Sensors Overview

This section details the **CoffeeTime** project's sensors, which include **temperature and humidity monitoring (DHT22), real-time clock (RTC), and ADC-based potentiometers** for user input adjustments.

Components & Pin Configuration

Sensor	Pin(s)	Function
DHT22	8	Measures ambient temperature & humidity
RTC (Real-Time Clock)	SDA (4), SCL (5)	Handles scheduled brewing times
Intensity Potentiometer	26	Adjusts coffee strength
Temperature Potentiometer	27	Sets brewing temperature
Water Quantity Potentiometer	28	Determines water volume

Temperature & Humidity Sensor (DHT22)

Functionality:

- Measures ambient **temperature (°C/°F)** and **humidity (%)**.
- Used to monitor environmental conditions for optimal brewing.

Functions:

- `read_from_dht()`: Reads temperature & humidity from DHT22.
- `is_valid_reading()`: Checks if sensor data is reliable.

- `print_dht_reading()`: Displays temperature and humidity values.

Real-Time Clock (RTC)

Functionality:

- Stores and retrieves the **current date and time**.
- Enables **scheduled coffee preparation** at a user-defined time.

Functions:

- `rtc_read()`: Reads time from RTC module.
- `format_time()`: Formats time into a readable format.
- `configure_schedule()`: Sets up a scheduled brewing time.

ADC - Potentiometers (User Input)

Functionality: Users can manually **adjust coffee strength, brewing temperature, and water volume**.

Functions:

- `read_intensity()`: Reads the coffee strength percentage.
- `read_desired_temperature()`: Retrieves the set water temperature.
- `read_water_quantity()`: Determines the brewing water amount.

Resource Verification (Simulated)

Functionality:

- Ensures the machine has **enough water and coffee beans** for brewing.
- Triggers **refill alerts** when resources are low.

Functions:

- `check_simulated_resources()`: Checks available water and coffee beans.

Refill Process:

- Red LED lights up when resources are insufficient.
- Buzzer plays warning beeps.
- User must press PLAY to simulate a refill.

This section describes the **sensor functionalities** in **CoffeeTime**, ensuring accurate readings and user control over brewing settings.