

## Digital watch modeling

John Lång and Suravi Saha roy

We designed a state model for a digital watch. It's a configurable watch with different modes. In the default screen, the current time is displayed. The watch has some other features too. Different clock features are:

1. Display the current time and date
2. Chrono display mode
3. Setting on and off the alarm
4. Switching on and off the stop watch
5. Edit time, date and alarm



### Functionalities:

1. The system starts in the time display mode. In this mode, the time (HH:MM:SS) and date (MM/DD/YY) are displayed. The time value is updated every second, even the watch is in chrono mode or any other states. But the time is not updated while editing.
2. Pressing the top right button turns on the background light. The light stays on for as long as the button remains pressed. From the moment the button is released, the light stays on for 2 more seconds, after which it is turned off.
3. Pressing the top left button alternates between the chrono and the time display modes.
4. When in chrono display mode, the elapsed time is displayed MM:SS:FF (with FF hundredths of a second). Initially, the chrono starts at 00:00:00. The bottom right button is used to start the chrono. The running chrono updates in 1/100 second increments. Subsequently pressing the bottom right button will pause/resume the chrono. Pressing the bottom left button resets the chrono to 00:00:00. The chrono will keep running (when in running mode) or keep its value (when in paused mode), even when the watch is in a different display mode (for example, when the time is displayed).
5. When in time display mode, the watch will go into time editing mode when the bottom right button is held pressed for at least 1.5 seconds.
6. When in time display mode, the alarm can be displayed and toggled between on or off by pressing the bottom left button. If the bottom left button is held for 1.5 seconds or more, the watch goes into alarm

editing mode. The first time alarm editing mode is entered, the alarm time is set to the previous alarm time so that the user can use the previous alarm time or edit it if needed. The alarm is activated when the alarm time is equal to the time in display mode. When it is activated, the screen will blink for 4 seconds, and then the alarm turns off. Blinking means switching to/from highlighted background twice per second. The alarm can be turned-off before the elapsed 4 seconds by a user interrupt if the top right button is pressed. After the alarm is turned off, it goes back to the time display mode.

7. When in (either time or alarm) editing mode, briefly pressing the bottom left button will increase the current selection. Note that it is only possible to increase the current selection, there is no way to decrease or reset the current selection. If the bottom left button is held down, the current selection is incremented automatically every 0.3 seconds. Editing mode should be exited if no editing event occurs for 5 seconds. Holding the bottom right button down for 2 seconds will also exit the editing mode.

### **Issues:**

Our digital watch model fulfills all the requirements of the given task, but two parts of behavior requirements 6 is implemented in different ways in our application. These are following:

1. We wanted to design the watch so that when the screen is blinking and the alarm is ringing, if the user press any button then the alarm will be turned off. But we faced a little difficulties with this feature. In our implementation, The alarm can be turned-off before the elapsed 4 seconds by a user interrupt if the top right button is pressed.
2. According to the task requirement the first time alarm editing mode is entered, the alarm time should be set to 12:00:00. In our case, when the first time alarm editing mode is entered, the alarm time is set to the previous alarm time so that the user can use the previous alarm time or edit it if needed.