VILNIUS UNIVERSITY
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DEPARTMENT OF COMPUTATIONAL AND DATA MODELING

Solar system area 4 2022 SRS

Requirements specification

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Vilnius
2022

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1 Purpose of the team's deliverable

1.1 Purpose

The purpose of our software is to calculate the width of wind pressure zones and their point coordinates on any roof types.

1.2 Intended audience

The software would be used by the customers of solar panel companies, wishing to cover the roofs of their homes with solar panel tiles.

1.3 Scope and intended use

The software of area 4 would be a small part of a larger system, capable of providing vital information about solar panel installation on the customer's house roof.

2 A high-level overview of the team's deliverable

The department of our area is responsible for determining the exact coordinates of wind pressure zones on the given roof surface for safety measures.
In order to do so, Area 1 department's extracted information from the data, provided by the customer, will be used and calculations to find out each wind zone's point coordinates will be done.
Based on said calculations, the software will identify the 3 areas of each wind pressure zone: Zone 3 - roof corners that are exposed to the wind, Zone 2 - edges of the roof, Zone 1 - the remaining area of the roof surface - the area that is not near edges. Since there are various roof types, the software will be capable of determining wind pressure zones for more than one roof type.
The work of our department will be used in Area 5 workings, which will create a visual representation of our calculations and package it into a PDF file as per the client's request.

3 Complete functional requirements of the team's deliverable

The software should determine the exact coordinates for every wind pressure zone level on a given roof face.

The width of the wind zone (marked "a") will be calculated using the following formulas:
mean roof height = (highest + lowest roof point height coordinate) / 2.
a = 0.4 * mean roof height.
if a < 3, a = 3.

The Roof face can have at most 3 different types of wind pressure zones:

- Level 1 zone - the are that is not near edges - the closest distance to the edge = a.
- Level 2 zone - the area along edges of the roof, the width of the zone = a.
- Level 3 zone - the area near exposed corners, the exposure of the corner depends on the edges that make up the corner.

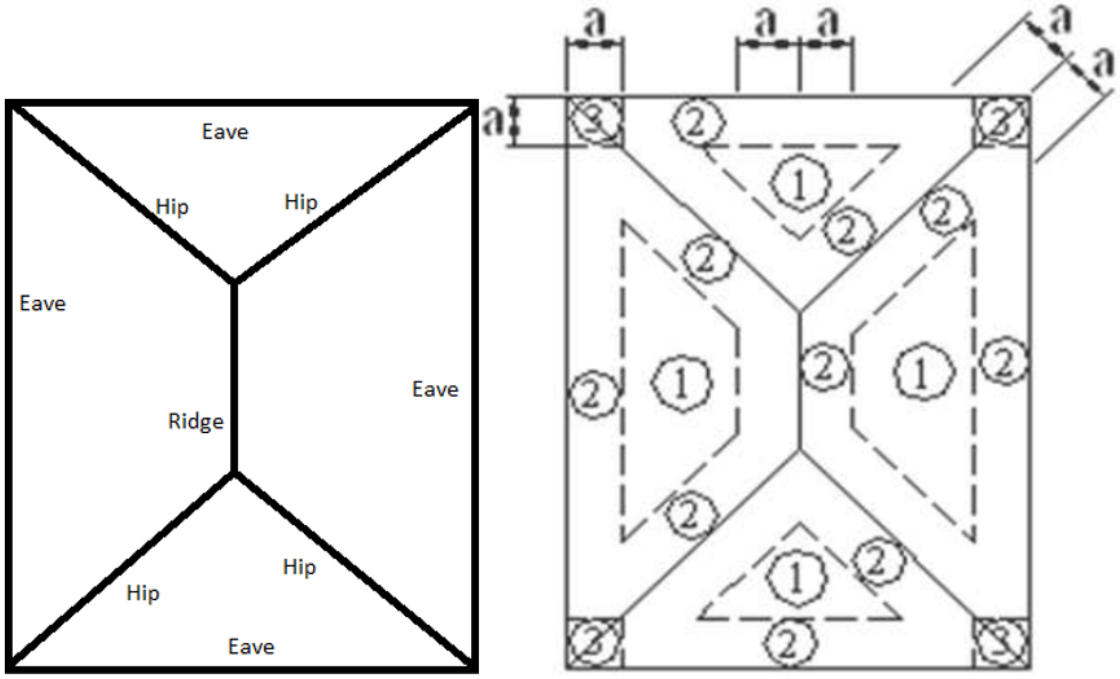

Figure 1. visual example of our team's calculations.

4 Non-functional requirements of the team's deliverable

The non-functional requirements, i.e. a set of specifications that describe the system's operational capabilities of the Area 4 will namely be:

- Performance constraints:

Reliability - the software should be able to properly perform the required functions under predefined conditions for a certain period of time without encountering a critical failure.
Efficiency - the software's algorithm should not require a lot of resources while still maintaining a balanced response time to perform the required functions.
Response time - the amount of time it takes for the software to return desired results should be short.

- Software quality:

Availability - the software should be available and functioning as described in the implementation plan, as this affects other areas of the project.
Usability - the available functions of the software should satisfy a maximum number of users' needs, while also being simple to use for intended users.

- Supportability:

Scalability - used to determine the highest workloads under which the system will still perform as expected. This does not necessarily define the maximum load the system has to process now, but rather the one it may have to deal with in the future.
Portability - the software should be available to be used in operating systems and/or machines other than the one in which it was created without requiring major rework or effort.

5 Implementation plan

Here is our weekly work plan that we are going to pursue in order to follow through with our job.

Week 1. Get acquainted with the whole project from the perspective of the client, meet the members responsible for the project, divide into teams and assign roles. Every week prepare a mini-report for the work we have done, issues we have encountered and work that we are planning to do in the upcoming week.

Week 2. Research the specific area that our team is accountable for and start communicating with others teams, discuss the tools and the technologies we are going to use. Start preparing a requirements specification document.

Week 3. Finish the requirements specification document and start researching what should be presented in the technical specification document.

Week 4. Hold meetings, discuss the project with other teams, make sure there is no miscommunication and everyone is one the same page. Start writing the technical specification document.

Week 5. Create the required diagrams for the TS document, start working on coding.

Week 6. Prepare a technical specification draft and consult the supervisors, start creating calculation logic for wind pressure zones on a simple gable roof.

Week 7. Finish the technical specification document, start implementing the logic into the software, start creating automated tests, start using more tools/technologies.

Week 8. Improve calculation logic - include calculations for other roof types.

Week 9. Continue working on coding and testing. Prepare a mid-term presentation.

Week 10. Merge area 4 with area 2, fix any conflicts between them.

Week 11. Improve the logic and code, merge area 5 with area 2/4. Work with area 5 to make sure our data is represented correctly.

Week 12. Work on the final presentation, add finishing touches to the software, write more automated tests.

Week 13. Finish working on the software and present the product.

6 Planed software versions

Here is a continuation of our implementation plan - a list of planned software versions.

1. Data of a simple gable roof's point coordinates is hard-coded. The software has no functionality.

2. An algorithm for finding the roof's lowest and highest vertical coordinates is implemented. The software can calculate mean roof height and wind pressure zone width.

3. Third level wind pressure zone point coordinate calculation function for a simple gable roof is implemented, automated testing is implemented. The software can now correctly find WP zone point coordinates next to corners, the angle of which is equal to 90.

4. An algorithm that, by grouping the results of third level WP zones, finds first and second level zone coordinates on a simple gable roof is implemented. The software now outputs full results of WP zone coordinates from simple gable roofs.

5. The hard-coded data is removed and a functionality which makes the software read the data from a prepared JSON file is implemented, our code is merged with area 2 and area 5 and any conflicts are resolved. The software now reads data from a JSON file, correctly outputs WP zone data of a simple gable roof, the data is organised, so that area 5 has no problems with visualization.

6. The WP zone point coordinate functionality is remade, so that it works with any roof type, instead of only creating third level WP zones it is updated to also create first level WP zone points, an algorithm that checks edge types that make up a corner is implemented, in order to make sure third level zones are not created where they should not exist, additional testing is implemented. The software now works properly with any roof type.

7. The updated code is again merged with area 2 and area 5. Conflicts between areas are fixed, more testing is created. The software is now fully functional: it reads data from a JSON file, finds mean roof height and WP zone width, calculates first and third WP zones, it is automatically tested and there are no interferences between other areas.