SmartWeather

Local, Real-time Weather Information

Group Members: Matt Laskowski, Mike Fillinger, Sam Yalda, Sayman Zaya

OAKLAND
UNIVERSITY

SCHOOL OF ENGINEERING
AND COMPUTER SCIENCE

4/22/2025

The Problem:

- People need quick, accurate, and user-friendly access to weather information, but many existing apps fall short.

- 80% of Americans were impacted by disruptive weather and heat waves during summer 2024.

- Despite the availability of over 10,000 weather apps across major platforms, many fail to provide timely, localized, and accurate weather information.

Key Issues:

- Overwhelming or cluttered interfaces make it hard for users to find what they need.

- Lack of local data limits decision-making for users based on their specific location.

- Not all apps offer important metrics like UV Index, AQI, and hourly forecasts in one place.

Relevance:

Why SmartWeather Matters:

- Approximately 80% of Americans check the weather daily, with 60% doing so multiple times a day.

- Global weather app market is projected to double by 2033, showing increasing demand.

- Weather affects daily planning, health, and safety

- Accurate weather updates can prevent harm

- Useful for travelers, athletes, everyday users, etc

Selected Requirements:

2.1 Functional Requirements

- The application shall allow users to search for weather by using their location or searching for a city.
- The application shall display real-time weather data, including:
  - Temperature in Celsius
  - Temperature in Fahrenheit
  - Wind speed in km/h and mph
  - Humidity percentage
  - Precipitation level in mm and inches
- The application shall provide a 7-day weather forecast, including:
  - Daily high and low temperatures
  - Expected precipitation percentage
  - Wind speed forecast
  - General weather conditions (e.g., sunny, cloudy, rainy)
- The application shall display an hourly forecast for up to 24 hours, including:
  - Hourly temperature
  - Hourly precipitation chance
  - Hourly wind speed in km/h and mph

- The application shall allow users to toggle between Celsius and Fahrenheit for temperature display.
  - Users shall be able to switch between Celsius and Fahrenheit from the settings menu.
  - The application shall remember the user's preferred temperature unit across sessions.
- The application shall provide a feels-like temperature based on humidity, wind speed, and air pressure.
  - The application shall display both the actual and feels-like temperature side by side for user comparison.
  - Feels-like temperature shall update dynamically based on real-time weather data.

1. **User Interface and Experience**
   - The application shall have a user-friendly UI with smooth navigation.
   - The UI shall be visually appealing, accessible, and responsive across various devices and screen sizes.
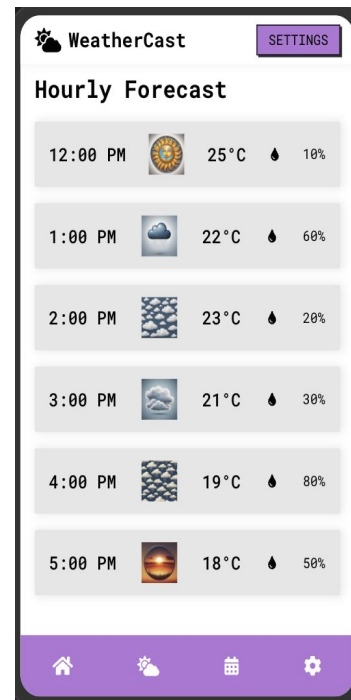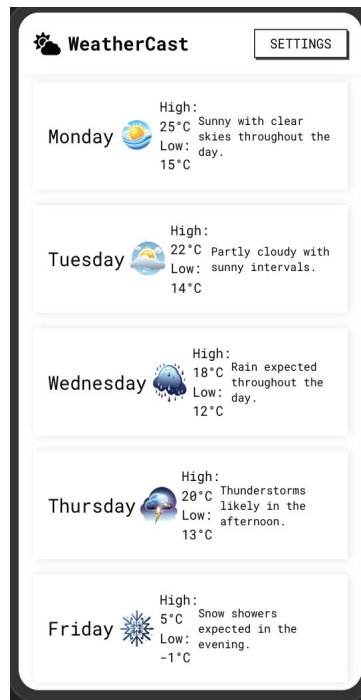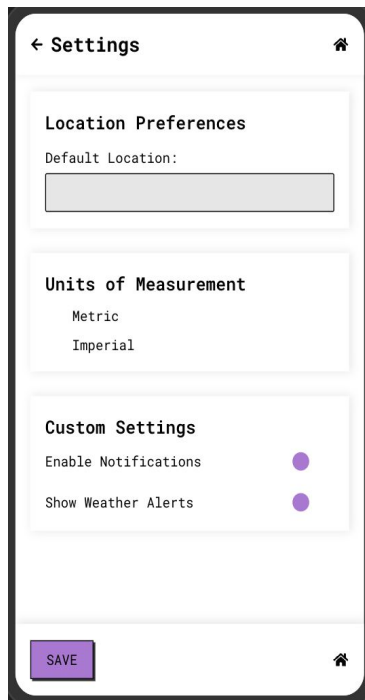   - The application shall support dark mode for user preference.
2. **Data Accuracy and Update Frequency**
   - Weather data shall be updated from the API every 10 minutes for accuracy.
   - The system shall fetch real-time updates without noticeable delays.
   - The application shall guarantee consistency of weather data across different views.
3. **General Performance**
   - The system shall support multiple simultaneous users.
   - Response time for fetching weather data shall be less than 2 seconds under normal conditions.
   - The application shall handle increased traffic during severe weather conditions without crashing.

Mock UI

WeatherCast | Switch City

Detroit
68°F
Partly Cloudy

Humidity
72%

Wind
5 mph

Daily Forecast   Hourly Forecast

← **Settings**

Location Preferences

Default Location:

Units of Measurement

Metric

Imperial

Custom Settings

Enable Notifications

Show Weather Alerts

SAVE

WeatherCast | SETTINGS

Monday
High: 25°C
Low: 15°C
Sunny with clear skies throughout the day.

Tuesday
High: 22°C
Low: 14°C
Partly cloudy with sunny intervals.

Wednesday
High: 18°C
Low: 12°C
Rain expected throughout the day.

Thursday
High: 20°C
Low: 13°C
Thunderstorms likely in the afternoon.

Friday
High: 5°C
Low: -1°C
Snow showers expected in the evening.

WeatherCast | SETTINGS

Hourly Forecast

12:00 PM		25°C		10%
1:00 PM		22°C		60%
2:00 PM		23°C		20%
3:00 PM		21°C		30%
4:00 PM		19°C		80%
5:00 PM		18°C		50%

Product Showcase / Technical Overview:

Development:

- Developed using Flutter which supports building high-performance, cross-platform applications from a single codebase. This makes it easier to later deploy to web, Android, and iOS in future versions.

WeatherAPI Integration:

- SmartWeather fetches live weather data through the "WeatherAPI" service, known for its accuracy, real-time updates, and wide-ranging weather metrics.

Security features:

- The API key is securely stored using a .env file the user must create.

- Input & Error Handling: The app checks for empty inputs, invalid cities, and connection errors to avoid crashes.
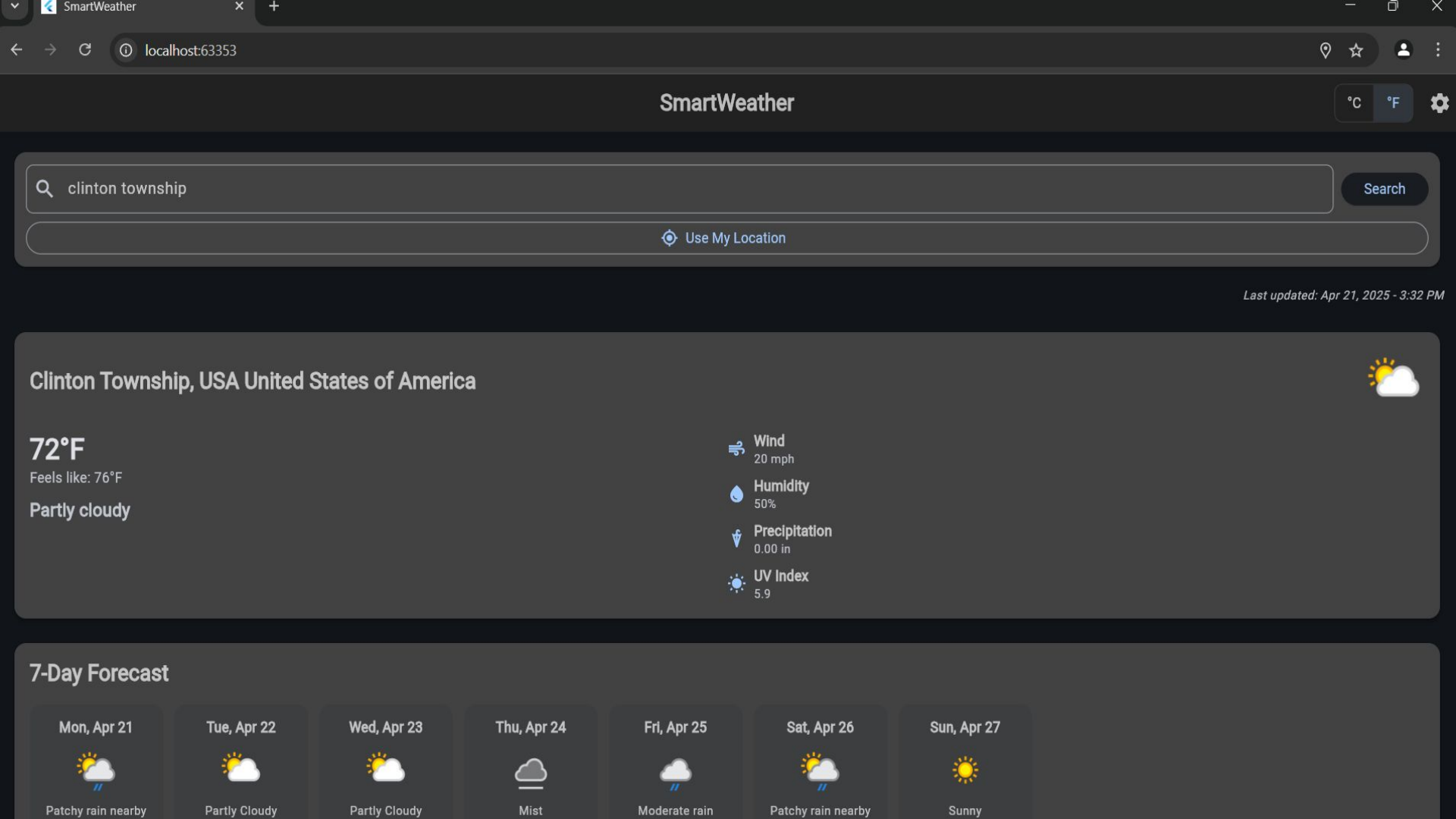
SmartWeather

°C °F

clinton township

Search

◎ Use My Location

Last updated: Apr 21, 2025 - 3:32 PM

Clinton Township, USA United States of America

72°F

Feels like: 76°F

Partly cloudy

Wind
20 mph

Humidity
50%

Precipitation
0.00 in

UV Index
5.9

7-Day Forecast

Mon, Apr 21	Tue, Apr 22	Wed, Apr 23	Thu, Apr 24	Fri, Apr 25	Sat, Apr 26	Sun, Apr 27
Patchy rain nearby	Partly Cloudy	Partly Cloudy	Mist	Moderate rain	Patchy rain nearby	Sunny

7-Day Forecast

Mon, Apr 21
Patchy rain nearby
High: 68°F
Low: 44°F
Rain: 77%
Wind: 20 mph

Tue, Apr 22
Partly Cloudy
High: 64°F
Low: 42°F
Rain: 0%
Wind: 16 mph

Wed, Apr 23
Partly Cloudy
High: 66°F
Low: 49°F
Rain: 0%
Wind: 9 mph

Thu, Apr 24
Mist
High: 71°F
Low: 45°F
Rain: 0%
Wind: 10 mph

Fri, Apr 25
Moderate rain
High: 62°F
Low: 57°F
Rain: 85%
Wind: 9 mph

Sat, Apr 26
Patchy rain nearby
High: 56°F
Low: 47°F
Rain: 0%
Wind: 14 mph

Sun, Apr 27
Sunny
High: 57°F
Low: 47°F
Rain: 0%
Wind: 11 mph

24-Hour Forecast

Time	Temp	Rain	Wind
12AM	44°F	0%	13 mph
1AM	44°F	0%	12 mph
2AM	44°F	0%	14 mph
3AM	44°F	0%	12 mph
4AM	44°F	0%	10 mph
5AM	44°F	0%	9 mph
6AM	44°F	0%	10 mph
7AM	45°F	0%	11 mph
8AM	46°F	0%	10 mph
9AM	47°F	0%	11 mph
10AM	52°F	0%	12 mph
11AM	57°F	100%	13 mph
12PM	62°F	0%	17 mph
1PM	65°F	0%	18 mph
2PM	67°F	0%	20 mph
3PM	72°F	0%	20 mph
4PM	66°F	0%	20 m|

°C | °F

Settings

Temperature Unit
◯ Celsius (°C)
◉ Fahrenheit (°F)

Theme
◉ System Default
◯ Light Mode
◯ Dark Mode

Accessibility
Large Text
Increase text size for better readability

High Contrast
Enhance color contrast for better visibility

Close Settings

Last updated: Apr 21, 2025 - 3:32 PM

Capabilities and Limitations

Capabilities:

- Provides minute-by-minute updates specific to the user's exact location.

- Offers comprehensive data, including temperature, humidity, wind speed, and UV Index straight from the API.

- Features an simple interface designed for quick information retrieval.

- Offers accessibility settings such as Large Text mode and High Contrast mode.

Limitations:

- Currently supports single-location tracking; multi-location support in future.

- Requires internet connectivity. Offline mode is a planned feature.

- See Future Features slide for more.

Future Features

Upcoming Potential Features:

- Multi-Location Support: Allowing users to monitor weather conditions in multiple areas.

- Offline Mode: Access to recent weather data without internet connectivity.

- Cross-platform availability

- AI-Powered Insights: Predictive analytics for personalized weather forecasts and health advisories.

References

- Flutter SDK
  Flutter Dev Team. (n.d.). *Flutter – Beautiful native apps in record time.* https://flutter.dev/

- Dart Programming Language
  Dart Dev Team. (n.d.). *Dart language overview.* https://dart.dev/

- WeatherAPI
  WeatherAPI. (n.d.). *Weather API Documentation.* https://www.weatherapi.com/docs/

- flutter_dotenv
  Dotenv. (n.d.). *A Flutter plugin for loading environment variables from .env file.* https://pub.dev/packages/flutter_dotenv

- http
  HTTP. (n.d.). *A composable, Future-based library for making HTTP requests. Makes network requests.* https://pub.dev/packages/http

- provider
  Remi Rousselet. (n.d.). *A wrapper around Inherited Widget to make them easier to use and more reusable. Allows weather updates.* https://pub.dev/packages/provider

- intl
  Dart Team. (n.d.). *Internationalization and localization facilities. Date format and time.* https://pub.dev/packages/intl

- Geolocator Plugin
  Baseflow. (n.d.). *Flutter geolocation plugin for Android and iOS. Gets device location.* https://pub.dev/packages/geolocator

- Icons
  Material Design. (n.d.). *Material Symbols and Icons.* https://fonts.google.com/icons

- Weather Icons
  WeatherAPI. (n.d.). *Icon CDN used from WeatherAPI. Uses API's icons for accuracy.* https://www.weatherapi.com/docs/#intro-usage

The end / Q&A