Session:	Project Name:
Summer, 2021	PM2.5 Monitor Management System

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PM2.5 Monitory Management System

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Revision History

Name	Date	Reason for Changes	Version
Lily Olson	09/05/2021	Initial Draft	0.5
Lily Olson	27/05/2021	Final Draft	1.0

1 Introduction

1.1 Purpose

This documentation defines the requirements of the PM2.5 Monitor Management System and explains how the system works. The purpose of this document is to identify unambiguously the user requirements and clearly define both functional and nonfunctional requirements of PM2.5 system. In addition, this document is intended to cover technical goals as well as objectives of the proposed System.

1.2 Project Scope and Product Features

The PM2.5 Monitor Management System is designed to measure the pollution levels both inside and outside of the school. The system is to be accessible on both the mobile phone and via computer web. With the knowledge that this system provides, the staff is able to better prepare for the health and safety of the students. With the web UI interface and the mobile UI interface even the parents will have access to how the pollution levels are in the school.

1.3 Reference Materials

- Web UI interface (employee interface)
  https://org.modao.cc/app/42417e4d9f8532d55dbce54e6cf400d20f664b94?simulator_type=device&sticky

- Mobile UI interface (parent interface)
  https://org.modao.cc/app/613ab49c06c8965450809ebed0d693648fbec31c?simulator_type=device&sticky#screen=skn5nbjaoq7e54n

- US Consulate PM2.5 AQI
  https://aqicn.org/city/shanghai/us-consulate/cn/

2 Overall Description

2.1 Users

Staff

- Read pollution levels, manage regions and sensors, manage page access of users.

Parents

- Read pollution levels at various regions of the school.

2.2 Characteristics

Color display of each area:

- According to the AQI interval in the table, judge the display air quality and color.
- Among them, the air quality is taken from the "Air Quality" field in the "Air Quality Standards table" and the color is taken from the "Color" field.

2.3 Operating Environment

- Web system shall operate on Internet Explorer/Chrome/Safari.
- Web system shall GUI environment.
- Web system shall maintain secure accessibility.

2.4 Function Description

Show all areas of the school's indoor PM2.5 value, update every hour.

Calculation method of PM2.5:

- Take the PM2.5 value measured by all sensors in the area (data is updated every hour).
- Calculate the average value of PM2.5 using the formula:

$$\bar{x} = \frac{x_1 + x_2 + \cdots + x_n}{n} = \frac{\sum_{i=1}^{n} x_i}{n}$$

Show outdoor AQI, data comes from the US Consulate PM2.5 AQI (updated every hour). https://aqicn.org/city/shanghai/us-consulate/cn/

The table below shows the school's latest "air quality standard table" and the measures that should be taken. The default content is shown in the figure below, and the user can modify the content

Grade	AQI (min)	AQI (max)	Color	Air quality	Student activity	Response process
1	0	100	Green	Good	Normal	No additional procedures
2	101	149	Yellow	Mild/ moderate pollution	Normal	Doors and windows closed. All air purifiers on.
3	150	174	Orange	Mild/ moderate pollution	Students with respiratory problems excused from outdoor activities	Doors and windows closed. All air purifiers on.
4	175		Red	Moderate/ heavy pollution	No outdoor activities	Doors and windows closed. All air purifiers on.

3 User Role Schemas

3.1 Staff

Role Schema: Staff
Description: Responsible for   • Set permissions for users   • Manage regions   • Manage sensors   • Manage air-quality standards definition
Permissions: • User (view, manage restrictions)

- Region (view, create, change, delete)

- Sensors (synchronize, set-up, search, download)

- Air-Quality Standards (view, edit)

- PM2.5 Standards (view, edit)

3.2 Parents

Role Schema: Parents
Description: Read pollution levels at various regions of the school
Permissions: None

4 User Case Scenarios

4.1 Staff – Login

Use Case	Staff performs login through Office 365
Scenario	Staff Login
Approach	User clicks on Office 365 link User logs in via Office 365
Exceptions	User does not have an account with Office 365

4.1.1   Staff – Add User

Use Case	Staff adds user through Office 365
Scenario	Add User

Approach	User clicks on "Add user" button
	Input:
	   • Name
	   • Office 365 mailbox
	Save new user successfully

Exceptions	User does not have an account/ mailbox with Office 365

4.1.2   Staff – Delete User

Use Case	Staff performs delete user
Scenario	Staff Delete User
Approach	User clicks on "Delete user" button System pops up "Delete user" window User confirms deletion
Exceptions	User cancels deletion

4.1.3   Staff – Manage User Permissions

Use Case	Staff performs manage user permissions
Scenario	Manage User Permissions
Approach	User clicks on "Permissions" button User checks some (or all) permissions for the user
Exceptions	None

4.2 Staff – Region

4.2.1   Staff – Create New Region

Use Case	Staff performs create new region
Scenario	Create New Region
Approach	User select "+" in top right corner System pops up "New Region" window Input: • Region name • Details User confirms creation
Exceptions	User creates existing region name

4.2.2   Staff – Edit Region

Use Case	Staff performs edit region

Scenario	Edit Region
Approach	User selects "Edit" button System pops up "Edit Region" window Input: • Region name • Details User confirms change
Exceptions	User changes to an existing region name

4.2.3   Staff – Delete Region

Use Case	Staff performs delete region
Scenario	Delete Region
Approach	User clicks on "Delete" button System pops up a window to confirm the deletion User confirms deletion
Exceptions	User cancels deletion

4.3 Staff – Sensors

4.3.1   Staff – Sync Sensors

Use Case	Staff performs synchronize sensor list
Scenario	Sync Sensors
Approach	User selects "Synchronize" button System pops up "Synchronize Sensors" confirmation window User confirms synchronization
Exceptions	User cancels synchronization

4.3.2   Staff – Assign Sensors to Region

Use Case	Staff assigns sensors to regions
Scenario	Assign Sensors to Region

Approach	User selects "Affiliated Region" (house icon) button
	System pops up "Affiliated Region" window
	User selects from a dropdown menu of regions
	User confirms change
Exceptions	User assigns sensor to the same region

4.3.3   Staff – Search

Use Case	Staff performs search function
Scenario	Search Function
Approach	User types word in space provided (next to magnifying glass icon)
	User selects "search" button
	System generates results based on what user types
Exceptions	User searches something not in the database

4.4 Staff – Edit Air-Quality Standards

Use Case	Staff performs change air quality standards chart
Scenario	Change Air Quality Standards Chart
Approach	User selects "edit" button
	System pops up "Edit Air Quality Standards" window
	Input:
	- Grade number - AQI (min) number - AQI (max) number - Color - Air quality - Student activity - Suggested procedures
	User clicks "define" to confirm change
Exceptions	User inputs values not defined

4.5 Staff – Edit PM2.5 Standards

Use Case	Staff performs PM2.5 standards
Scenario	Change PM2.5 Standards
Approach	User selects "edit" button System pops up "Edit PM2.5 Standards" window Input: • Grade number • AQI (min) number • AQI (max) number • Color • Air quality User clicks "define" to confirm change
Exceptions	User inputs values not defined

4.6 Parents

4.6.1 Parents – View data

Use Case	Parents view data
Scenario	View Data
Approach	Parent opens Wellington College PM2.5 application Parent can view data
Exceptions	Parent does not have app

5 Appendix A

GUI	= Graphical user interface, allows users to interact with electronic devices
PM2.5	= Particle matter (PM) that measures 2.5 micrometers or less in diameter
AQI	= Air Quality Index, measures how polluted or not polluted the air is