Java Developer Internship

Final project report

Project Title: Smart Weather Forecast Application Using JavaFX

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Submitted To: Elevate Labs

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A Journey Through Building the Weather Forecast App

1. What We Set Out to Build

- A smart weather forecasting app built using JavaFX.
- Focused on modern UI with live API integration, responsive charts, and light/dark mode.
- Added real-life features like auto-detect location, favorite cities, and theme switch.

2. Phase 1: Project Setup and API Integration

- ✓ **JavaFX + Maven Project Setup** using Eclipse IDE.
- ✓ Integrated **OpenWeatherMap API** to fetch real-time and 5-day forecast.
- ✓ Fetched and parsed JSON using **Gson** for weather, humidity, condition, and icons.
- ✓ Auto-detected user's city using **IP-API**.
- ✓ Setup **initial UI layout** with FXML and applied default light theme.

3. Phase 2: UI Features and Visual Enhancements

3.1 Real-Time Weather & Forecast Table

- Displayed current temperature, humidity, condition, and weather icon.
- Implemented a TableView for 5-day daily forecast with:
    - Date
    - Average temperature
    - Weather condition

3.2 Temperature Line Chart

- Added a `LineChart` to visualize the 5-day temperature trend.
- Updated dynamically based on user search or auto-detect city.
- Made the chart clean and minimal with labeled axes.

3.3 Dark Mode Toggle

- Implemented a `ToggleButton` to switch between:
    - 😊 Light theme (`light-theme.css`)
    - 🌙 Dark theme (`dark-theme.css`)
- Scene styles updated dynamically based on toggle selection.

4. Phase 3: Favorites, ComboBox, and City Management

4.1 Autocomplete Dropdown (ComboBox)

- Replaced the plain input field with an editable `ComboBox`.
- Pre-filled with popular cities like Mumbai, Delhi, Bengaluru.
- User can select, type, or autocomplete city names.

4.2 Add-to-Favorites

- Added a button to let users add typed city to the dropdown list.
- Prevented duplicates in favorite cities.

4.3 Auto-Detect on Launch

- App fetches city from IP address (`http://ip-api.com/json`).

- Automatically sets cityComboBox to detected value and fetches weather.

5. Tools & Technologies Used

TOOL/LIBRARY	PURPOSE
JAVAFX	GUI framework for desktop UI
GSON	JSON parsing
OPENWEATHERMAP API	Real-time weather data
IP-API	Geolocation using IP
ECLIPSE IDE	Development Environment
SCENEBUILDER (OPT)	Visual FXML layout (if used)
JAVAFX CHARTS	Temperature LineChart
CSS	Custom theming (light/dark mode)

6. Testing & Validation

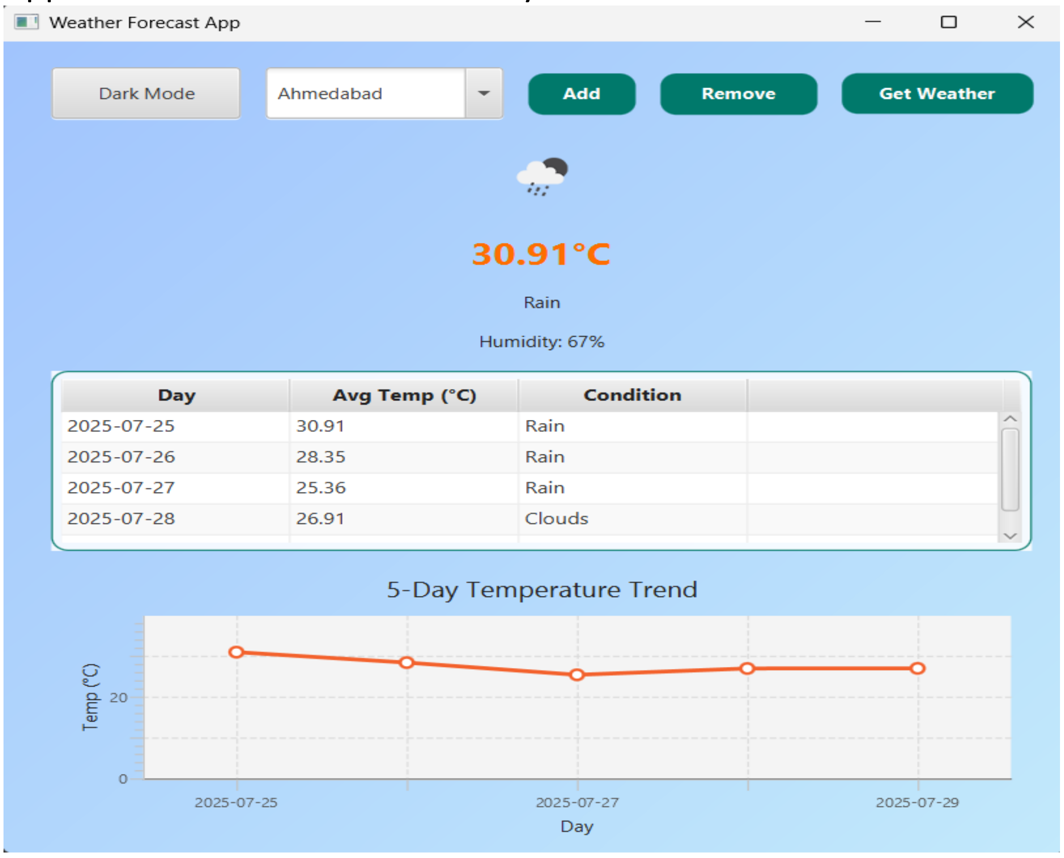
- ✅ Validated against city names: valid, invalid, empty input.
- ✅ Chart and table tested for dynamic updates.
- ✅ Dark/light theme switches without error.
- ✅ App startup tested with no internet, fallback error logging.
- ✅ ComboBox allows manual typing and selection both.

7. Challenges Faced

- ❗ Scene being null during initialize() — fixed using sceneProperty() listener.
- ❗ FXML styling applied too early — resolved by lazy theme loading.
- ❗ ComboBox and editable input handling logic needed refinement.
- ❗ Handling API key securely – was manually inserted (can be improved with config).
- ❗ LineChart flickering with too many updates — optimized with single series.

8. Screenshots

- App launch with auto-detected city



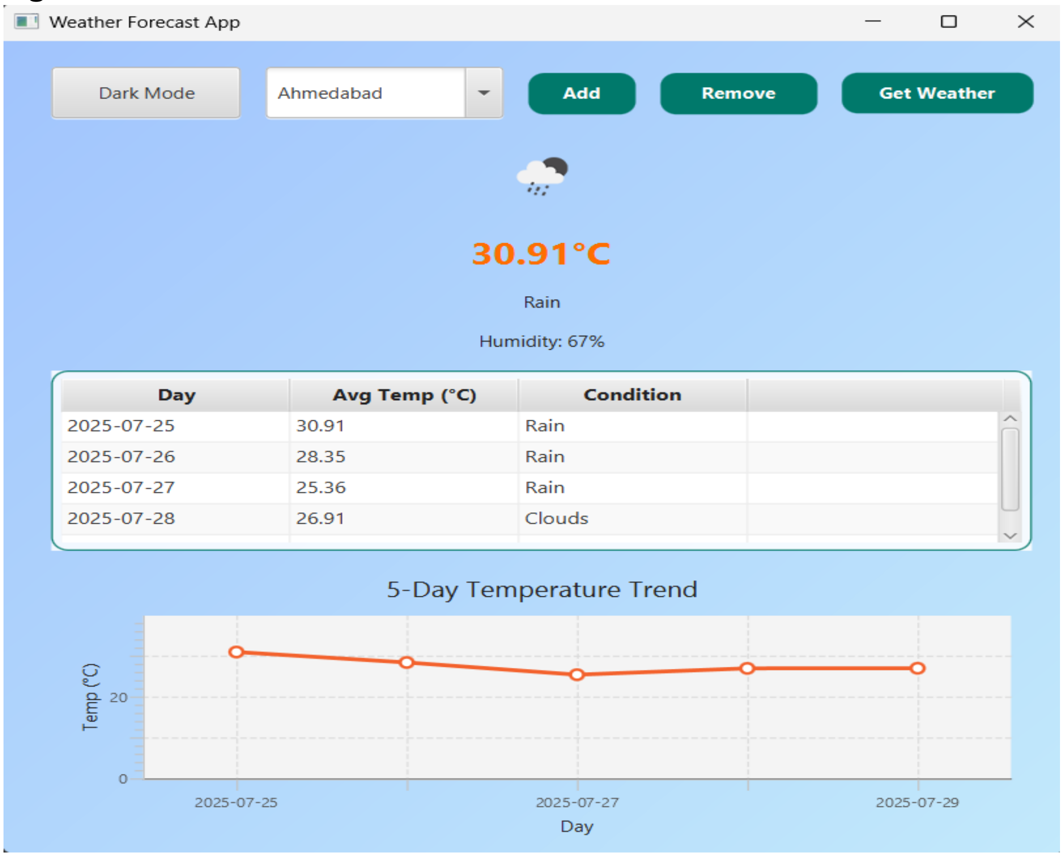
30.91°C

Rain

Humidity: 67%

Day	Avg Temp (°C)	Condition
2025-07-25	30.91	Rain
2025-07-26	28.35	Rain
2025-07-27	25.36	Rain
2025-07-28	26.91	Clouds

- Light themes



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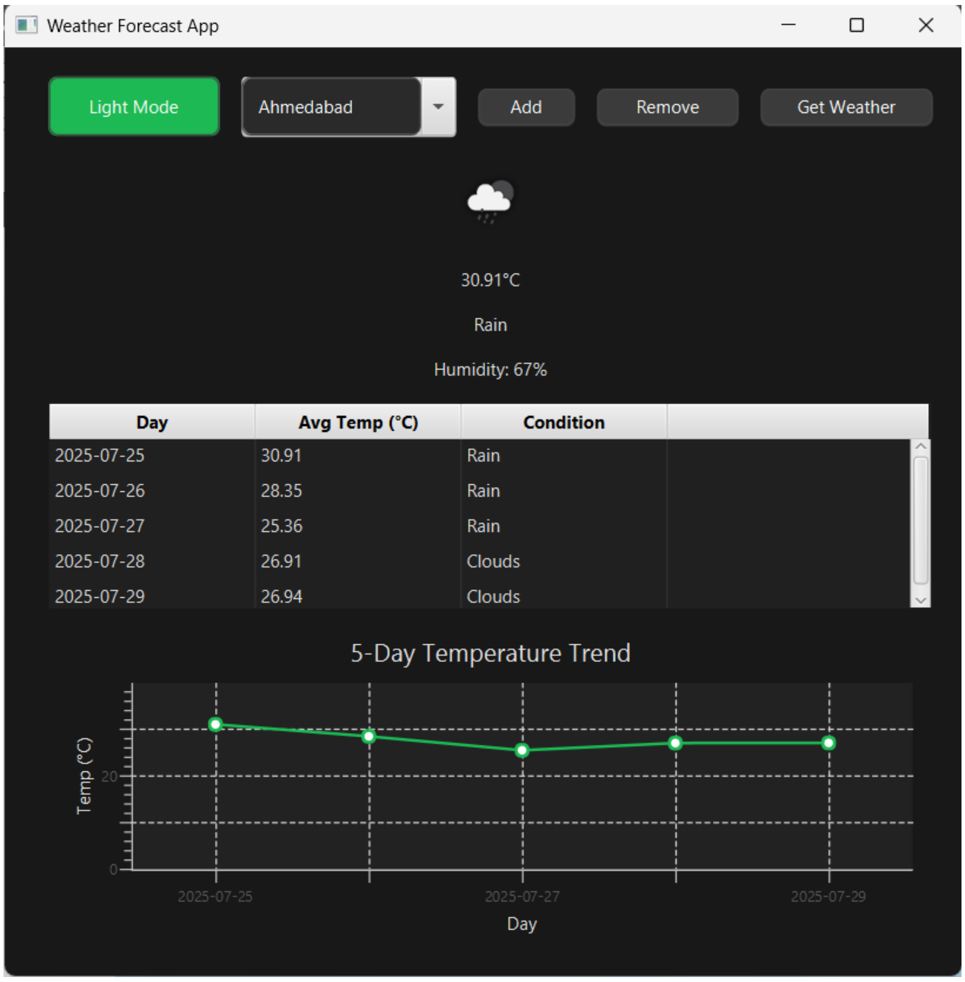
- Dark themes



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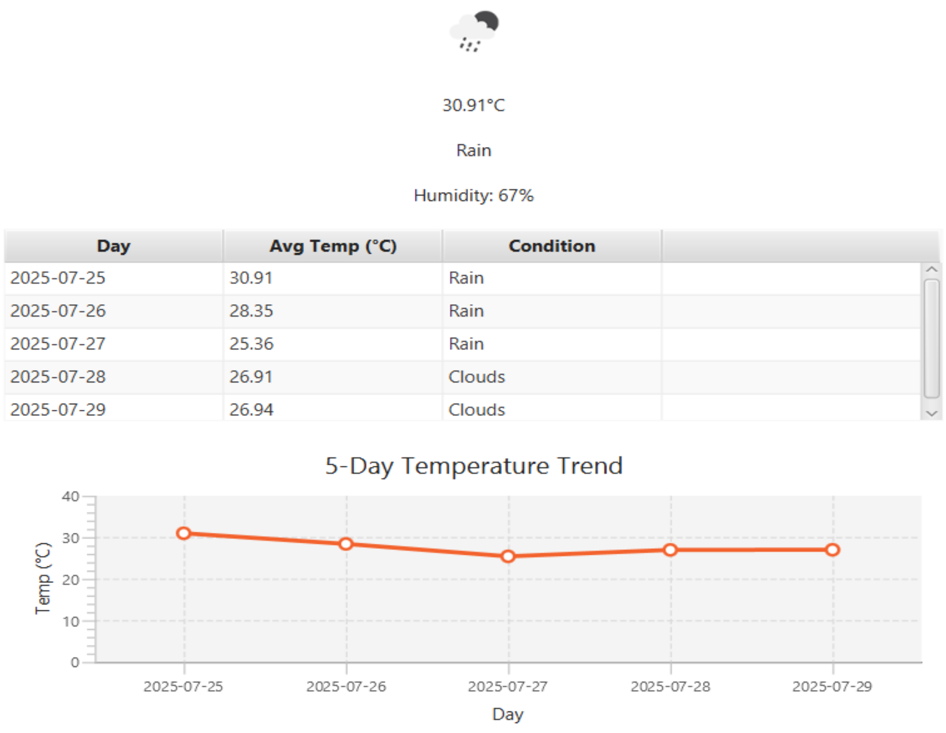
2025-07-27	25.36	Rain
2025-07-28	26.91	Clouds
2025-07-29	26.94	Clouds

- Forecast Table with weather icons



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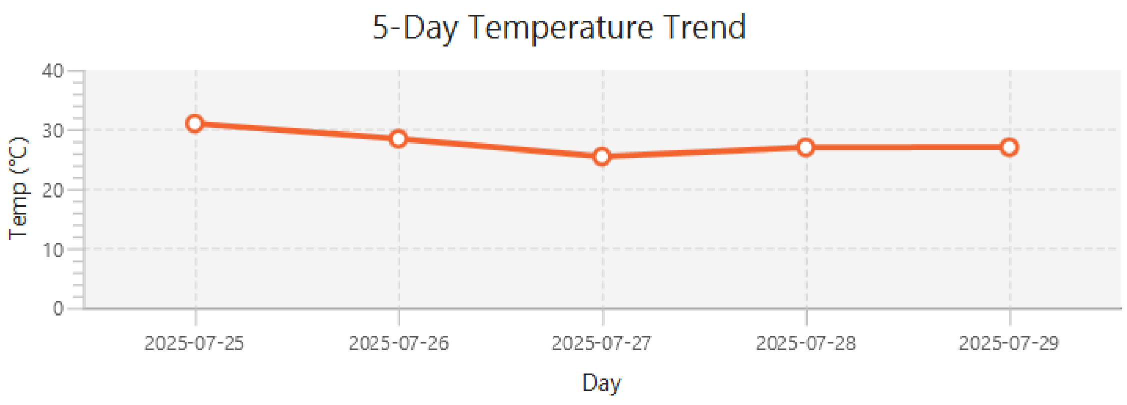
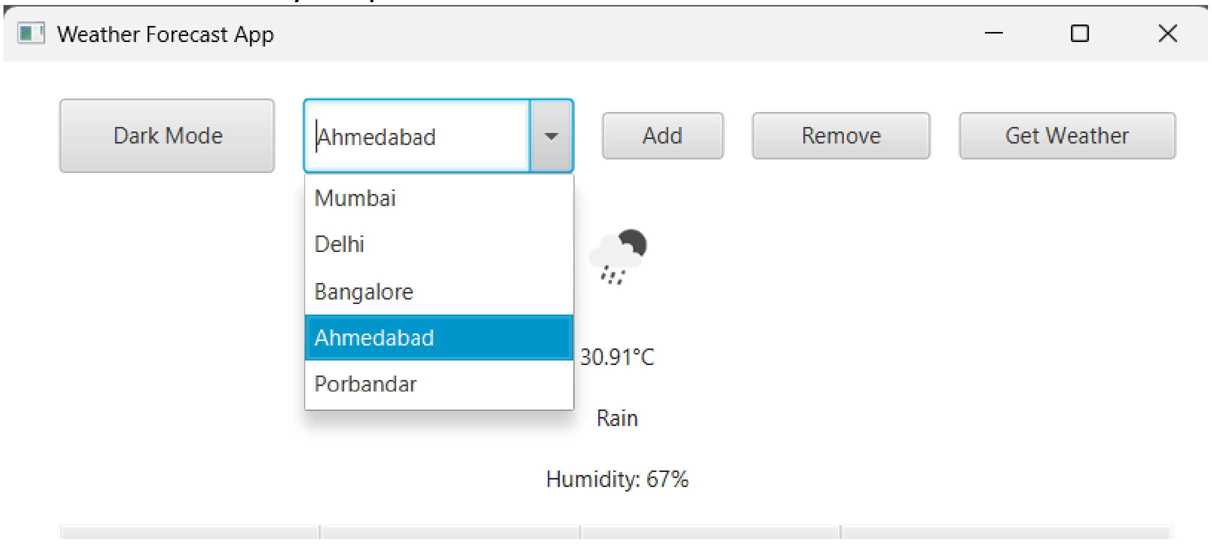
- Temperature Chart



- ComboBox with city dropdown



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9. Outcome & Conclusion

- ✓ Fully working real-time JavaFX weather app.
- ✓ Auto-detects city, lets user search, and visualizes forecast clearly.
- ✓ Combines good design with responsive components and public APIs.
- ✓ Ready to scale further with future enhancements.