Homework

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***System Requirements**

1)	The clock shall be compact, desk-friendly, safe, and suitable for girls.
2)	The clock shall feature a pixel display with simple animations, clear visibility, and eye-catching appeal.
3)	The clock shall function as a smart robot, and fulfill all the functions of a clock.
4)	The clock shall be adaptively informative, intuitive, and smartly connected.
5)	The clock shall support Wi-Fi and Bluetooth connectivity, with companion applications for device configuration, wireless setup, brightness adjustment, calendar synchronization.
6)	The clock shall support direct interaction via physical controls.
7)	The clock shall support multiple charging options.
8)	The clock shall feature smartphone-scheduled alarms with visual display effects.

1. **The clock shall be compact, desk-friendly, safe, and suitable for girls.**
    1.1. The clock case should be a girly colour.
    1.2. The clock should have a rectangular block shape with rounded edges on all sides.
    1.3. It should be a compact, tabletop-style clock, with proportions similar to those shown in the original image.
    1.4. The case should have a smooth, matte finish.
2. **The clock shall feature a pixel display with simple animations, clear visibility, and eye-catching appeal.**
    2.1. The clock must feature a graphic display capable of rendering pixel art and animation, not just segmented LEDs. A dot-matrix LED array or a low-resolution monochrome OLED/LCD screen would be suitable, provided it can achieve the desired effect.
    2.2. The display area should be prominent, occupying most of the front face.

2.3. The display should primarily output in a vibrant lime green color, matching the original aesthetic, though it can have limited additional colors if necessary for richer robot eye expressions.

3. The clock shall function as a smart robot, and fulfill all the functions of a clock.

3.1. Default Display (Robot Eyes);

3.1.1. When idle, the display should prominently feature blinking robot eyes. These eyes should be expressive and animated, conveying a sense of "awareness" or personality.

3.1.2. The blinking should be natural and not repetitive.

3.1.3. The eyes can subtly change expression based on current events (e.g., slightly wider when an alarm is about to go off, a "sleepy" look at night).

3.2. Time Display:

3.2.1. When activated (e.g., by a button press, motion sensor, or schedule), the display should clearly show the time in a standard 12-hour format (e.g., "10:30 AM"). The 'AM'/'PM' indicator should be present.

3.2.2. The font for the time should be clear and readable, utilizing the graphic display's capabilities (e.g., pixel font).

3.2.3. The time display can be integrated around or within the robot eye animation, or briefly replace it, depending on the desired user experience.

4. The clock shall be adaptively informative, intuitive, and smartly connected.

4.1. Clear graphical indicators for Wi-Fi and Bluetooth connection status must be displayed (e.g., small icons that appear when connected/disconnected).

4.2. Calendar Events: When a Google Calendar event is upcoming or current, the display should provide a visual cue. This could be a change in the robot eye expression, a small icon, or briefly displaying event text (e.g., "MEETING @ 2PM").

4.3. Brightness: The display should have adjustable brightness settings, controllable through the device and the smartphone app, to prevent it from being too bright at night. The robot eye animations should also scale with brightness.

5. The clock shall support Wi-Fi and Bluetooth connectivity, with companion applications for device configuration, wireless setup, brightness adjustment, calendar synchronization.

5.1. Connectivity:

5.1.1. Wi-Fi: The clock must have an integrated Wi-Fi module (e.g., 2.4 GHz) to connect to a local network for time synchronization and other smart features.

5.1.2. Bluetooth: The clock must have an integrated Bluetooth module for initial setup via a smartphone app and potential future audio capabilities.

5.2. Smartphone App: A companion smartphone app (iOS and Android) is required for:

5.2.1. Initial Wi-Fi and Bluetooth setup, configuring robot eye animations and expressions, managing time display preferences.

5.2.2. Google Calendar Integration: Connecting to a user's Google Calendar account (via secure OAuth). The app will handle the authentication, syncing, and filtering of events. The clock should receive event notifications and data from the app.

5.2.3. Alarm management.

5.2.4. Brightness control.

5.3. **Timekeeping:** The clock should accurately display the current time, automatically synchronized via a Wi-Fi connection (using NTP - Network Time Protocol) to ensure accuracy.

5.4. **Google Calendar Display Logic:** The clock should display information about upcoming Google Calendar events. This could involve briefly showing the event title, time, or a special robot eye expression when an event is imminent. The display logic for cycling through events or prioritizing them should be configurable via the app.

6. **The clock shall support direct interaction via physical controls.**
   The device should include physical buttons (e.g., on top or back) for basic controls like:
   6.1. Displaying time/event on demand.
   6.2. Snooze alarm.
   6.3. Adjusting brightness.

7. **The clock shall support multiple charging options.**
   The clock should be powered by a USB cable or a wall adapter.

8. **The clock shall feature smartphone-scheduled alarms with visual display effects.**
   The clock should have an alarm function, controllable via the smartphone app. The alarm sound should be played through an integrated speaker. The robot eyes can change expression when an alarm sounds.