Arduino Alarm Clock User Manual

1. Product Overview

The Arduino Alarm Clock created by Arvin Ghaloosian is a versatile digital clock designed for embedded systems enthusiasts. Based on an Arduino Nano with a DS3231 RTC module and a 1.44" SPI TFT display, it offers advanced features for timekeeping, alarms, and customization.

2. Features

• Dual independent alarms (Alarm 1 & Alarm 2)

• Snooze function with 5-minute duration

• Multiple alarm melodies: Default beep, Star Wars, Harry Potter, Pink Panther

• 12/24-hour time display toggle

• Customizable time and date text colors (12 presets each)

• Automatic scene graphics (morning/day/evening/night) based on time of day

• Date display with day-of-week indicator

• Non-volatile settings stored in EEPROM

• RTC backup battery support for time retention during power loss

3. Hardware Layout

Component positions on the board (refer to silkscreen):

- • U1: Arduino Nano socket header
- • SW1: Alarm Set button
- • SW2: Cycle / Toggle Alarm button
- • SW3: Time Set button
- • SW4: Color Set button
- • SW5: Snooze / Time Format button
- • SW6: Date Set button
- • U3: Buzzer header
- • U5: RTC I^2C header
- • U6: TFT display SPI header
- • U4: Power input header

4. Powering the Clock

You can power the clock in two ways:

- Via the Arduino Nano mini-USB port
- Via regulated 5 V DC to the VIN pin and GND pin on the power header

Recommended current: ≥300 mA.

5. Display and Scene Graphics

The 1.44" TFT screen shows the current time, date, alarm status indicators, and a small scene graphic that switches between morning, day, evening, and night, based on real-time clock data.

6. Button Functions

Button	Short Press	Long Press
SW1 (Alarm Set)	Enter Alarm 1 setup	Enter Alarm 2 setup
SW2 (Cycle/Toggle Alarm)	Toggle alarms on/off	
SW3 (Time Set)	Enter time adjustment	
SW4 (Color Set)	Cycle time text color	Cycle date text color
SW5 (Snooze/Time Format)	Snooze/stop alarm or toggle 12/24-hr	Cycle alarm melody
SW6 (Date Set)	Enter date adjustment	

7. Setting Time and Date

- Press SW3 to enter time setup mode.
- Use SW4 to increment the hour (short press) or reset to 0 (long press).
- Press SW3 again to adjust minutes; confirm with SW3 to exit.

- Press SW6 to enter date setup mode. Adjust day, month, and year in sequence using SW4 and confirm each stage with SW6.

8. Alarm Configuration

- Short press SW1 to set Alarm 1: adjust hour & minute with SW4, confirm with SW1.
- Long press SW1 to set Alarm 2: adjust hour & minute with SW4, confirm with SW1.
- Use SW2 to toggle both alarms on or off.

9. Snooze and Alarm Off

When an alarm triggers:

- Short press SW5 to snooze for 5 minutes.
- Long press SW5 to turn off the alarm until its next scheduled time.

10. Melody Selection

With no alarm active, long press SW5 to cycle through available melodies:

- Default beep
- Star Wars theme
- Harry Potter theme
- Pink Panther theme

11. Color Customization

- Short press SW4 to cycle time text colors through preset options.
- Long press SW4 to cycle date text colors.

Settings are saved automatically in EEPROM.

12. Maintenance and Troubleshooting

- Keep the board and display free of dust; clean with a dry, lint-free cloth.
- Power cycle the device if it malfunctions.
- To reset settings, erase EEPROM via ISP or reload firmware.
- Ensure all headers (RTC, TFT, Arduino) are firmly seated.
- Replace the DS3231 backup battery if time drift is observed.

13. Technical Specifications

Parameter	Specification
Microcontroller	Arduino Nano (ATmega328P)
Display	1.44" 128×128 TFT SPI
RTC Module	DS3231 with backup battery
Power Supply	5 V DC via mini-USB or VIN @ ≥300 mA
Operating Temp.	0–50 °C
Board Size	100 × 60 × 15 mm