Smart Load Monitoring System

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Aim

to create a smart load monitoring system that uses the HX711 load cell module to continuously measure weight and sends out real-time alerts through the cloud when important weight thresholds are exceeded.

Problem Statement

Manually tracking the weight of materials in warehouses and businesses might result in overburden, waste, or unanticipated supply depletion. An automated system that not only weighs but also notifies them to act promptly to the employees whenever it is required.

Scope of the Solution

- material weight tracking in real time.
- threshold for overload and underload warnings that can be changed.
- cloud-based alerting system that makes use of Blynk and similar platforms.
- Useful in supply chains, industries, warehouses, and inventory management systems.

Required Components

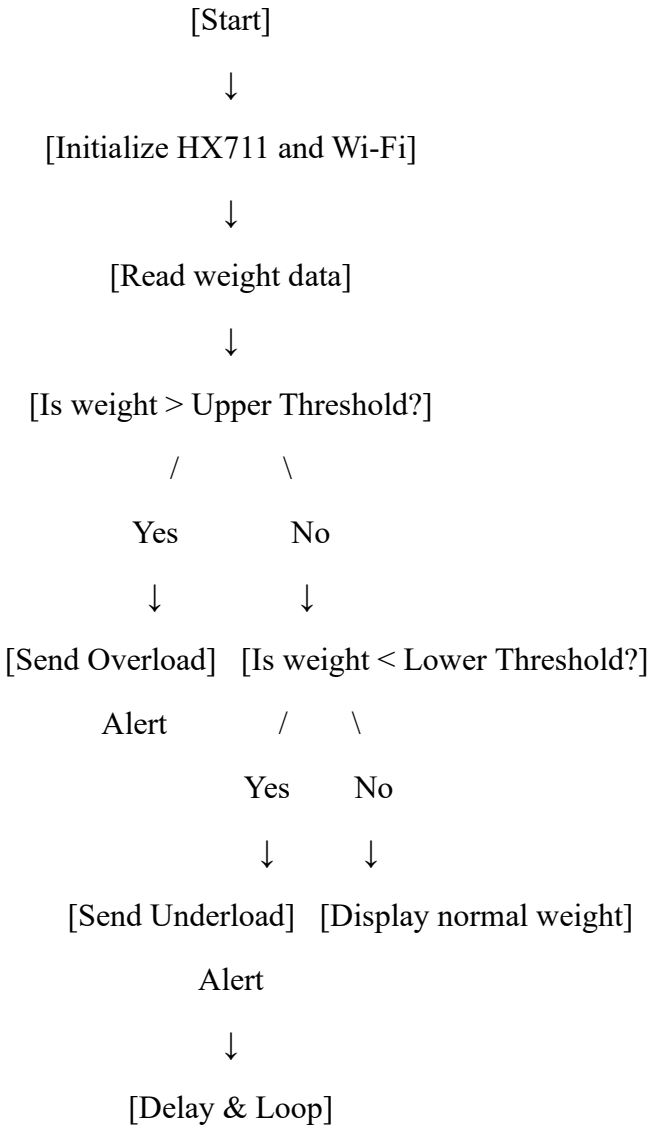
Software

- ESP32
- HX711
- Load Cell
- Jumper wires
- LCD 16x2 i2c display

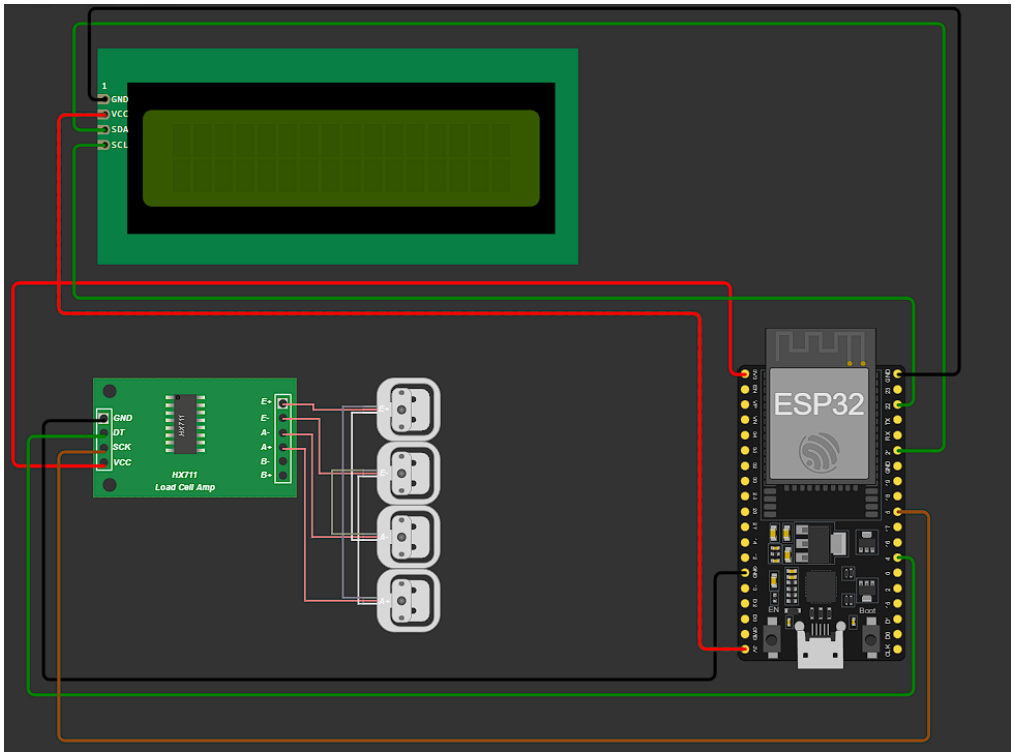
Cloud Environment

- BLYNK IoT platform

Flowchart


[Start]
↓
[Initialize HX711 and Wi-Fi]
↓
[Read weight data]
↓
[Is weight > Upper Threshold?]
/ \
Yes No
↓ ↓
[Send Overload] [Is weight < Lower Threshold?]
Alert / \
Yes No
↓ ↓
[Send Underload] [Display normal weight]
Alert
↓
[Delay & Loop]

Simulated Circuit



Video of the demonstration

The video demonstrates the functioning of the smart load monitoring system, as it highlights the real time monitoring of the load along with the alerts being sent whenever there was overloading(9.8kg) or underloading(9.4kg). Despite, many efforts been made in the calibration of the load cell HX711, the inaccuracy was still evident in the measuring of weight. Although many references suggested that the load cell had inaccurate readings by default in the WOKWI simulation environment. Thus, small range of weight was considered in order to achieve the task via calibration factor. Thus, the link for the demonstration is shared below:

https://drive.google.com/file/d/1mcOq_lOAamrRbxp8-f8j7kTKoKw0-Boy/view?usp=sharing

Project

https://wokwi.com/projects/434653173431591937

GitHub

https://github.com/Hitendra59/Smart-load-monitor

Conclusion

The Smart Load Monitoring System successfully demonstrates real-time weight sensing using an HX711 load cell with ESP32, integrated seamlessly with an LCD display and Blynk IoT platform. It not only displays weight readings but also enables wireless monitoring and alerts for overload or underload conditions. This project showcases the potential of low-cost, IoT-based solutions for smart industrial and household load management.