User Guide SGT App

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1 Introduction

The Smart Grid User Interface project was conducted for the lectureship Balanced Energy Systems located at the HAN in Arnhem. The goal of the project is to document and develop an application that can change the parameters surrounding the Smart Grid Table while also providing the ability to view the results of the calculations made at different points of the power grid. Up until now, it was only possible to simulate scenarios using predefined values. With this application, it will be possible to modify these at running time as well as see the results of these changes. The app offers utility for exploring and modifying modules connected to the grid, breaking and repairing cables, viewing calculations, changing scenarios, and debug utilities. It is available on Android and Desktop and can have a different layout depending on the type of screen.

This document contains a user-manual for using the application.The audience for the document includes both instructors and students. The assumption was that the users are not very tecnically savvy, so both the application and the user manual had to be intuitive and easy to use,

2 System Requirements

Android systems are required to be of Android 4.1 (API level 16) or higher. For desktop versions, users are required to have a 64-bit based architecture. Finally, all versions require 200MB of storage.

3 App interface

The app interface consists of two versions. A horizontally oriented and vertically oriented version. Depending on the screen and page, a different layout can be displayed. Take note, all funcitonality stays the same!

Through the refresh icon (first icon from the left on the top right of the screen), the app can be manually refreshed. Through the gear icon (second icon from the left on the top right of the screen), the settings page can be opened. Using the navigation bar at the bottom of the screen, users can navigate from page to page.

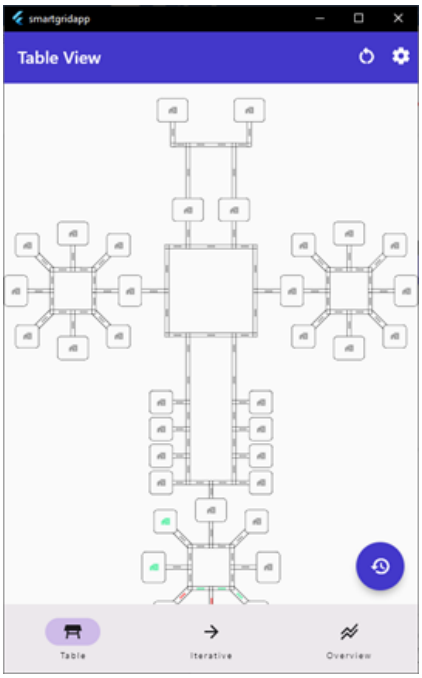

Figure 1: SGT User Interface

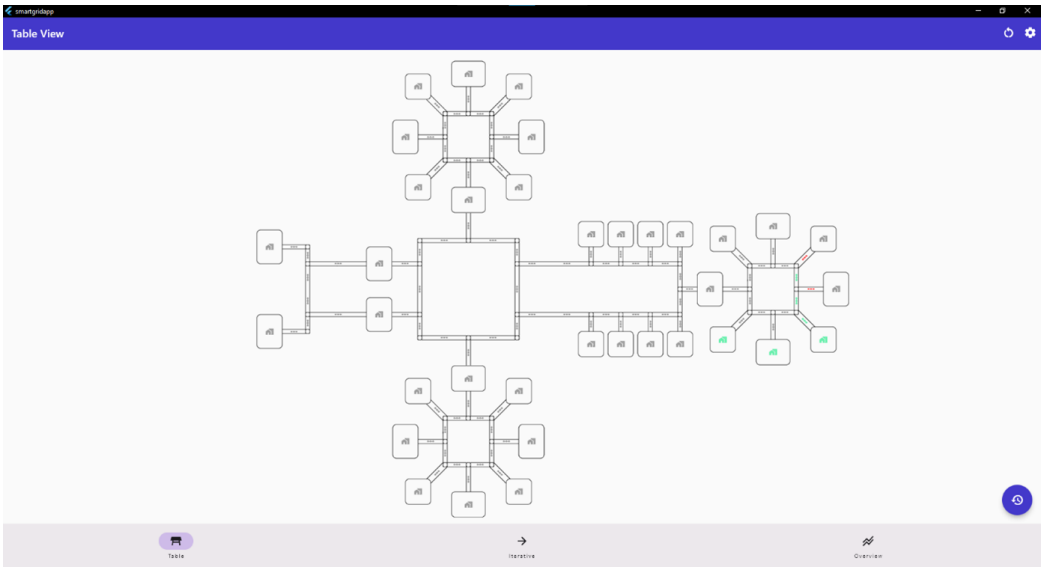

Figure 2: SGT User Interface (Horizontal)

4 Getting started

Before being able to use the app, there are a couple of steps that need to be completed.

4.1 Connecting to the broker

Whenever you open up the application, it should automatically connect to the broker. If this is not the case, this can mean a couple of things.

1. You are not connected to Tenda2.
2. The simulation is not yet running.
3. The connection is unstable.

First check if you are connected to the WiFi network Tenda2. It is required to be on the same network as the simulation. If this has not fixed the issue, make sure the simulation is running. Finally, if all steps mentioned above have not worked, you can connect to the broker manually. This can be done through the WiFi icon on the top right of the screen. Here the host address of the broker can be manually entered.

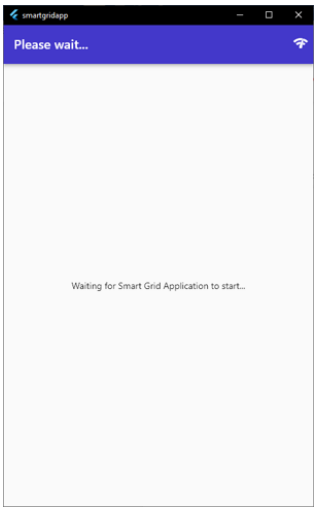

Figure 3: Wait screen

4.2 Setting the broker topic

Before being able to receive data, we must make sure the app is listening to the correct table. This can be done through the settings page. Make sure the number within the **Base Topic** matches the number of the Smart Grid Table that is being used. If this is not the case, change the number within the topic to match the number of the Smart Grid Table. This setting is saved in the cache memor. The next time you use the app, it should already be defined. The topic should always have the following format: `SmartDemoTable<Table Number>/GUI/`

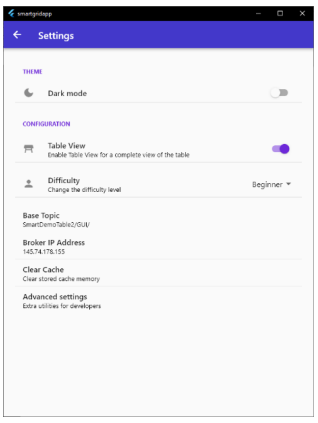

Figure 4: Settings page

4.3 User Types

Within the application, there exist two different roles of users. Admins and regular users. The default login will always be a regular user. The role of regular user is for all normal users of the Smart Grid Table. For example students or attendees of workshops. The role of admin is meant for teachers, hosts, and developers.

Regular users have access to modify the grid and view the results of calculations. Administrators have acces to configure, debug, or manage the Smart Grid Table and simulation as they see fit.

4.4 Difficulty Levels

Difficulty levels were introduced to help less technical users operate the application. There exist two levels. Beginner and advanced users. Beginner users have limited acces to modules and are restricted in the way these can be edited. For some parameter fields for example, they use sliders instead of entry fields to help them in selecting values for certain fields.

Through the settings screen can the difficulty level be changed by using the dropdown menu as shown in figure 5

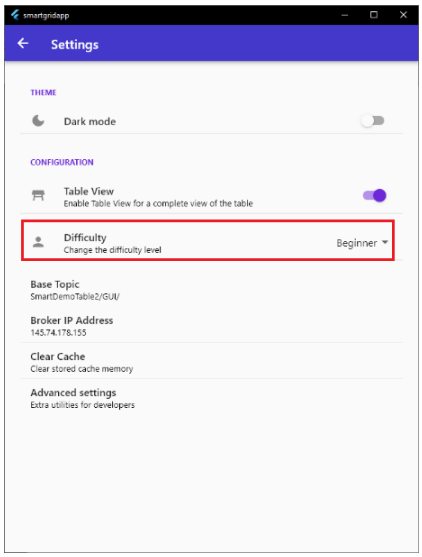

Figure 5: Difficulty setting

5 Regular Users

This section contains a description of all utility available to regular users.

5.1 Viewing the grid

One of the two main ways of viewing the Smart Grid Table is the table view page (figure 6). The table view page contains the full Smart Grid Table. Like google maps for example, it provides a familiar and widely used interface for navigation panning and zooming, making it easy for users to explore the power grids. It allows users to better understand the spatial distribution and relationships between the different sections. Users can also view live updates of the power grids on the map, providing a dynamic and up-to-date view. This page is primarily used on a big screen during workshops and sessions but is also be available through the settings page for regular users.

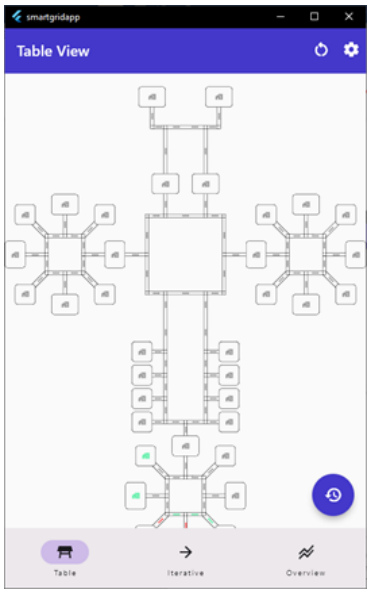

Figure 6: Table view

The other way of viewing the Smart Grid Table is the table iteration page (figure 7). Unlike the Table view page, the iterative page only contains a single table section in view. This allows users to access the power grid in a structured and organized format, making it easier to search, sort and filter specific sections or details.

Specifically for mobile users, which have limited screen space, this might be a better way to access the grid. This screen wil always be enabled unlike the table view page which needs to be enabled through the settings page.

Figure 7: Iterative view

5.2 Changing module parameters

By clicking on an active module (a highlighted module icon) through the table view or iterative view, the dialog window shown in figure 8 will pop up. From here, users can change the general and component properties of the module.

When a component type contains one or more elements, the icon will be colored green, otherwise grey. From left to right the icons are: generators, transformers, storages, and loads. By clicking on the icon, the component window will be opened. Depending on the difficulty level, users can modify the parameters of these components.

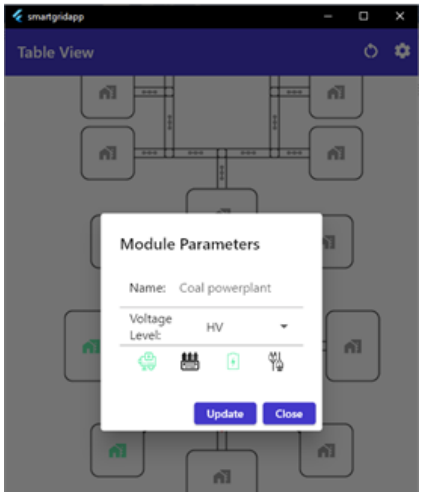

Figure 8: Module dialog

5.3 Changing line states

By clicking on a line, the line window will be opened (figure 9). Simply by pressing the 'Deactivate' or 'Activate' button, users can change the state of the cable.

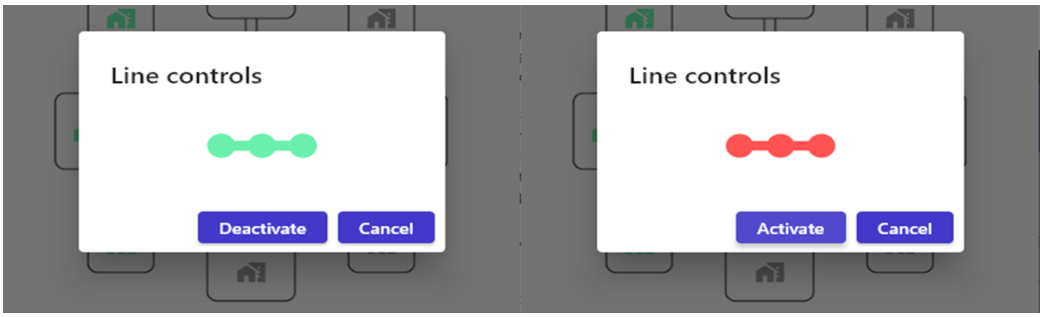

Figure 9: Line dialog

5.4 Viewing calculations

Through the graph insights page or global view page (figure 10) a number of graphs related to the calculations performed on the grid can be seen. Through the dropdown users can select the type of graph as well as enabling and disabling certain graphs. Below, a legend is listed reflecting the data displayed within the graph.

Depending on the scenario type active: static or dynamic, a different graph is displayed. For static scenarios, bar charts are used since they are more suitable for displaying the difference between categories. For dynamic scenarios, line graphs are used because these are more suitable for displaying changes over time. Whenever the simulation recalculates the network, the graphs on the screen will be updated accordingly.

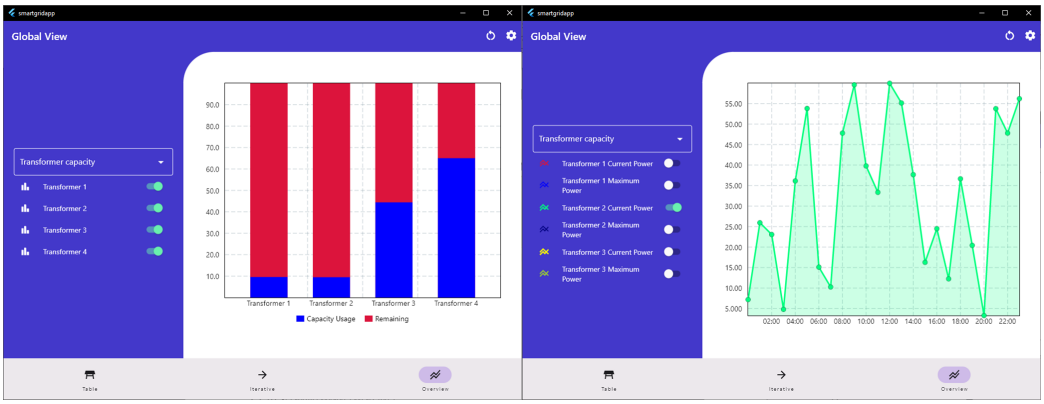

Figure 10: Calculation results

6 Admin Users

This section contains a description of all utility available to admins users.

6.1 Changing the Scenario

The scenario manager page (figure 11) allows admins to change the active scenario from the app. Within the text field, the active scenario name and type is listed. The scenario can be changed by using one of the dropdown menus for either dynamic or static scenarios.

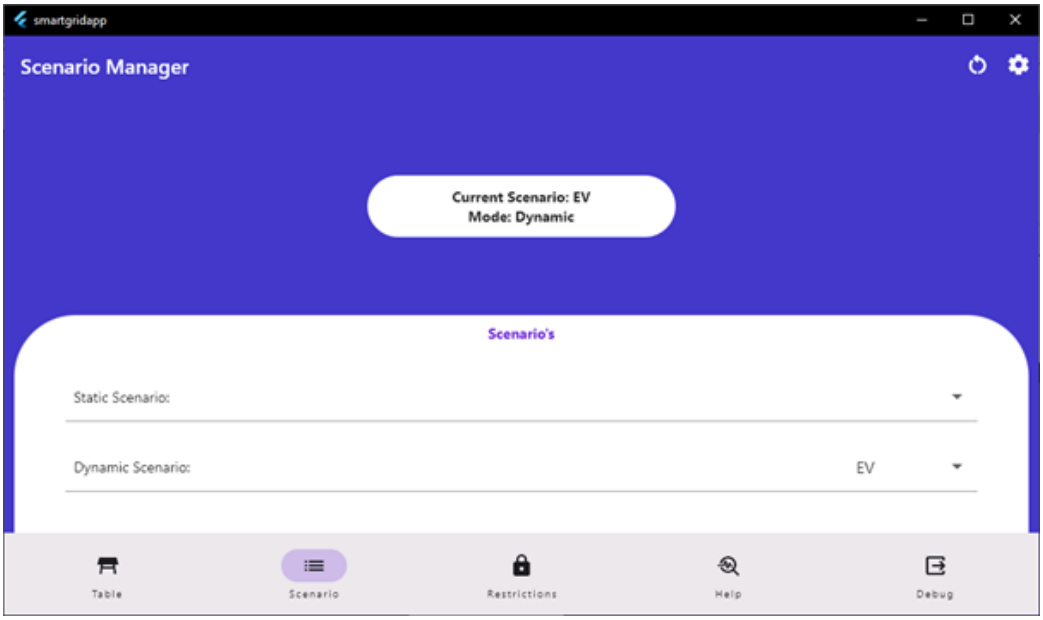

Figure 11: Scenario management

6.2 Managing user restrictions

The user restrictions page (figure 12) contains the utility for changing the write restrictions of a user type. The user type can be selected through the dropdown at the top. Using a switch restrictions can be toggled.

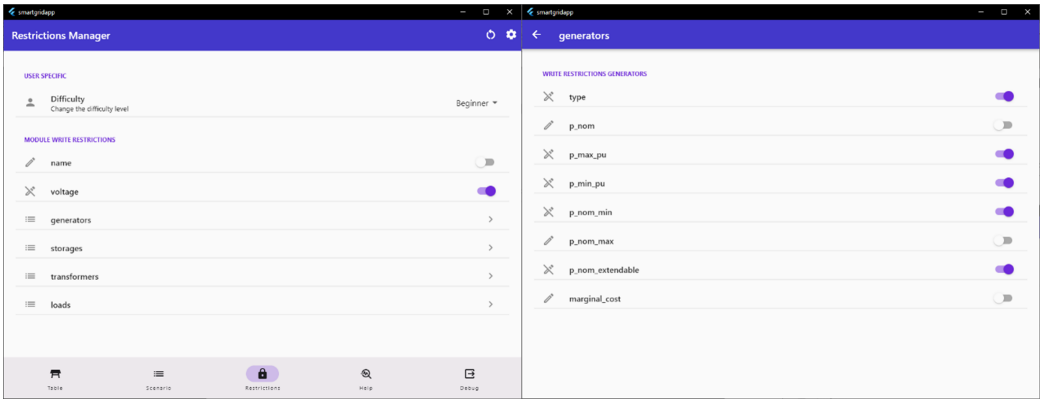

Figure 12: Restrictions management

6.3 Debugging the application

Through the debug page (figure 13, a list of logs messages can be seen. These are catogorised in three types. Info, warning, and error. Info messages are for following the events in the background of the application. Warnings show something is going wrong but does not severely affect the functionality of the application. Errors indicate something is hindering the application and should be solved as soon as possible.

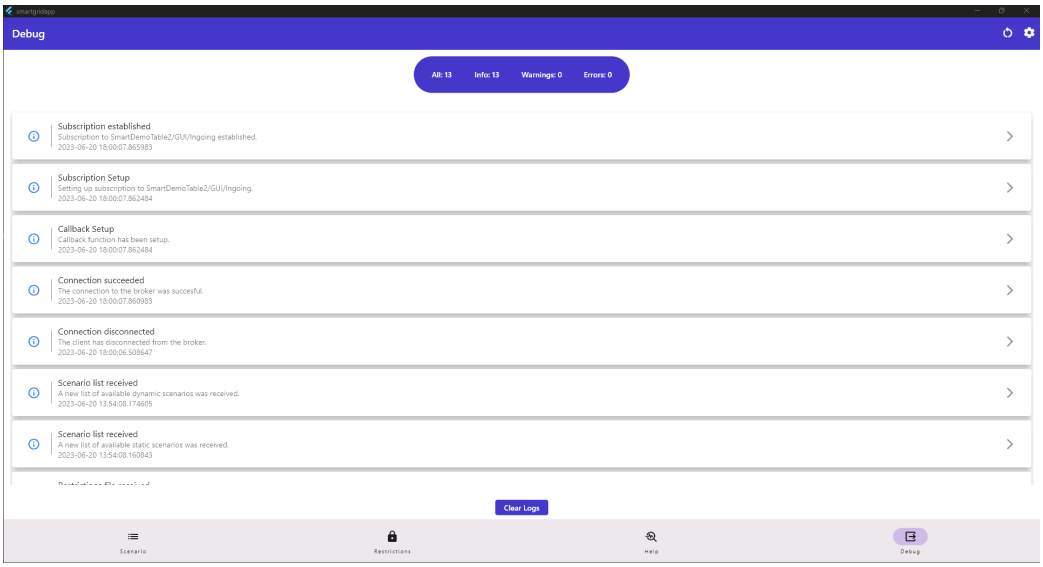

Figure 13: Debug logs

6.4 Troubleshooting

The help page (figure 14) contains some instructions to help setup the table and application. This page is available in the login screen as well as through the admin panel.

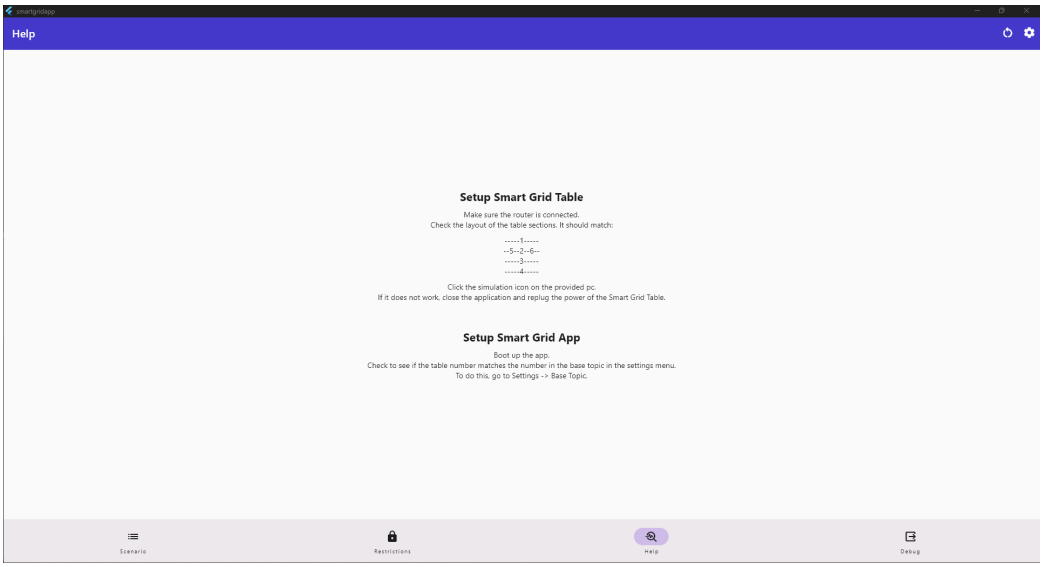

Figure 14: Help page