CASIO F91W SIMULATOR USING MATLAB

AIM:

Write a program to simulate the basic functionalities of a Casio F91W digital watch using MATLAB.

SOFTWARE REQUIRED:

PC loaded with MATLAB software.

THEORY:

The Casio F91W is a classic digital watch known for its simplicity and functionality, including features like time display, date display, stopwatch, and backlight. This project involves simulating these functionalities using MATLAB's GUI capabilities.

The simulation includes the following features:

- **Clock Display:** Displays the current time in HH:MM:SS format.
- **Date Display:** Displays the current date in DD-MMM-YYYY format.
- **Stopwatch:** A stopwatch capable of starting, stopping, and resetting.
- **Backlight Simulation:** Changes the background color to simulate turning on/off the backlight.

The project is broken down into the following steps:

1. **Creating the GUI Layout:** Using MATLAB's `uicontrol` to design the interface for the watch, including text displays for time, date, and stopwatch, as well as buttons for controlling the stopwatch and backlight.
2. **Implementing Clock Functionality:** Using a timer object to update and display the current time and date every second.
3. **Implementing Stopwatch Functionality:** Using another timer object to track elapsed time in tenths of a second. The stopwatch can be started, stopped, or reset.
4. **Simulating Backlight:** Changing the background color of the GUI window to simulate toggling the backlight on or off.

PROGRAM CODE:

```
function casio_f91w_sim()
    % Create main figure
    f = figure('Name', 'Casio F91W Simulator By Amit Kumar', ...
```

```
            'Color', [0 0 0], ...
            'Position', [500 300 300 250], ...
            'NumberTitle', 'off', ...
            'Resize', 'off');

    % Clock display
    hTime = uicontrol('Style', 'text', ...
                      'FontSize', 24, ...
                      'FontWeight', 'bold', ...
                      'ForegroundColor', 'green', ...
                      'BackgroundColor', 'black', ...
                      'Position', [50 160 200 50]);

    % Date display
    hDate = uicontrol('Style', 'text', ...
                      'FontSize', 12, ...
                      'ForegroundColor', 'cyan', ...
                      'BackgroundColor', 'black', ...
                      'Position', [100 135 100 30]);

    % Stopwatch display
    hStopwatch = uicontrol('Style', 'text', ...
                           'FontSize', 18, ...
                           'ForegroundColor', 'yellow', ...
                           'BackgroundColor', 'black', ...
                           'Position', [80 100 140 30], ...
                           'String', '00:00.0');

    % Stopwatch control buttons
    uicontrol('Style', 'pushbutton', 'String', 'Start/Stop', ...
              'Position', [30 60 80 30], ...
              'Callback', @toggleStopwatch);
    uicontrol('Style', 'pushbutton', 'String', 'Reset', ...
              'Position', [120 60 60 30], ...
              'Callback', @resetStopwatch);
    uicontrol('Style', 'pushbutton', 'String', 'Light', ...
              'Position', [190 60 60 30], ...
              'Callback', @toggleBacklight);

    % Timer for clock
```

```
    clockTimer = timer('ExecutionMode', 'fixedRate', ...
                       'Period', 1, ...
                       'TimerFcn', @updateClock);
    start(clockTimer);

    % Timer for stopwatch
    swTimer = timer('ExecutionMode', 'fixedRate', ...
                    'Period', 0.1, ...
                    'TimerFcn', @updateStopwatch);
    swRunning = false;
    swTime = 0;

    % Toggle stopwatch start/stop
    function toggleStopwatch(~, ~)
        swRunning = ~swRunning;
        if swRunning
            start(swTimer);
        else
            stop(swTimer);
        end
    end

    % Reset stopwatch
    function resetStopwatch(~, ~)
        swTime = 0;
        set(hStopwatch, 'String', '00:00.0');
    end

    % Update stopwatch display
    function updateStopwatch(~, ~)
        swTime = swTime + 0.1;
        minutes = floor(swTime / 60);
        seconds = floor(mod(swTime, 60));
        tenths = floor(mod(swTime * 10, 10));
        swStr = sprintf('%02d:%02d.%d', minutes, seconds, tenths);
        set(hStopwatch, 'String', swStr);
    end

    % Update clock every second
    function updateClock(~, ~)
```

```
        t = datetime('now');
        timeStr = datestr(t, 'HH:MM:SS');
        dateStr = datestr(t, 'dd-mmm-yyyy');
        set(hTime, 'String', timeStr);
        set(hDate, 'String', dateStr);
    end

    % Toggle backlight
    lightOn = false;
    function toggleBacklight(~, ~)
        lightOn = ~lightOn;
        if lightOn
            f.Color = [0.2 0.5 0.6];  % Light on (blue-ish)
        else
            f.Color = [0 0 0];        % Light off (black)
        end
    end

    % Clean up timers when window is closed
    f.CloseRequestFcn = @(src, event) cleanup();

    function cleanup()
        stop(clockTimer);
        delete(clockTimer);
        if isvalid(swTimer)
            stop(swTimer);
            delete(swTimer);
        end
        delete(f);
    end
end
```

RESULT:

Hence, a Casio F91W simulator with functionalities like clock display, date display, stopwatch control, and backlight simulation has been successfully implemented using MATLAB.