**GROUP 16&15 BME**

**SMART ALARM CLOCK**

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**1. Introduction**

This documentation explains how to build a **Smart Alarm Clock** using an **Arduino Uno**, **DS1307 RTC module**, **I2C LCD**, and push buttons. The system allows:

* Setting and displaying **current time & date**
* Setting and **toggling an alarm** (ON/OFF)
* **Snooze functionality** (5-minute delay)
* **Visual & audio feedback** (LED & buzzer)

**2. Components Used**

| **Component** | **Quantity** | **Purpose** |
| --- | --- | --- |
| Arduino Uno | 1 | Main microcontroller |
| DS1307 RTC Module | 1 | Keeps accurate time |
| I2C LCD (16x2) | 1 | Displays time, date, and alarm status |
| Push Buttons | 5 | Set time, alarm, snooze, toggle alarm |
| Buzzer | 1 | Alarm sound |
| LED | 1 | Visual alarm indicator |
| Resistors (220Ω) | 1 | LED current limiting |
| Breadboard & Jumper Wires | - | Connections |

**3. Circuit Schematic**

**Wiring Diagram**

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Arduino Uno Pinout:

- A4 (SDA) → SDA (DS1307, LCD)

- A5 (SCL) → SCL (DS1307, LCD)

- D2 → Set Hour Button

- D3 → Set Minute Button

- D4 → Set Alarm Button

- D5 → Alarm Toggle Button

- D6 → Snooze Button

- D8 → Buzzer (+)

- D13 → LED (+)

- 5V → VCC (DS1307, LCD)

- GND → Common Ground

**Button Connections**

* All buttons are **INPUT\_PULLUP** (connect one side to Arduino pin, other to GND)
* No external resistors needed (internal pull-up used)

**4. Software Implementation**

**Key Features**

1. **Real-Time Clock (RTC)**
   * Uses RTClib to read time from DS1307.
   * Auto-sets time on first boot using compilation time.
2. **LCD Display**
   * Shows:
     + **Date (YYYY-MM-DD)**
     + **Time (HH:MM)**
     + **Alarm status (ON/OFF/DISABLED)**
3. **Alarm System**
   * **Toggle ON/OFF** with a dedicated button.
   * **Snooze** adds 5 minutes to alarm time.
   * **Buzzer & LED** activate when triggered.
4. **Button Handling**
   * **Debouncing** to prevent false triggers.
   * **Hold detection** for setting time/alarm.

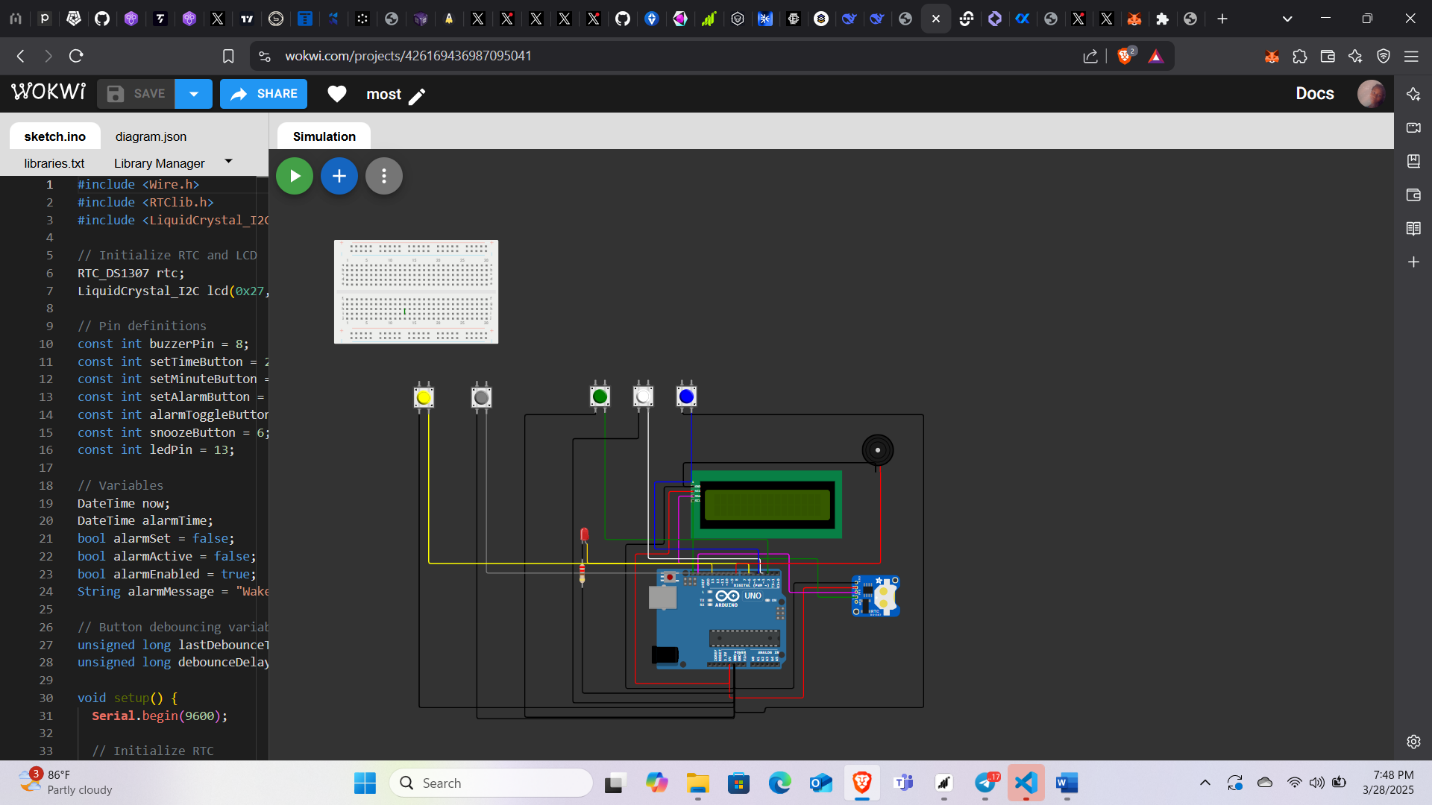
**5. Code Explanation**

**Key Functions**

| **Function** | **Description** |
| --- | --- |
| displayDateTime() | Shows current date & time on LCD |
| setTime() | Adjusts current hour |
| setMinute() | Adjusts current minute |
| setAlarmTime() | Sets alarm hour & minute |
| toggleAlarm() | Enables/disables alarm system |
| triggerAlarm() | Activates buzzer & LED |
| snoozeAlarm() | Delays alarm by 5 minutes |

**Button Logic**

| **Button** | **Action** |
| --- | --- |
| **Set Hour** | Increment hour (hold to adjust) |
| **Set Minute** | Increment minute (hold to adjust) |
| **Set Alarm** | Set alarm time (press to switch between hour & minute) |
| **Alarm Toggle** | Enable/disable alarm system |
| **Snooze** | Delay alarm when active |

**CONNECTIONS**