

BYTE FORCE

Name	Department	Semester
KINJOL DAS	ECE	5th
Name	Department	Semester
MAHARSHI ROY	ECE	5th
Name	Department	Semester
SWASTIKA GHOSH	ECE	5th
Name	Department	Semester
SURYAGNIK ROY	ECE	5th

Evision – Smarter Diagnostics for
Smarter Mobility

PROBLEM STATEMENT & OBJECTIVE

- ❑ Electric Vehicle Diagnostic Tool(House: RED; Problem Statement No.:10)
- ❑ The aim of this project is to design a **real-time, low-cost EV diagnostic system** that monitors voltage, current, temperature, and driving behavior, and then **alerts about faults, unsafe driving, or battery health issues**. This ensures **driver safety, longer battery life, and reliable EV performance**.

❑ WHY THIS PROBLEM MATTERS?

- EVs are growing fast, but users face battery failures, charging issues without warning which leads to accidents.
- Driving style impacts battery and motor health, yet drivers get no real-time feedback.
- Mechanics depend on costly diagnostic tools, making quick, affordable service difficult.
- Fleet owners and drivers want simple, low-cost, real-time monitoring to prevent breakdowns and extend battery life.
- A portable EV diagnostic tool bridges this gap, improving safety, reliability, and trust in EVs.

❖ Why it Matters?

- A low-cost diagnostic tool bridges the gap between complex EV systems and everyday users.
- It helps in preventive maintenance, avoids sudden breakdowns, and builds trust in EV technology.

THE IDEA!

- **Battery Health Monitoring by Cycle:** Tracks battery condition based on charge-discharge cycles for accurate diagnostics.
- **Humidity Sensor Integration:** Monitors environmental humidity to prevent moisture-related battery issues.
- **No Miniature Circuits Used:** Avoids delicate circuits that cannot easily get damaged, increasing system reliability.
- **Smart Alerts & Predictions:** Reduces false alarms and predicts maintenance needs using real-time and historical data.
- **User-Friendly Interface:** Provides clear, actionable insights via a display.
- **Unique Advantage:** Combines **cycle-based battery monitoring** and **environmental sensing** safely, unlike conventional EV diagnostic tools.

Due to this Battery Health Monitoring, there is lot more of reduction in E-waste.

WHAT MAKES OUR SYSTEM USEFUL OR UNIQUE

Accurate Battery Health: Cycle-based monitoring gives precise insights, not just random readings.

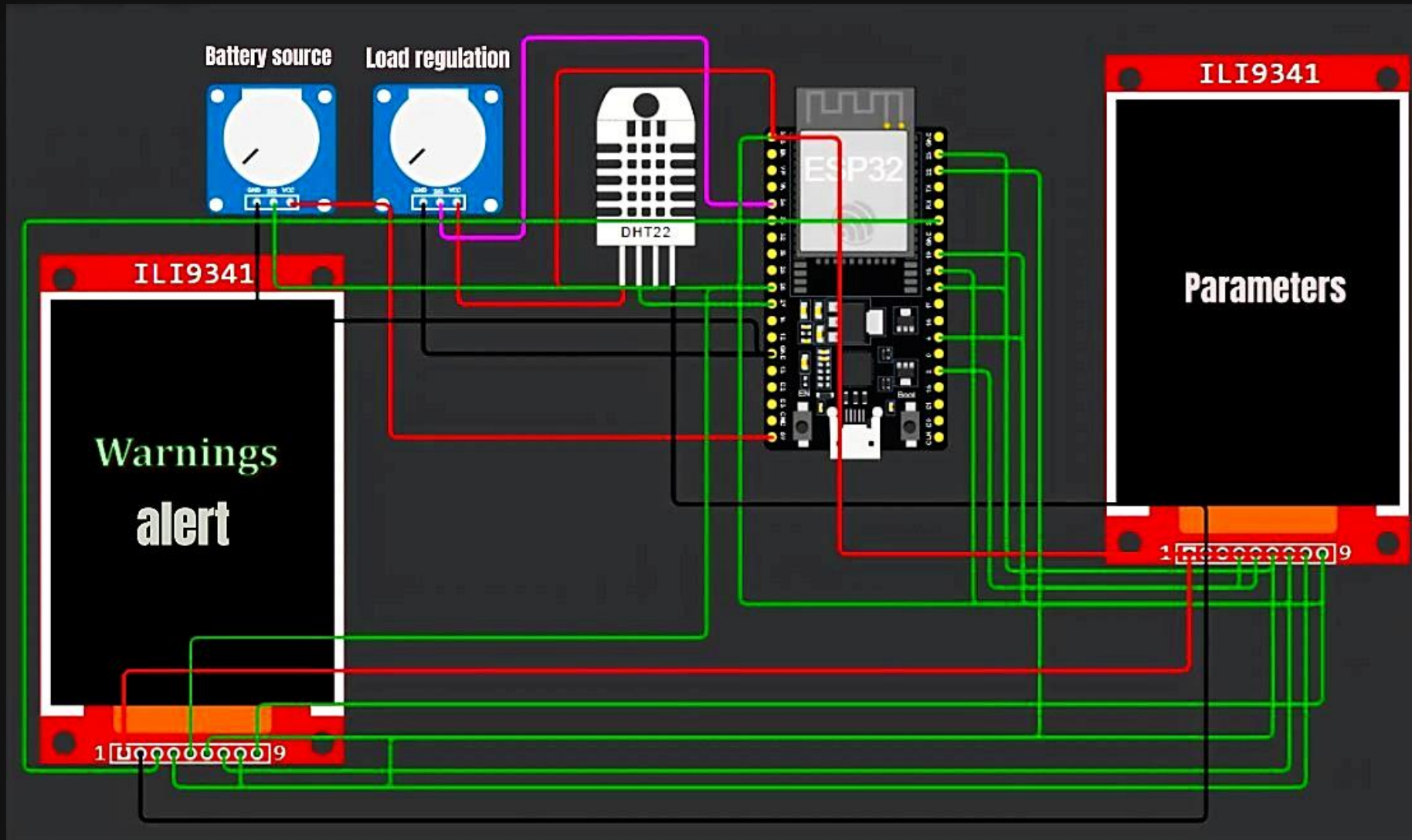
Prevents Damage: Humidity sensing reduces risk of moisture-related failures.

Higher Reliability: No miniature circuits → more durable and less prone to failure.

User Convenience: Easy-to-read interface saves time and improves decision-making.

Cost Saving

THE CIRCUIT DIAGRAM



FLOWCHART

- ❑ Visualize process flow
- ❑ Show steps: Input → Processing → Output
- ❑ Keep arrows and blocks simple

TECHNOLOGY STACK

❑ Hardware:

1. ESP32

2. DHT22

3. 2 ILI9341(TFT DISPLAY):

TFT1 → shows real-time parameters (V, A, SOC, Temp, Humidity, Battery Cycles, Health).

TFT2 → shows **alerts only** (low voltage, overheating, high humidity).

4. *POTENTIOMETER(2)*: ONE USED FOR VOLTAGE SOURCE AND OTHER FOR DEMONSTRATION PURPOSE.

❑ Software:

1. WOKWI SIMULATOR

2. ARDUINO IDE

CHALLENGES & SOLUTIONS

CHALLENGES

1. Basic sensors (potentiometers, DHT22, ESP32 ADC): Limited accuracy, cannot capture real EV battery behavior. Low cost, need for calibration for modern EV system
2. No remote monitoring: Data only on TFT, no cloud or app. Increases cost due to modules & connectivity.
3. EEPROM logging: Limited write cycles, small memory. SD card module adds slight extra cost.
4. Voltage-based SOC estimation: Simple linear mapping is inaccurate in real EVs. Requires additional circuitry → medium cost.
5. Scalability to real EV battery packs: Prototype monitors single source → not suitable for multi-cell packs. Higher cost (BMS chips).

SOLUTIONS

1. Use dedicated current/voltage sensors (INA219, ACS712) and better temp sensors (thermistor/DS18B20).
2. Add WiFi (MQTT) / GSM for alerts.
3. Use FRAM / SD card for data history for battery usage pattern monitoring to improvements.
4. Add Coulomb counting / BMS algorithms.
5. Add multi-cell monitor ICs / CAN bus.

REFERENCES & PROJECT LINKS

- ❑ References :

- ❑ **Roy, P. K., Shahjalal, M., Shams, T., Fly, A., & Stoyanov, S. (2023).**
- ❑ Huhman, B. M. (2017).
- ❑ Pech, M., Vrchota, J., & Bednář, J. (2021).
- ❑ Bourechak, A., Zedadra, O., Kouahla, M. N., & Guerrieri, A. (2023).
- ❑ Duan, Z., Zhang, L., Feng, L., Yu, S., Jiang, Z., Xu, X., & Hong, J. (2021).

- ❑ Project Links:

- ❖ GitHub repo :
- ❖ demo YouTube video :
- ❖ Project demo :