**VIET NAM NATIONAL UNIVERSITY HO CHI MINH CITY**

**UNIVERSITY OF INFORMATION TECHNOLOGY**

Ảnh có chứa biểu tượng, Đồ họa, hình mẫu, Phông chữ

Mô tả được tạo tự động

**Mobile Application Development**

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# TEACHER’S COMMENTS

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# CHAPTER 1: OVERVIEW OF THE TOPIC

## Introduction

In the modern era, the demand for health and quality of life is becoming increasingly crucial. One of the factors directly affecting our health is the indoor air quality in enclosed environments, such as offices, residences, schools, and hospitals. Therefore, monitoring indoor air quality has become a significant area of research.

The topic "Indoor Air Quality Monitoring Application" focuses on developing a mobile application to help users monitor and assess the indoor air quality of enclosed spaces. This application will provide detailed information on air quality parameters such as CO2 concentration, temperature, humidity, and other factors that may impact the health of users.

## Objectives

This report presents the process of developing and deploying the "Indoor Air Quality Monitoring" application to provide an effective solution for monitoring air quality in enclosed environments.

## 3. Motivation

Air quality has become an increasingly important issue for health and lifestyle. This application is developed to meet the need for monitoring and assessing indoor air quality.

# CHAPTER 2: CONTENT

## Functions

### *1.1. HomePage*

The HomePage serves as the gateway to the website, embodying a multifaceted interface designed for user engagement and accessibility. Within this section, we delve into key functionalities that define the user experience.

1. Language Switching: Users have the option to change the language of the website. This feature enhances user accessibility and ensures a more personalized experience.
2. Login: Clicking this button will transfer the user to the login interface.
3. Signup: Clicking this button will transfer the user to the Signup interface.
4. Login with Google: To enhance user convenience and security, the website provides the option to sign in using Google credentials. This method simplifies the login process for users who prefer using their Google accounts.

A screenshot of a login screen

Description automatically generated

Figure 1. HomePage Sceen

### *1.2. Signup*

On the Registration Page, users will encounter a straightforward registration process involving the following fields:

1. Back Button: To provide users with the flexibility to navigate back to the previous page, a "Back" button is included. Clicking this button will return users to the previous screen in the registration process.
2. Language Switching: Users have the option to change the language of the website. This feature enhances user accessibility and ensures a more personalized experience.
3. Username: Users will be prompted to choose a unique username. This serves as their identifiable handle within the platform.
4. Email: The email field is where users input their valid email addresses. This information is crucial for communication purposes and account verification.
5. Password: Users must create a secure password. The password should adhere to the platform's security guidelines, typically involving a combination of uppercase and lowercase letters, numbers, and special characters.
6. Retype Password: To ensure accuracy and prevent errors, users will need to re-enter their chosen password in this field.
7. Sign Up Button: Clicking this button will validate the entered details and create a new user account.
8. Signup: New users can register on the website by providing necessary information such as username, email, and password. This process enables them to create accounts and access additional features exclusive to registered users.
9. Login with Google: To enhance user convenience and security, the website provides the option to sign in using Google credentials. This method simplifies the login process for users who prefer using their Google accounts.

A screenshot of a login form

Description automatically generated

Figure 2. Signup Sceen

### *Login*

On the Login Page, users will find a streamlined interface for accessing their accounts:

1. Back Button: To provide users with the flexibility to navigate back to the previous page, a "Back" button is included. Clicking this button will return users to the previous screen in the registration process.
2. Language Switching: Users have the option to change the language of the website. This feature enhances user accessibility and ensures a more personalized experience.
3. Username: Users will input their chosen username. This is the unique identifier they selected during the registration process.
4. Password: The password field is where users enter their confidential password. The platform's security guidelines will dictate the complexity of the password.
5. Remember Me Checkbox: To enhance user convenience, a "Remember Me" checkbox is provided. Users can check this box to keep their login credentials stored for future sessions, eliminating the need to re-enter them each time.
6. Forgot Password button: In case users forget their password, a "Forgot Password?" button is prominently displayed. Clicking this button will guide users through the process of resetting their password.
7. Login: The login functionality allows registered users to access personalized content, services, and features. Users can input their credentials securely to log in and access their accounts.
8. Signup: New users can register on the website by providing necessary information such as username, email, and password. This process enables them to create accounts and access additional features exclusive to registered users.
9. Login with Google: To enhance user convenience and security, the website provides the option to sign in using Google credentials. This method simplifies the login process for users who prefer using their Google accounts.

A screenshot of a login screen

Description automatically generated

Figure 3. Login Sceen

### *Forgot password*

On the Forgot Password Page, users can initiate the process of resetting their password:

1. Back Button: To provide users with the flexibility to navigate back to the previous page, a "Back" button is included. Clicking this button will return users to the previous screen in the registration process.
2. Language Switching: Users have the option to change the language of the website. This feature enhances user accessibility and ensures a more personalized experience.
3. Email: Users will input the email address associated with their account. This email address is where the password reset instructions will be sent.
4. Send Request Button: A "Send Request" button allows users to submit their email address and trigger the password reset process. Clicking this button will send a verification email to the provided address.
5. Login: The login functionality allows registered users to access personalized content, services, and features. Users can input their credentials securely to log in and access their accounts.
6. Login with Google: To enhance user convenience and security, the website provides the option to sign in using Google credentials. This method simplifies the login process for users who prefer using their Google accounts.

A screenshot of a login screen

Description automatically generated

Figure 4. Forgot password Sceen

### *Map*

The Map Interface offers users various functionalities for location tracking and weather information:

1. Cursor for Location: Users can utilize a cursor to pinpoint specific locations on the map, providing a visual representation of their selected area.
2. Zoom In/Out Buttons: Interactive buttons for zooming in and out enable users to adjust their view of the map for a more detailed or broader perspective.
3. Weather Status Information Panel: A dedicated information panel displays real-time weather conditions, including temperature, humidity, and other relevant data for the selected location.
4. View Detail Button: Users can access a more detailed view of the weather information by clicking a "View Details" button. This opens a comprehensive overview of the weather forecast for the selected area.

A map of a city

Description automatically generated

Figure 5. Map Sceen 1

A screenshot of a map

Description automatically generated

Figure 6. Map Sceen 2

### *MainDashboard*

The Dashboard provides users with a comprehensive overview of relevant information:

1. User Name Display: At the top of the Dashboard, the user's name is prominently displayed, personalizing the experience.
2. Date and temperature Display: The current date and temperature are shown to keep users informed about the latest data.
3. Environmental Metrics:

The following environmental metrics are displayed:

- AQI (Air Quality Index):

 PM10 (Particulate Matter 10)

 PM2.5 (Particulate Matter 2.5)

 CO2 (Carbon Dioxide)

- Wind Information:

 Wind Direction

 Wind Speed

- Weather Conditions:

 Temperature

 Humidity

1. Tab Navigation Bar: A horizontal navigation bar allows users to seamlessly switch between different tabs or sections within the Dashboard. Each tab may represent different aspects or features of the platform, providing a user-friendly and organized interface.

A screenshot of a weather forecast

Description automatically generated

Figure 7. MainDashboard Sceen 1

A screenshot of a cell phone

Description automatically generated

Figure 8. MainDashBoard Sceen 2

### *Graph*

The graphical interface for the Indoor Air Quality Monitoring Application incorporates a user-friendly display of real-time and historical data. The primary components include tables and graphs, offering insights into various air quality parameters.

1. Data Selection Table:

The application features data tables that present key air quality parameters, including but not limited to:

* Temperature
* AQI
* PM10
* PM25
* CO2
* Wind Direction
* Wind Speed
* Humidity
* Rainfall

These tables allow users to quickly access and compare different air quality metrics for a comprehensive understanding of their indoor environment.

1. Time-Frame Selection Table:

Users can choose the time frame for the displayed data, with options such as:

* Day
* Week
* Month
* Year

This time-frame selection provides flexibility for users to analyze both short-term and long-term trends in indoor air quality.

1. Date Selection: For a more granular analysis, users can choose a specific date using the "Date Selection" feature. This allows users to pinpoint air quality data for a particular day.
2. Time Selection: Users have the option to select a specific time range using the "Time Selection" feature. This further refines the data, enabling users to focus on specific hours or intervals.
3. Graphical Representation: The graphical interface includes visually intuitive graphs that dynamically update based on user-selected parameters and time frames. Graphs may depict trends and fluctuations in air quality, helping users identify patterns and correlations.

A screenshot of a graph

Description automatically generated

Figure 9. Graph Sceen

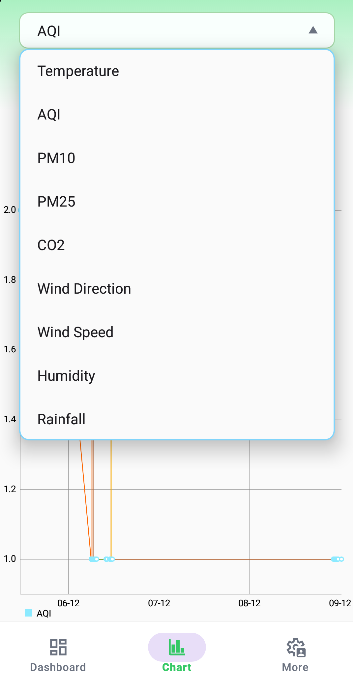


Figure 10. Data Selection Table Sceen

A screenshot of a graph

Description automatically generated

Figure 11. Time-Frame Selection Table Sceen

A screenshot of a calendar

Description automatically generated

Figure 12. Date Selection Sceen

A screenshot of a clock

Description automatically generated

Figure 13. Time Selection Sceen

### *1.8. Settings*

On the Settings Page, users have access to various sections for managing their account and preferences:

1. Display username and gmail
2. Account Settings: Users can view and update their account details, including username, email, and other relevant information.
3. Password Settings: This section allows users to change their account password for security purposes.
4. Authenticator Settings: Users can configure two-factor authentication settings for an additional layer of account security.
5. General Settings: Users can customize general preferences such as language, notification preferences, and other platform settings.
6. About Us: This section provides information about the platform, its mission, and any relevant background details.
7. Contact Us: Users can find contact information for customer support or general inquiries.
8. Logout Button: A "Logout" button is available for users to securely log out of their accounts.

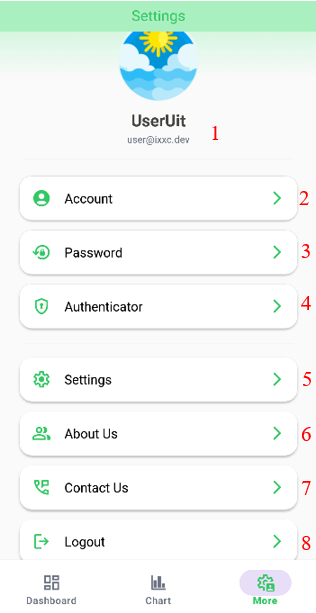


Figure 14. Settings Sceen

A screenshot of a phone

Description automatically generated

Figure 15. Account Setting Sceen

A screenshot of a login screen

Description automatically generated

Figure 16. Change Password Setting Sceen

## 2. Device Requirements

-Android:

+Android studio : 4.2.1

+Gradle : 7.4.2

+Min sdk : 27

+Target sdk : 34

## 3. Libraries and Technologies

* Language : Javascript
* Android SDK (Software Development Kit): Includes essential tools for Android app development, comprising compilers, emulators, and detailed documentation.
* Java Programming Language: Android Studio utilizes Java as the primary programming language for app development.
* Android Support Library: Provides components and utilities supporting various Android versions, simplifying development and optimizing user experience across multiple devices.
* Gradle: Project management and build automation system. It helps manage project libraries, resources, and dependencies.
* Retrofit: A library facilitating easy and flexible handling of HTTP network requests.

# CHAPTER 3: SUMMARY

## Achievements

In the process of researching and developing the Android Studio Indoor Air Quality Monitoring application using an API, we have achieved significant milestones, including:

* Designing and deploying an effective user interface, allowing users to easily monitor indoor air quality through data collected from the API.
* Integrating and interacting with the air quality API to gather detailed and reliable information on air pollution levels.
* Developing data analysis functions from the API to display crucial air quality parameters and provide notifications when necessary.

## Limitations

While we have achieved some milestones, we are also aware of certain limitations:

* Dependency on the stability and quality of the API, which may impact data collection capabilities if the API malfunctions or experiences issues.
* Requires a stable internet connection to access and interact with the API, posing limitations for users in areas with connectivity issues.

## 3. Future Development

To enhance and expand the application's features, we propose several directions for future development:

* Optimize the application to be compatible with various Android versions and a diverse range of mobile devices.
* Research and integrate additional APIs to provide rich and multidimensional information on air quality.
* Develop an automatic data update feature from the API to ensure continuous and accurate information maintenance.

# CHAPTER 4: CONCLUSION

In conclusion, the development and implementation of the Android Studio Indoor Air Quality Monitoring application using an API represent a significant step toward addressing the crucial issue of indoor air pollution. Through our efforts, we have achieved notable accomplishments and gained valuable insights into the challenges and possibilities in this domain.

* Impact on User Experience: The user-friendly interface and seamless integration with the air quality API contribute to an enhanced user experience. Users can effortlessly access and interpret real-time indoor air quality data, fostering awareness and promoting healthier living environments.
* Challenges and Lessons Learned: Throughout the development process, we encountered challenges related to API reliability and internet connectivity. These challenges underscore the importance of continuous refinement and adaptation to ensure the application remains resilient in diverse conditions.
* Contributions to Air Quality Monitoring: Our application, relying on an API-driven approach, provides a valuable contribution to the field of air quality monitoring. By harnessing the power of existing data sources, we enable users to make informed decisions regarding their indoor environments.
* Future Prospects and Recommendations: Looking ahead, there is significant potential for further advancements in the Android Studio Indoor Air Quality Monitoring application. Recommendations for future development include exploring additional APIs for comprehensive data, optimizing performance for a wider range of devices, and implementing features that enhance the application's resilience to varying network conditions.
* Call to Action: As we conclude this project, we emphasize the importance of ongoing research and collaboration to address the global challenge of indoor air pollution. By fostering innovation and integrating emerging technologies, we can collectively contribute to creating healthier indoor spaces for individuals and communities.

# REFERENCES