, for the electronics only:** Low is roughly ₹2,000 or less, Medium about ₹2,000–5,000 and High above ₹5,000. They are rough bands, not quotes.
- **Keep the demo at low voltage.** Household supply in India is nominally 230 V AC at 50 Hz, which can kill; a 12 V DC fan, pump or LED strip driven through the relay uses the same control logic.
- **LoRa is allowed in India** in the 865–867 MHz band, so buy modules made for that band.

Which board should you use: ESP32, Arduino or Raspberry Pi?

Pick the smallest board that does the job. A microcontroller runs one program and sleeps on little power; a Raspberry Pi 5 is a full Linux computer that can run a camera model or a local server.

Common IoT boards compared

BOARD	WHAT IT IS	WIRELESS	BEST FOR	COST BAND
ESP32 dev board	Microcontroller; Arduino IDE, ESP-IDF or MicroPython	Wi-Fi and Bluetooth built in	The default for cloud-connected sensors	Low
Arduino Uno R3	ATmega328P microcontroller at 16 MHz	None on the board	Learning and simple control; add an ESP32 for the cloud	Low (clones); genuine boards cost more
Raspberry Pi Pico 2 W	RP2350 microcontroller; C/C++ or MicroPython	2.4 GHz Wi-Fi and Bluetooth 5.2	MicroPython projects on a budget	Low
Raspberry Pi 5	Linux computer, quad-core Arm Cortex-A76 at 2.4 GHz	Dual-band Wi-Fi and Bluetooth 5.0	Cameras, on-device AI, gateways and local dashboards	High
ESP32-CAM	ESP32 module with a small camera	Wi-Fi and Bluetooth	Snapshots and simple streaming	Low

Specs from Espressif, Arduino and Raspberry Pi.

Cost bands are rough totals for the electronics only: **Low** is roughly ₹2,000 or less, **Medium** about ₹2,000–5,000, **High** above ₹5,000. They assume common modules from Indian hobby-electronics stores, not quotes; check current prices, and add an enclosure, power supply and shipping.

Planning IoT projects using Arduino? Most ideas below name an ESP32, which you program from the same Arduino IDE. An Arduino Uno R3 handles the sensing and control logic well, but it needs a Wi-Fi board such as an ESP32 to reach a dashboard.

Difficulty: Beginner is one board, one or two sensors and a ready-made dashboard. Intermediate adds actuators, control logic or your own app. Advanced means several nodes, a camera, on-device AI or long-range radio.

Topic ideas, not delivered projects

These are starting points to discuss with your guide. Ideas marked **Mains** switch or measure 230 V; read the safety rules first. Our delivered work is in the case studies.

What are good smart home and energy IoT projects?

TOPIC IDEA · INTERMEDIATE · LOW COST

Appliance energy monitor with a clamp sensor

Measure an appliance's current without cutting a wire, then show daily units and an estimated bill.

− Hardware, dashboard and viva angle

Hardware: ESP32, SCT-013 split-core current transformer, burden and bias resistors
Dashboard: ThingSpeak
Viva angle: RMS current from raw samples, checked against a plug-in meter.
Mains
: the clamp goes around one insulated wire only.

TOPIC IDEA · BEGINNER · LOW COST

Smart switchboard with schedules

Control lights and a fan from your phone, with timers and a manual override.

− Hardware, dashboard and viva angle

Hardware: ESP32, 4-channel optocoupled relay module, push buttons
Dashboard: Home Assistant with ESPHome, or Blynk IoT
Viva angle: what still works when Wi-Fi drops.
Mains
: demo with 12 V loads.

TOPIC IDEA · INTERMEDIATE · LOW COST

Water-tank level monitor and pump control

Start the pump when the tank is low, stop when full, and cut out if it runs dry.

Hardware, dashboard and viva angle

Hardware: ESP32, JSN-SR04T waterproof ultrasonic sensor, YF-S201 flow sensor, relay
Dashboard: Blynk IoT
Viva angle: spotting dry running from the flow rate.

Mains

if the pump is AC.

TOPIC IDEA · BEGINNER · LOW COST

Door and motion alert with photos

A PIR or door sensor triggers a photo sent to your phone.

Hardware, dashboard and viva angle

Hardware: ESP32-CAM, HC-SR501 PIR sensor, magnetic reed switch
Dashboard: a Telegram bot
Viva angle: false triggers, and how you reduced them.

TOPIC IDEA · BEGINNER · LOW COST

LPG leak alarm with exhaust fan

Detect a leak, sound an alarm, start a 12 V exhaust fan and send an alert.

Hardware, dashboard and viva angle

Hardware: ESP32, MQ-6 LPG sensor, buzzer, MOSFET or relay for the fan
Dashboard: Telegram or Blynk alerts
Viva angle: sensor warm-up and how you set the alarm threshold.

TOPIC IDEA · INTERMEDIATE · MEDIUM COST

Classroom CO2 and ventilation monitor

Show CO2, temperature and humidity for each room and flag when to open windows.

Hardware, dashboard and viva angle

Hardware: ESP32, Sensirion SCD40 CO2 sensor, BME280
Dashboard: InfluxDB and Grafana
Viva angle: why CO2 is a practical proxy for ventilation.

Which IoT projects suit agriculture and the environment?

TOPIC IDEA · BEGINNER · LOW COST

Drip irrigation that checks the forecast

Water only when the soil is dry and no rain is expected.

Hardware, dashboard and viva angle

Hardware: ESP32, capacitive soil-moisture sensor, DHT22, 12 V solenoid valve with a MOSFET or relay
Dashboard: Blynk IoT, with rain forecasts from the Open-Meteo API
Viva angle: why capacitive probes last longer than resistive ones in wet soil.

TOPIC IDEA · INTERMEDIATE · MEDIUM COST

PM2.5 air-quality station

Log particulate matter, temperature and humidity, and compare with the nearest official station.

Hardware, dashboard and viva angle

Hardware: ESP32, Plantower PMS5003 laser particle sensor, BME280
Dashboard: a public ThingSpeak channel
Viva angle: the gap between your readings and the CPCB station, and the effect of humidity.

TOPIC IDEA · INTERMEDIATE · MEDIUM COST

Greenhouse climate controller

Keep temperature and humidity within a band using fans and a mister.

Hardware, dashboard and viva angle

Hardware: ESP32, SHT31 sensor, BH1750 light sensor, 12 V fans, relay
Dashboard: Arduino Cloud
Viva angle: on-off control with hysteresis against PID.

TOPIC IDEA · ADVANCED · MEDIUM COST

LoRa farm sensor network

Soil nodes across a field report to one receiver with no Wi-Fi in range.

Hardware, network and viva angle

Hardware: ESP32 boards with SX1276 LoRa modules for the 865–867 MHz band, capacitive soil sensors, DS18B20
Network: point-to-point to an ESP32 receiver, or LoRaWAN through The Things Network (IN865 plan) if a gateway is nearby
Viva angle: your measured range and battery life with deep sleep.

TOPIC IDEA · INTERMEDIATE · MEDIUM COST

Water-quality monitor for tanks or ponds

Track pH, TDS, turbidity and temperature.

Hardware, dashboard and viva angle

Hardware: ESP32, analogue pH probe kit, TDS sensor module, turbidity sensor, waterproof DS18B20
Dashboard: ThingSpeak
Viva angle: two-point pH calibration with buffer solutions.

TOPIC IDEA · ADVANCED · HIGH COST

Leaf-disease camera with on-device AI

A camera photographs plants daily and a small model flags likely disease.

Hardware, cloud and viva angle

Hardware: Raspberry Pi 5, Camera Module 3
Cloud: Firebase for alerts; the model is trained on the public PlantVillage images
Viva angle: accuracy on your own leaf photos against the dataset's.

TOPIC IDEA · INTERMEDIATE · MEDIUM COST

Weather station with a rain gauge

Rain, wind, pressure and humidity, compared with the forecast.

Hardware, dashboard and viva angle

Hardware: ESP32, BME280, tipping-bucket rain gauge, cup anemometer
Dashboard: Grafana
Viva angle: counting gauge tips with interrupts and debouncing.

What health and assistive IoT projects can students build?

TOPIC IDEA · INTERMEDIATE · LOW COST

Heart-rate and SpO2 logger

Read pulse and oxygen saturation and alert a caregiver if low values persist.

Hardware, cloud and viva angle

Hardware: ESP32, MAX30102 sensor, SSD1306 OLED
Cloud: Firebase Realtime Database with a small web app
Viva angle: readings compared with a commercial oximeter. Say clearly that it is not a medical device.

TOPIC IDEA · INTERMEDIATE · LOW COST

Fall detector for elderly people

Detect a fall from motion data and send an alert, with a button to cancel.

Hardware, dashboard and viva angle

Hardware: ESP32, MPU6050 accelerometer and gyroscope, buzzer
Dashboard: Telegram or Blynk alerts
Viva angle: false alarms from sitting down fast; a threshold against a small ML model.

TOPIC IDEA · BEGINNER · LOW COST

Smart pill box

Reminds at each dose time and logs whether the compartment was opened.

Hardware, dashboard and viva angle

Hardware: ESP32, DS3231 real-time clock, reed switches, buzzer
Dashboard: Blynk IoT
Viva angle: keeping time correctly without internet.

TOPIC IDEA · INTERMEDIATE · LOW COST

Smart cane for visually impaired users

Vibrates near obstacles and shares location when the SOS button is pressed.

Hardware, cloud and viva angle

Hardware: ESP32, HC-SR04 ultrasonic sensor, vibration motor, NEO-6M GPS
Cloud: a Telegram location message through a phone hotspot
Viva angle: detection range and blind spots, such as overhanging branches.

TOPIC IDEA · ADVANCED · MEDIUM COST

Head-tilt controlled wheelchair model

Tilt your head to drive a small-scale wheelchair model that stops for obstacles.

− Hardware, dashboard and viva angle

Hardware: ESP32, MPU6050 on a cap, L298N or BTS7960 motor driver, 12 V geared motors, HC-SR04
Dashboard: optional trip logging
Viva angle: dead zones and smoothing so the motion is not jerky.

Have an IoT idea?

Send it with your branch and review dates. The consultation is free.

Message before 7 pm for a reply today.

Free consultation →

WhatsApp

Which smart city, transport and campus projects work well?

TOPIC IDEA · ADVANCED · HIGH COST

Parking occupancy from one camera

One camera counts free slots in a marked lot.

– Hardware, software and viva angle

Hardware: Raspberry Pi 5, Camera Module 3
Software: Ultralytics YOLO, a simple web page
Viva angle: accuracy by time of day, and why you store counts, not faces or plates.

TOPIC IDEA · INTERMEDIATE · MEDIUM COST

Vehicle tracker with geofence alerts

Live location, trip history and an alert when the vehicle leaves an area.

– Hardware, cloud and viva angle

Hardware: ESP32, NEO-6M GPS, a 4G LTE module such as SIMCom's A7670 series
Cloud: Firebase with a Leaflet map
Viva angle: GPS drift and how you filtered it. Older SIM800L boards are 2G-only, so check your operator still supports 2G.

TOPIC IDEA · BEGINNER · LOW COST

RFID attendance with a web dashboard

Tap a card to mark attendance; teachers see reports.

– Hardware, cloud and viva angle

Hardware: ESP32, MFRC522 RFID reader, OLED
Cloud: Firebase, or Google Sheets through Apps Script
Viva angle: stopping proxy attendance, for example with an R307 fingerprint sensor.

TOPIC IDEA · INTERMEDIATE · LOW COST

Smart bins with a pickup route

Bins report how full they are; the dashboard plans a route through the full ones.

– Hardware, software and viva angle

Hardware: ESP32 and an HC-SR04 per bin
Software: Google OR-Tools routing, a Leaflet map
Viva angle: route length against visiting every bin.

TOPIC IDEA · BEGINNER · LOW COST

Streetlight that dims on an empty road

Full brightness on motion, dim otherwise, with fault reports.

Hardware, dashboard and viva angle

Hardware: ESP32, PIR sensor, BH1750 light sensor, 12 V LED with a MOSFET PWM driver
Dashboard: ThingSpeak
Viva angle: energy saved in your own measured trial.

TOPIC IDEA · ADVANCED · MEDIUM COST

Two-wheeler crash alert

Detect a crash from impact and tilt, then send the location to contacts unless the rider cancels.

Hardware, cloud and viva angle

Hardware: ESP32, MPU6050, NEO-6M GPS, 4G LTE module
Cloud: SMS or a Telegram message
Viva angle: telling a crash from a pothole.

TOPIC IDEA · BEGINNER · LOW COST

Noise monitor for libraries and hostels

Estimate sound level and alert when it stays high.

Hardware, dashboard and viva angle

Hardware: ESP32, INMP441 I2S microphone, LED indicator
Dashboard: Blynk IoT
Viva angle: why the reading is relative unless calibrated against a sound level meter.

Which industrial, safety and edge-AI IoT project ideas stand out?

TOPIC IDEA · INTERMEDIATE · LOW COST

Motor vibration monitor for predictive maintenance

Compute vibration features on the board and flag unusual patterns.

− Hardware, dashboard and viva angle

Hardware: ESP32, ADXL345 accelerometer, a small DC motor as the test rig
Dashboard: MQTT into InfluxDB and Grafana
Viva angle: FFT peaks explained. Our delivered M.E. / M.Tech predictive-maintenance project shows the modelling side.

TOPIC IDEA · INTERMEDIATE · LOW COST

Cold-chain temperature logger

Log fridge or cool-box temperature, keep logging offline and alert on excursions.

− Hardware, cloud and viva angle

Hardware: ESP32, waterproof DS18B20 probes, microSD module
Cloud: AWS IoT Core over MQTT with device certificates
Viva angle: store-and-forward when the network drops.

TOPIC IDEA · BEGINNER · LOW COST

Fire and smoke safety node

Smoke, flame and temperature readings trigger a buzzer, a 12 V fan and an alert.

− Hardware, dashboard and viva angle

Hardware: ESP32, MQ-2 smoke sensor, IR flame sensor, DHT22
Dashboard: Node-RED over MQTT
Viva angle: combining sensors to cut false alarms.

TOPIC IDEA · ADVANCED · LOW COST

Voice-command switch with TinyML

Recognise a few spoken keywords offline, on the microcontroller itself.

− Hardware, software and viva angle

Hardware: ESP32-S3 board, INMP441 microphone
Software: Edge Impulse or LiteRT for Microcontrollers (formerly TensorFlow Lite for Microcontrollers)
Viva angle: accuracy against model size after quantisation.

TOPIC IDEA · ADVANCED · HIGH COST

Helmet-check camera at a site gate

Detect people without helmets and log each event with a time.

Hardware, software and viva angle

Hardware: Raspberry Pi 5, Camera Module 3
Software: Ultralytics YOLO, a Grafana or web log
Viva angle: frames per second on the Pi, and privacy.

TOPIC IDEA · INTERMEDIATE · LOW COST

Lab energy meter with usage alerts

Voltage, current, power and units for one lab circuit, with alerts on unusual use.

Hardware, dashboard and viva angle

Hardware: ESP32, PZEM-004T v3.0 module
Dashboard: Grafana
Viva angle: your readings against the building meter.
Mains
: the module connects to live wiring, so a qualified person must wire it.

TOPIC IDEA · BEGINNER · LOW COST

Stock shelf that weighs itself

Load cells estimate the item count and trigger a reorder alert.

Hardware, dashboard and viva angle

Hardware: ESP32, load cells with an HX711 amplifier
Dashboard: a Firebase web app
Viva angle: calibration with known weights, and drift over a day.

TOPIC IDEA · ADVANCED · HIGH COST

Offline edge gateway

A local server collects data from several nodes, serves dashboards without internet and syncs when back online.

Hardware, software and viva angle

Hardware: Raspberry Pi 5 plus two or more ESP32 nodes
Software: Mosquitto, Node-RED, InfluxDB, Grafana
Viva angle: MQTT topics, QoS levels and what happens on reconnect.

Which cloud platform or dashboard should you use?

Use a hosted dashboard for a quick, reliable demo, or self-host when you want full control and an offline mode. Free plans and limits change, so check them when you start.

IoT dashboards and clouds for student projects

PLATFORM	GOOD FOR	KEEP IN MIND
Blynk IoT	Phone dashboards in minutes	The free plan has device and feature limits
ThingSpeak	Logging, charts and MATLAB analysis	Free for small non-commercial projects (under 3 million messages a year when this was written)
Arduino Cloud	Dashboards for Arduino and ESP32 sketches	Check the free plan's limits
Firebase Realtime Database	Your own web or mobile app on live data	Write security rules; test-mode rules leave data open
Node-RED, InfluxDB and Grafana on a Pi	Full control; works on a local network without internet	More setup, and you maintain it
Home Assistant with ESPHome	Smart-home projects with local control	Needs a Pi or spare PC running Home Assistant
AWS IoT Core	Industry-style MQTT with device certificates	Set a billing alert before you start

ThingSpeak limit from its licence page. Skip older tutorials built on Google Cloud IoT Core: Google retired it on 16 August 2023, and its Eventarc deprecations page records the Cloud IoT shutdown on that date.

How do you keep a mains-powered IoT build safe?

Household supply in India is nominally 230 V AC at 50 Hz, which can kill. Most projects never need to touch it.

- **Demo at low voltage.** Drive a 12 V DC fan, pump or LED strip through the relay; the control logic is the same.

- **Power the electronics from a closed, certified 5 V adapter.** Never build transformerless or capacitor-dropper supplies.
- **Rate the switching parts above the load.** Use optocoupled relay modules with a wide margin over the load's voltage and current, or a certified smart plug for the mains side.
- **Measure current without breaking the circuit.** A split-core clamp (SCT-013) goes around one insulated wire. Modules that connect to live wiring, such as the PZEM-004T, must be wired by a qualified person.
- **Enclose everything on the mains side.** A closed insulated box, cable glands, a fuse on the live wire, no exposed terminals, and low-voltage wiring kept physically apart.
- **Work dead, test protected.** Unplug before touching anything, use an RCCB-protected socket, never work alone on live circuits, and never demo with the lid off.
- **Get it checked.** Ask your lab in-charge or an electrician to inspect the wiring before first power-up.
- **Batteries and water.** Use protected lithium cells with a charger module that includes protection, never charge swollen cells, keep boards above the water line, and prefer low-voltage DC pumps.

General precautions, not certified electrical advice
Follow your lab's safety rules and your college's academic rules. If you are unsure about any mains wiring, keep the demo at 12 V.

How do you make an IoT project viva-ready?

- **Draw the whole data path.** Sensor, board, MQTT or HTTP, cloud, dashboard, action: this is your first architecture slide.
- **Calibrate against a reference.** Compare your readings with a commercial meter or an official station and report the error.

- **Handle dropouts.** Buffer readings on the board or an SD card, and show what the dashboard does when Wi-Fi fails.
- **Be honest about sensors.** MQ-series gas sensors give relative readings that need warm-up and calibration, and pulse-oximeter modules are not medical devices.
- **Keep a recorded backup demo.** Hardware fails on the day more often than code.

Adding analytics makes a stronger project: forecast the next reading, detect anomalies, or add a model from the final year project ideas for CSE. For the write-up, see project report and PPT help; if your guide wants a published base paper, see IEEE projects.

For the model side of an edge-AI build, see machine learning projects for final year. For other branches and domains, browse all our final year project ideas, sorted by branch.

Frequently asked questions

Which board is best for an IoT final year project: ESP32, Arduino or Raspberry Pi?

For most cloud-connected projects, an ESP32: it has Wi-Fi and Bluetooth built in and can be programmed from the Arduino IDE. An Arduino Uno R3 has no wireless on the board. Choose a Raspberry Pi when you need a camera, heavier on-device AI or a local server.

How much does an IoT final year project cost?

Most single-board sensor projects need roughly ₹2,000 or less of electronics, while camera or Raspberry Pi 5 projects usually go above ₹5,000. These are rough bands for common modules, not quotes; check current prices, and add the enclosure, power supply and shipping.

Can I do an IoT project without buying hardware?

You can start in a browser simulator such as Wokwi, which runs Arduino, ESP32 and Raspberry Pi Pico code, then move to real parts once the logic works. Ask your guide whether a simulated project is accepted for the final demo.

Which IoT projects suit ECE students?

Pick ideas where the electronics carry the marks: sensor interfacing, calibration, power and radio. The appliance energy monitor with a clamp sensor, the LoRa farm sensor network, the motor vibration monitor and the head-tilt controlled wheelchair model all fit. CSE students often prefer the camera and on-device AI builds, such as parking occupancy or the leaf-disease camera. For VLSI, DSP, communication and RF topics, see our final year project ideas for ECE students.

Can I use LoRa for a project in India?

Yes. India allows low-power wireless equipment in the 865–867 MHz band, and LoRaWAN uses the IN865 plan there. Buy LoRa modules made for that band rather than 915 MHz modules meant for other countries.

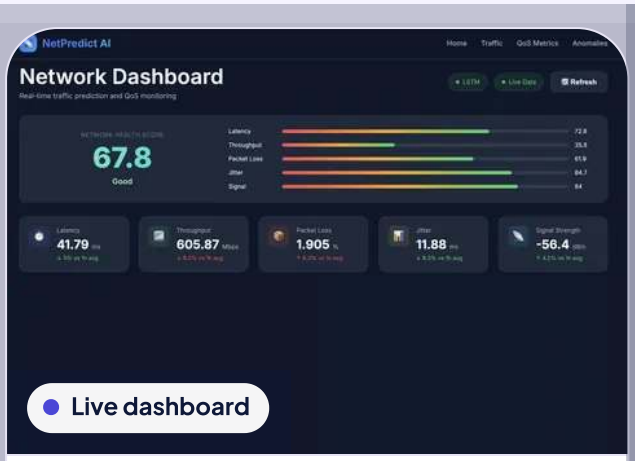
Can The Ultimate Project World help with an IoT project?

Yes, with planning, the code (firmware, dashboard and any ML model), the report, the PPT and viva preparation. Share your idea and your college's requirements in the free consultation and we will tell you exactly what we can take on.

DELIVERED WORK

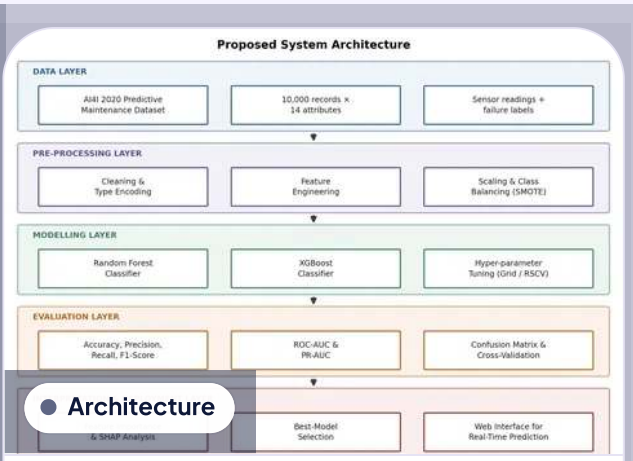
The data side, from delivered projects

Dashboards, sensor-style data and on-device inference from M.Tech and M.E. projects, shown with names and institute details removed.



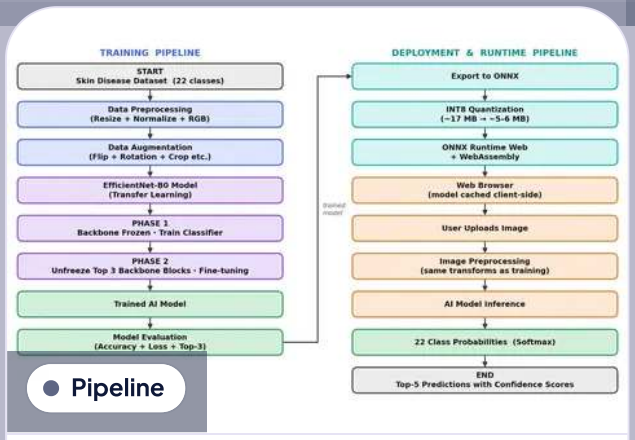
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