Workshop No. 1 — Conceptual Design for a Domotic Circuit Simulator

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Requirements

Functional:

1. The system must offer **a library of selectable components.** *(High)*
2. The system must allow **adding components** to the workspace. *(High)*
3. The system must allow **connecting components** to each other. *(High)*
4. The system must **calculate voltages and currents** throughout the circuit. *(Medium)*
5. The system must allow **editing component values or properties.** *(Medium)*
6. The system must **visually display the simulation results.** *(High)*
7. The system must allow **importing and exporting circuits.** *(Low)*

Non-Functional:

1. The system must have an **intuitive and user-friendly interface.** *(High)*
2. The system must **use consistent colors and a defined visual identity.** *(Low)*

User Stories

Title:	Priority:	Estimate:
library of selectable components	High	

User Story:

- **As a** user,
- **I want** to view and select component from a library,
- **So that** I know which components I can use in my circuit.

Acceptance Criteria:

- **Given** the interface displays a library of components,
- **When** the user selects a component from that library,
- **Then** the interface shows a short description and an icon representing the selected component.

Title:	Priority:	Estimate:
Add components to the workspace.	High	

User Story:

- **As a** user,
- **I want** to add components to the workspace,
- **So that** I can use the components in my circuit.

Acceptance Criteria:

- **Given** the interface displays a library of components and a workspace,
- **When** the user selects a component from the library and adds it to the workspace,
- **Then** the interface shows the added component in the workspace,
- **And** the user can move the components within the workspace.

Title:	Priority:	Estimate:
Connect the components with “cables”	High	

User Story:

- **As a** user,
- **I want** to connect the components that are in the workspace,
- **So that** I can create my own circuit.

Acceptance Criteria:

- **Given** the interface displays components in the workspace,
- **When** the user connects components together,
- **Then** the interface shows the components that are connected,
- **And** the user can disconnect components or add new connections between them.

Title:	Priority:	Estimate:
View the results of the simulation.	High	

User Story:

- **As a** user,
- **I want** to view the results of my simulated circuit,
- **So that** I can know if the circuit works or needs changes.

Acceptance Criteria:

- **Given** the user has created and simulated a circuit,
- **When** the simulation is completed,
- **Then** the interface shows the results of the simulated circuit,
- **And** the user can view the results to see whether the circuit is working properly.

Title:	Priority:	Estimate:
user-friendly and intuitive interface	High	

User Story:

- **As a** user,
- **I want** to know how use the interface easily,
- **So that** I can use the program without needing the documentation.

Acceptance Criteria:

- **Given** the user interacts with the system,
- **When** the user explores and uses the interface,
- **Then** the user can operate the system without referring to the documentation,
- **And** finds the interface user-friendly and easy to use.

Title:	Priority:	Estimate:
calculate voltage and current in the circuit	Medium	

User Story:

- As a user,
- I want to know the calculated voltage and current in my circuit,
- So that I can understand how to use that circuit and with which values to choose.

Acceptance Criteria:

- **Given** the user has simulated a circuit,
- **When** the system calculates the electrical parameters,
- **Then** the interface shows the calculated values of voltage and current,
- **And** the user can understand how those values were obtained and how to use them.

Title:	Priority:	Estimate:
Allow editing the values or properties of the components	Medium	

User Story:

- **As a** user,
- **I want** to edit the values or properties of the components,
- **So that** I can use my own values to calculate and build my circuits.

Acceptance Criteria:

- **Given** the interface displays the components in the workspace,
- **When** the user edits the values or properties of a component,
- **Then** the interface updates the component with the new values,
- **And** the user can use their own values to calculate and build their circuits.

Title:	Priority:	Estimate:
Allowing to import and export circuits	Low	

User Story:

- **As a** user,
- **I want** to import and export circuits,
- **So that** I can share them on different devices.

Acceptance Criteria:

- **Given** the user has created or edited a circuit in the interface,
- **When** the user chooses to import or export the circuit,
- **Then** the system allows the action using a file with a specific extension required by the program.

Title:	Priority:	Estimate:
The interface should have consistent colors and a defined visual identity	Low	

User Story:

- **As a** user,
- **I want** to have a workspace that doesn't cause visual fatigue,
- **So that** I can work better.

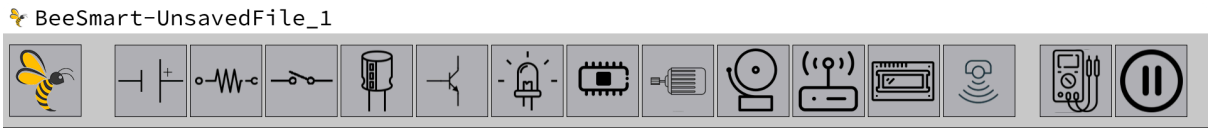
Acceptance Criteria:

- **Given** the user is using the system interface,
- **When** the user accesses the appearance or theme settings,
- **Then** the interface allows basic theme customization,
- **And** follows consistent standards of colors, spacing, and shapes.

Mockups

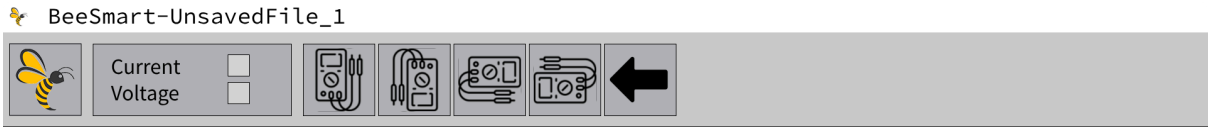
Main Page

This is the main page, it shows every component and a few options



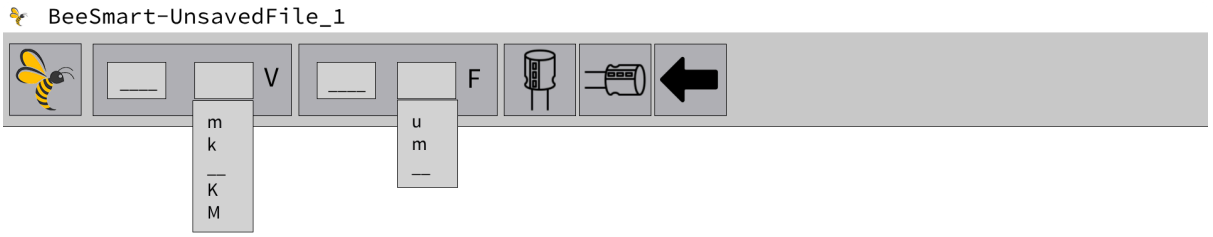
Probes

This is the probes page, it allows the user to choose between probes and the facing of them.



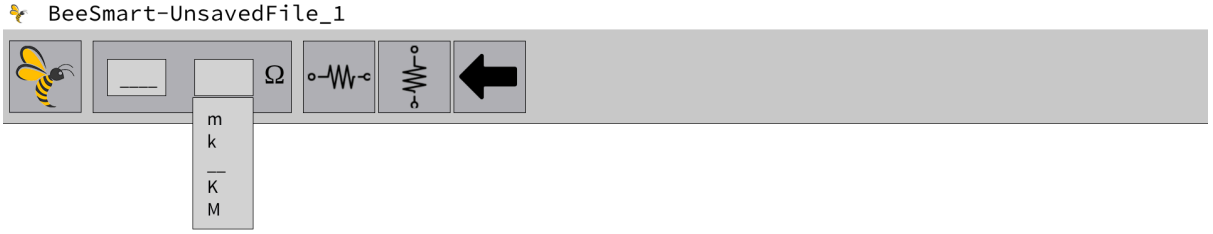
Capacitors

This is the capacitors page, it allows the user to choose the capacitance and voltage of the component.



Resistors

This is the resistors page, it allows the user to choose the resistance of the resistor.

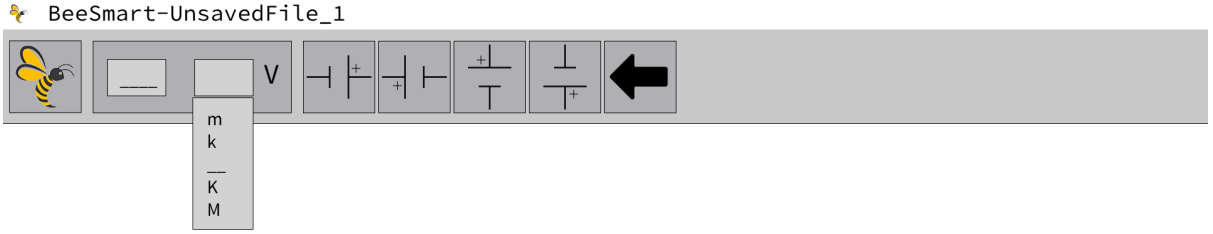


Diodes

This is the diodes/LEDS page, it lets the user choose the orientation of the diode.

Sources

This is the sources page, it lets the user to choose voltage of the source, orientation and type.



Switches

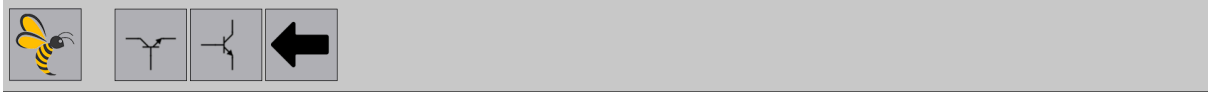
This is the switches page, it allows the user to change the orientation of the switch.

BeeSmart-UnsavedFile_1

Transistors

This is the transistors page, it allows the user to change the orientation of the transistor.

BeeSmart-UnsavedFile_1

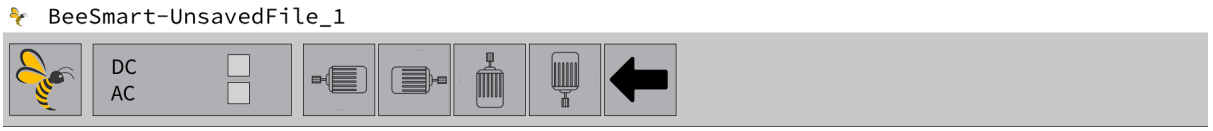


Screens

This is the screens page, it lets the user to choose the orientation of the screen.

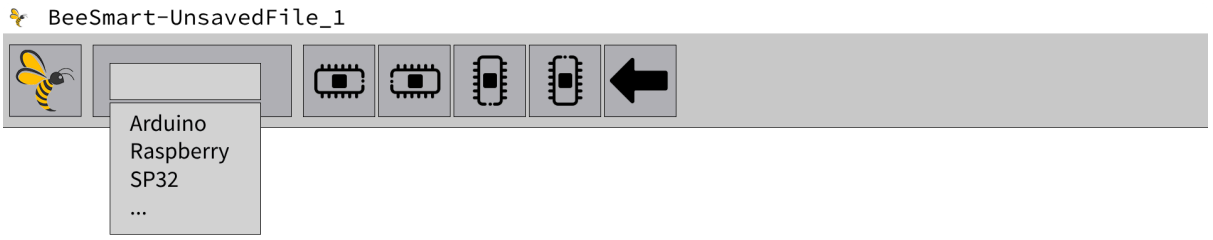
Motors

This is the motors page, it lets the user to choose the type and orientation of the motors.



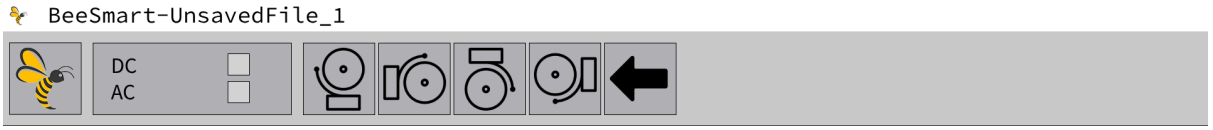
Microcontrollers

This is the microcontrollers page, it lets the user to choose the type of the controller and the orientation of it.



Alarms

This is the alarms page, it lets the user to choose the orientation of the alarm.



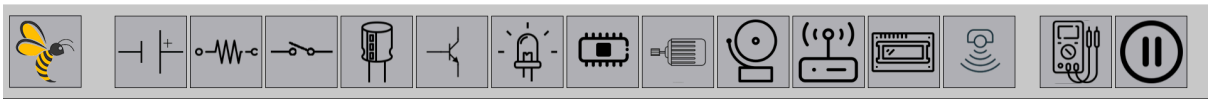
Sensors

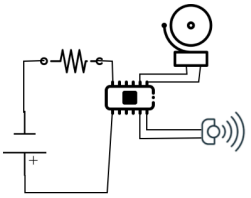
This is the sensors page, it lets the user to choose the type of the sensor and the orientation of it.

Circuit

This is an example of a circuit, with a run/stop button and a few components.

BeeSmart-UnsavedFile_1





For Help Press F1	Circuit Running

CRC Cards

Components	
- Store type, value, and state (e.g., resistor, LED, transistor). - Handle its visual representation in the workspace. - Connect to other components (input/output nodes). - Update behavior when simulation runs.	- Workspace - Simulator

Workspace	
- Manage all components in the project. - Handle connections (that's the logical "circuit"). - Detect and manage user actions (drag, drop, connect, delete). - Render components and wires visually. - Communicate component states with the simulator.	- Component - Simulator - Interface

Simulator	
- Run or pause the simulation. - Calculate the electrical behavior of all connected components. - Send updates to the workspace for visual feedback.	- Workspace - Component - Interface

Interface	
- Manage all user interface elements: menus, toolbar, workspace, and status bar. - Handle general user commands (e.g., New, Save, Run). - Communicate user actions to the workspace or simulator. - Change Theme(Colors, illustrations, etc..)	- Workspace - Simulator - FileManager

FileManager	
- Save and load project files (with extensions like .bsm). - Store workspace layout and component data. - Manage “unsaved file” and file naming.	- Workspace - Interface

Toolbar	
- Contain all tool buttons (components, simulation controls). - Detects selected tool or component type. - Notify workspace or simulator of user actions.	- Interface - Workspace - Simulator

StatusBar	
- Display current messages (e.g., “Circuit Running”, “Press F1 for Help”). - Update according to simulation state.	- Interface - Simulator

Repository link

https://github.com/Ricardo-Esteban-Cepeda-Gomez/DomoticCircuitSimulator