Internal Operations Overview

This section details the **core functionalities** of the **CoffeeTime** project, including **initial configuration, resource verification, and the coffee preparation process**.

System Setup

Responsible for initializing:

- LEDs and LED bar
- LCD Display (I2C)
- Servo Motors and Stepper Motor
- Temperature and Humidity Sensor (DHT22)
- IR Remote Control
- Buzzer for notifications
- ADC for potentiometer readings

Function:

`setup_machine()`: Initializes all components and displays system instructions.

Coffee Preparation Process

Reads User Preferences:

- Coffee strength (via intensity potentiometer)
- Desired temperature (via temperature potentiometer)
- Water amount per cup (via water quantity potentiometer)

Verifies Machine Resources

- Checks if there's enough water and coffee beans for the selected cups.
- Alerts the user if a refill is needed.

Simulates Coffee Brewing Process:

- LED bar updates according to coffee strength.
- Water heating simulation using a temperature progression.
- Servo 1 releases coffee beans, and the stepper motor grinds them.
- Servo 2 controls coffee extraction into the cup(s).

Finalization & Feedback:

- Resource levels are updated (water & coffee beans).
- Success message is displayed on the LCD.
- Buzzer plays a melody, and the LED bar blinks.

Functions:

- prepare_coffee(cups): Main coffee-making process.
- simulate_water_heating(temp): Simulates water heating.
- determine_coffee_strength(pressure): Defines coffee intensity level.
- determine_temperature_level(temp): Classifies the temperature level.

This section ensures the **CoffeeTime** system functions properly, providing a seamless user experience with an efficient and realistic brewing process.