

REPORT ON **“DIGITAL CLOCK USING MATLAB”** USING MATLAB

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CERTIFICATE

This is to certify that the project report entitled **“Digital Clock Using Matlab”** is submitted by

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In partial fulfilment of the requirements for the award of BACHELOR OF TECHNOLOGY degree in ELECTRONICS AND COMMUNICATION ENGINEERING from SREENIDHI INSTITUTE OF SCIENCE AND TECHNOLOGY affiliated to JAWAHARLAL NEHRU TECHNOLOGY UNIVERSITY, HYDERABAD (Telangana). This is a record of Bonafide work carried out by him/her during the academic year 2022-2023 under our guidance and evaluation.

NAME OF INTERNAL GUIDE

Dr.ASHA DEVI,
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DECLARATION

We hereby declare that the work described in this project report “Digital Clock Using Matlab” titled which is being submitted by us in partial fulfillment for the award of Bachelor of Technology in the Department of Electronic and Communication Engineering, Sreenidhi Institute Of Science and Technology is the result of investigations carried out by us under the guidance of Mrs.Dr.Asha Devi , professor, Department of ECE, Sreenidhi Institute of Science and Technology, Hyderabad.

PLACE : Hyderabad

DATE :

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Abstract

Creating a digital clock in MATLAB involves leveraging its graphical user interface (GUI) capabilities and programming functionalities to display and continuously update the current time. The digital clock application primarily focuses on providing an accurate representation of time in hours, minutes, and seconds ('HH:mm:ss' format), complemented optionally by date display ('HH:mm:ss dd-mmm-yyyy'). Key features include real-time updating using MATLAB's datetime function and timer object, ensuring precise timekeeping without manual intervention.

Additional functionalities such as start/stop controls for time updating, alarm setting capabilities, and customizable appearance options enhance user interaction and customization. MATLAB's versatile GUI development tools, including App Designer and programmatically created interfaces, facilitate the creation of a user-friendly and visually appealing digital clock application adaptable to various preferences and usage scenarios.

This abstract encapsulates the core elements and functionalities involved in building a digital clock application in MATLAB, highlighting its educational value in GUI design, event-driven programming, and real-time data handling within the MATLAB environment.

Introduction

In today's digital age, the ability to accurately track time is crucial across various applications and disciplines. MATLAB, a powerful numerical computing environment, offers robust tools for developing applications with graphical user interfaces (GUIs), making it an ideal platform for creating digital clocks. A digital clock serves not only as a practical utility for displaying real-time information but also as a fundamental exercise in GUI design, event handling, and real-time data synchronization.

MATLAB provides developers with two primary approaches to building digital clocks: using the intuitive App Designer for graphical interface design or programming directly through MATLAB scripts. App Designer simplifies the creation process by allowing developers to visually design interfaces through drag-and-drop components like labels and buttons. This approach streamlines the development of aesthetically pleasing and functional digital clocks, suitable for users ranging from beginners to advanced developers seeking rapid prototyping capabilities.

Alternatively, programming the digital clock in MATLAB offers greater flexibility and control over customization. Developers can define the layout, appearance, and behavior of each GUI component programmatically, catering to specific design requirements or advanced features not readily achievable through the visual interface of App Designer. This method also provides a deeper understanding of MATLAB's scripting capabilities and event-driven programming paradigms, essential for implementing dynamic and interactive digital clocks.

Both approaches leverage MATLAB's inherent strengths in numerical computation and data visualization, ensuring accurate time representation through functions like `datetime` for time retrieval and formatting. Real-time updating, facilitated by MATLAB's timer object, guarantees continuous synchronization of displayed time with system time, enhancing the clock's reliability and responsiveness.



Description

For those who prefer a more hands-on approach, MATLAB allows for programmatically creating figures and UI components. This method offers greater flexibility in layout and styling but requires explicit positioning and formatting commands. Regardless of the approach chosen, the central challenge is ensuring the displayed time is updated in real-time.

To achieve this, MATLAB's `datetime` function retrieves the current system time, which you format to display hours, minutes, and seconds ('HH:mm:ss'). This formatted time can then be dynamically updated using a timer object. The timer executes a specified function at regular intervals, ensuring the displayed time remains accurate without manual intervention.

Enhancements to the basic digital clock can include displaying additional information such as the date ('HH:mm:ss dd-mmm-yyyy'), implementing start/stop controls for the timer to pause and resume time updates, or adding features like alarms or notifications triggered at specific times. These additions not only enrich the functionality of the clock but also provide opportunities to explore more advanced aspects of MATLAB's GUI capabilities and event handling.

In practice, creating a digital clock serves as a practical exercise in GUI development, event-driven programming, and real-time data handling within MATLAB. Whether approached through the graphical ease of App Designer or the programmatically precise method, building a digital clock underscores MATLAB's versatility in creating interactive applications tailored to user needs and preference.

Matlab code :

```
function digital_clock_with_date()

% Create a figure window
hFig = figure('Name', 'Digital Clock', 'NumberTitle', 'off', ...
             'MenuBar', 'none', 'ToolBar', 'none', 'Color', 'k');

% Set up the axes
hAx = axes('Parent', hFig, 'Position', [0 0 1 1], 'XColor', 'k', 'YColor', 'k');
set(hAx, 'XTick', [], 'YTick', [], 'XLim', [0 1], 'YLim', [0 1]);

% Add a title to the figure
title(hAx, 'Digital Clock', 'Color', 'w', 'FontSize', 20, 'FontWeight', 'bold');

% Initialize text objects for displaying the time and date
hTextTime = text(0.5, 0.5, '', 'FontSize', 40, 'Color', 'r', ...
                'FontWeight', 'bold', 'HorizontalAlignment', 'center', 'VerticalAlignment',
'middle');
hTextDate = text(0.5, 0.4, '', 'FontSize', 30, 'Color', 'r', ...
                'FontWeight', 'bold', 'HorizontalAlignment', 'center', 'VerticalAlignment',
'middle');

% Loop to update the clock every second
while ishandle(hFig)
    % Get the current time
    currentTime = datetime('now');
    currentTimeStr = datestr(currentTime, 'HH:MM:SS');
    currentDateStr = datestr(currentTime, 'dddd');
    currentDateStr = datestr(currentTime, 'mmmm dd, yyyy');

    % Update the text objects
```

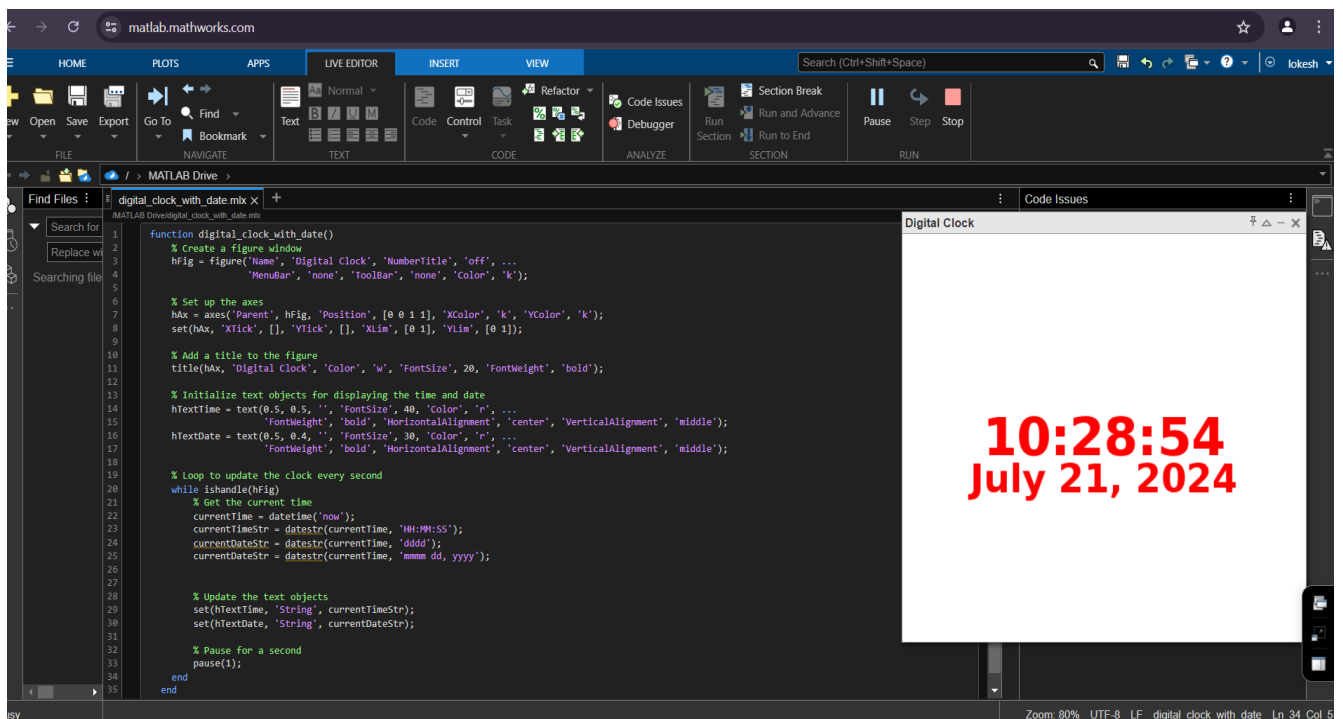
```

set(hTextTime, 'String', currentTimeStr);
set(hTextDate, 'String', currentDateStr);

% Pause for a second
pause(1);
end
end

```

Result :



Advantages:

1. Ease of GUI Development:

2. **Integration with MATLAB's Capabilities.**
3. **Flexibility and Customization.**
4. **Real-Time Updating.**
5. **Educational and Practical Application.**

Disadvantages:

1. **Complexity in Programmatic Approach.**
2. **Performance Considerations.**
3. **Learning Curve for Beginners.**
4. **Limited Native Styling Options.**
5. **Platform Dependency.**

Features:

Advanced features like time zone selection accommodate global usage scenarios by allowing users to view and switch between different time zones. This capability is beneficial for applications used across regions or by users in diverse geographic locations.

Conclusion:

In conclusion, creating a digital clock in MATLAB allows you to incorporate a range of features that go beyond basic time display. Whether enhancing usability with alarms and customization options or catering to international users with time zone selection, MATLAB's capabilities empower you to build a versatile and user-friendly digital clock application tailored to diverse needs and preferences.

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