# Problem Statement: Overloading and Underloading Problem in Coal Wagons.

# Objectives: The primary objectives of addressing the overloading and underloading problem in coal wagons are as follows:

- Enhance safety by preventing overloading and underloading incidents.
- Ensure compliance with regulatory standards and guidelines.
- Improve operational efficiency and reduce costly delays.
- Implement real-time monitoring and reporting mechanisms.

# Components :

Certainly, I can provide a more detailed explanation of the circuit connections for your project. Here's how to connect the components:

The components used are :

1. Arduino Uno
2. Load Cell (with HX711 module)
3. Servo Motor
4. 16x2 LCD (Liquid Crystal Display)
5. LED
6. 220-ohm Resistor
7. Push Button (for calibration)

# Connections:

1. Load Cell (with HX711 module):

- Connect the red wire (VCC) of the HX711 module to 5V on the Arduino.

- Connect the black wire (GND) of the HX711 module to GND on the Arduino.

- Connect the white wire (DT - Data) of the HX711 module to A0 on the Arduino.

- Connect the yellow wire (SCK - Clock) of the HX711 module to A1 on the Arduino.

2. Servo Motor:

- Connect the red wire of the servo to 5V on the Arduino.

- Connect the brown wire of the servo to GND on the Arduino.

- Connect the orange or yellow wire of the servo to pin 10 on the Arduino.

3. 16x2 LCD:

- Connect the VSS (Ground) pin of the LCD to GND on the Arduino.

- Connect the VDD (Power) pin of the LCD to 5V on the Arduino.

- Connect the VO (Contrast Adjustment) pin of the LCD to the middle pin of a potentiometer, and connect the other two potentiometer pins to 5V and GND respectively.

- Connect the RS (Register Select) pin of the LCD to pin 7 on the Arduino.

- Connect the RW (Read/Write) pin of the LCD to GND on the Arduino.

- Connect the E (Enable) pin of the LCD to pin 6 on the Arduino.

- Connect the D4, D5, D6, and D7 pins of the LCD to pins 5, 4, 3, and 2 on the Arduino.

4. LED:

- Connect the longer leg (anode) of the LED to a 220-ohm resistor.

- Connect the other end of the resistor to pin 8 on the Arduino.

- Connect the shorter leg (cathode) of the LED directly to GND on the Arduino.

5. Push Button (for calibration, optional):

- Connect one leg of the push button to a digital pin (e.g., pin 9) on the Arduino.

- Connect the other leg of the push button to GND on the Arduino.

- You may also want to use a pull-up resistor (e.g., 10k ohms) between the digital pin and 5V to ensure reliable button readings. Connect one end of the resistor to the digital pin and the other end to 5V.

6. Power:

- Power the Arduino using a USB cable or an external 5V power supply.

7. Grounding:

- Ensure that all components share a common ground by connecting their GND pins to the Arduino's GND.

Please note that the LCD wiring may vary depending on the specific model of your 16x2 LCD display, so check the datasheet or documentation for your particular display to confirm the pinout. Additionally, if you have a different servo model, make sure to connect it according to the manufacturer's specifications.

# Conclusion :

The overloading and underloading problem in coal wagons is a critical issue that demands proactive solutions. By implementing a comprehensive system that includes weight sensors, real-time monitoring, and data analysis, we aim to enhance safety, compliance, and efficiency in the coal transportation industry.