Software Engineering Lab 4: Prototyping

Software Engineering Lab: MATLAB App Designer Prototype Development

Lab Overview: In this lab, students will create a software prototype using MATLAB's App Designer to solidify foundational skills in graphical user interface (GUI) development. The lab emphasizes hands-on experience with creating and refining software components, managing requirements, and tracking software evolution through GitHub. Each student will build two prototype applications, one for basic GUI development and the other replicating a given design.

Learning Objectives: This lab aligns with the course objectives by engaging students in the following:

- **Software Life Cycle Awareness**: Students work through the design, development, and version control phases of software engineering by creating small-scale software applications.
- **Requirements Definition and Analysis**: Students practice translating design requirements into a functional GUI using App Designer, a skill critical to requirements analysis.
- **Design and Development**: Through hands-on prototype creation, students learn how to design user interfaces, configure components, and implement basic functionality in MATLAB, integrating software with system components.
- **Software Process Improvement**: The iterative design process in this lab helps students understand the value of prototyping and user feedback in improving software usability.
- **Systems Engineering Context**: By building functional prototypes, students see how individual software applications integrate within larger systems, reinforcing the systems engineering framework and addressing software engineering issues in practice.

Part 1: Creating a Basic Reservation GUI

Objectives: Build a simple GUI that demonstrates key design elements and basic functionality.

1. **Interface Layout**:
    - Create a figure with two panels using MATLAB's App Designer.
    - Label the first panel "Settings" and remove the label from the second panel.
2. **Settings Panel**:
    - Add a dropdown menu labeled "Selection" with options "Steak," "Salad," and "None."
    - Include a text input box labeled "Party Name."
    - Add a numeric input box labeled "Guest(s)" and set the default value to `0`.
    - Place a button labeled "Submit" below the input fields.

3. **Axes Panel**:
    - Add an axes component to the second panel, remove tick marks and labels.
    - Add a box around the axis and change the background color to black.
4. **Saving and Documentation**:
    - Save the application as `<firstname>_reservation.app` in the `labs/lab_4/part_1_reservations` folder.
    - Run the application, take a screenshot, and save it as `<firstname>_reservation.jpg` (or .png/.jpeg).
    - Commit the `.app` file and screenshot to the `labs` branch of the class GitHub repository.

Part 2: Reproducing the UGV Operations GUI

Objectives: Develop a more complex GUI based on a provided design example, further reinforcing layout replication and component configuration.

1. **Reproducing Design**:
    - Access the reference screenshot `ugv_ops_gui.png` located in `labs/lab_4/part_2_ugv_ops/`.
    - Using MATLAB's App Designer, replicate the design as accurately as possible.
    - The labs/lab_4/summary_template.html file can be used for the source of your HTML widget shown under the Simulation panel.
2. **Saving and Documentation**:
    - Save the final prototype as `<firstname>_ugv_prototype.app` in the `labs/lab_4/part_2_ugv_ops` folder.
    - Run the application, capture a screenshot, and save it as `<firstname>_ugv_prototype.jpg`. (or .png, .jpeg)
    - Commit both the `.app` file and screenshot to the `labs` branch on GitHub.

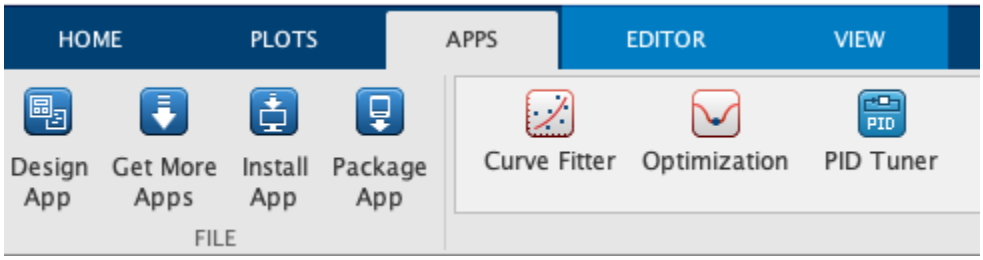
Submission Requirements:

1. Ensure that all files, including `.app` files and screenshots, are placed in the appropriate folders within `labs/lab_4`.
2. Commit and push your work to the `labs` branch on GitHub under `labs/lab_4`.

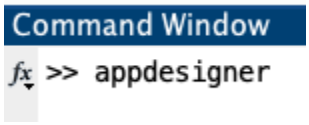
Appendix

Starting App Designer

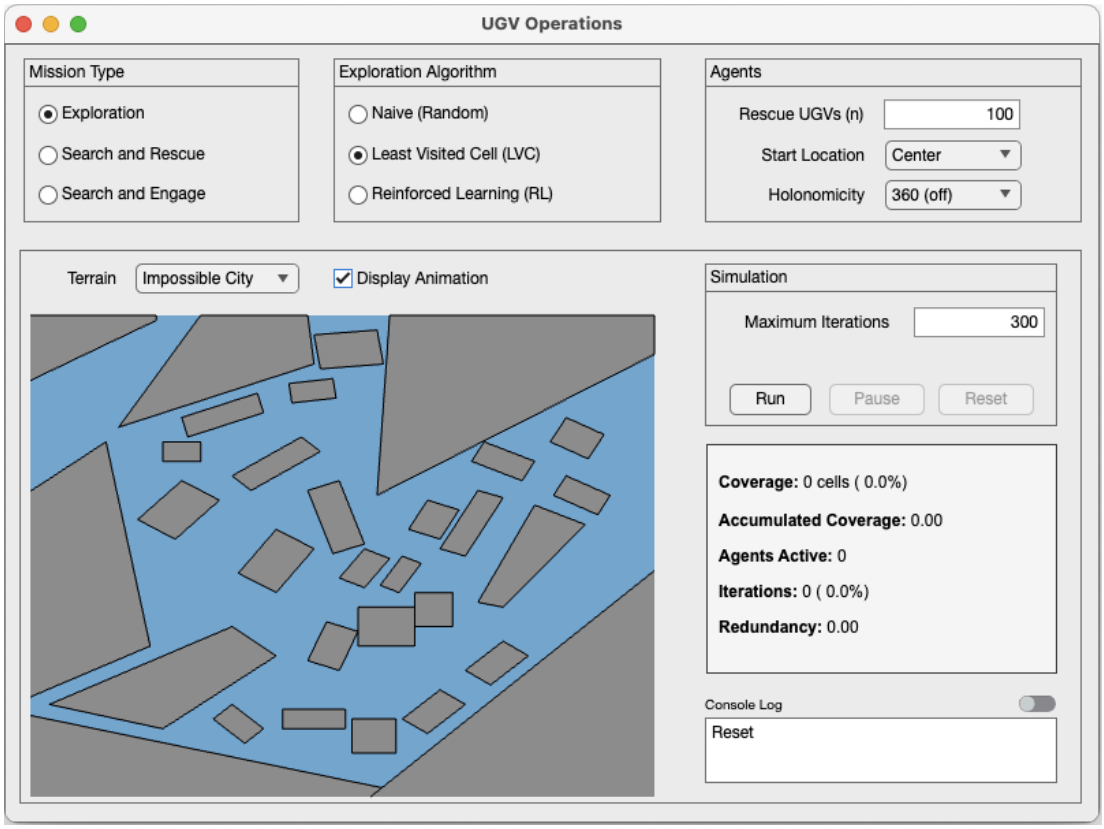
Open MATLAB
Select APPS from the ribbon bar at the top.
Click 'Design App'



Or from the command window: `appdesigner`



ugv_ops_gui image



summary_template.html

```
<html>
    <head>
        <style>
            body { font-family: "Arial", sans-serif; font-size: 12px;
background-color: #fafafa; border: 1px solid #444; padding: 8px; }
            h2 { font-size: 14px; }
            .info { display: flex; align-items: center; margin-bottom: -10px;}
        </style>
    </head>

    <body>
        <div class="info">
            <p><b>Coverage:</b>   0 cells ( 0.0%)</p>
        </div>
        <p><b>Accumulated Coverage:</b> 0.00</p>
        <p><b>Agents Active:</b> 0</p>
        <p><b>Iterations:</b>   0 ( 0.0%)</p>
        <p><b>Redundancy:</b> 0.00</p>
    </body>
</html>
```