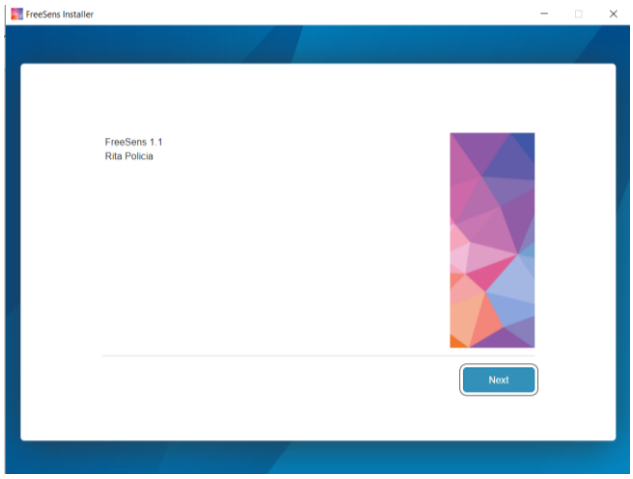
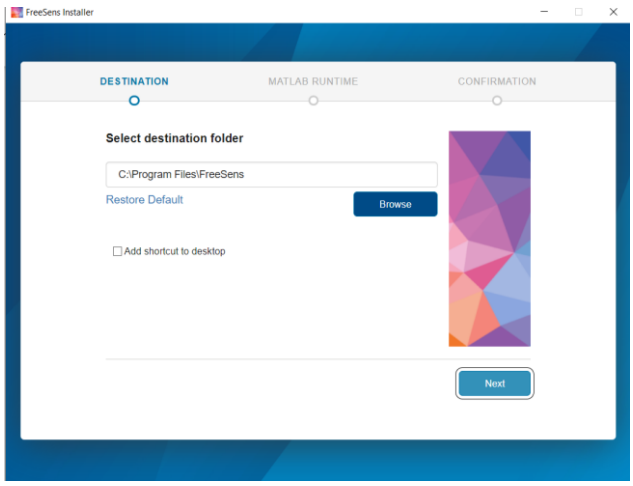
FreeSens installation guide

1. Install MATLAB Runtime, version R2022b, from the following link: https://www.mathworks.com/products/compiler/matlab-runtime.html
MATLAB Runtime is a collection of shared libraries, MATLAB code, and other files that enables the execution of compiled and packaged MATLAB applications on systems without an installed version of MATLAB. End users who want to run these applications without MATLAB must install MATLAB Runtime or specify the location of a MATLAB Runtime network installation.
NOTE: You will need administrator rights to run the MATLAB Runtime installer.

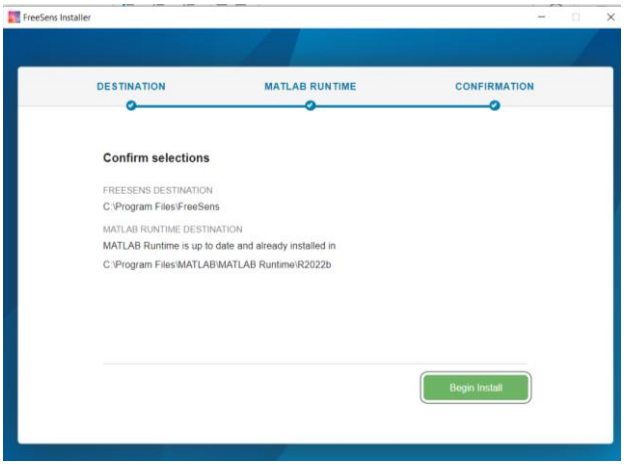
2. Open “MyAppInstaller_web” file. Click “Next” button.



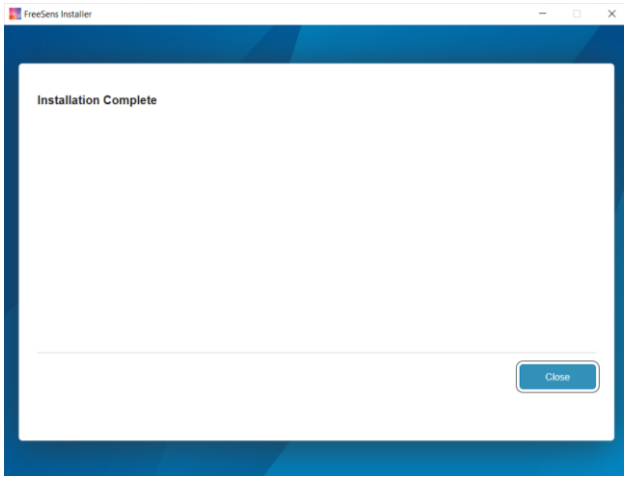
3. Select the destination folder and press “Next” button.



4. Press the button “Begin Install”



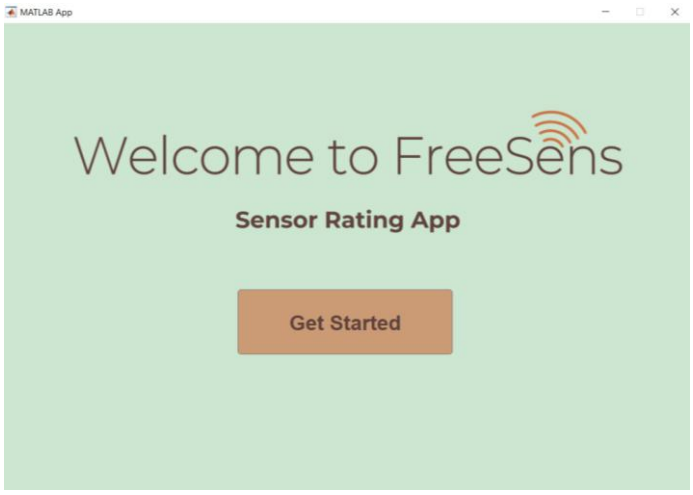
5. When the installation is complete press the button “Close”



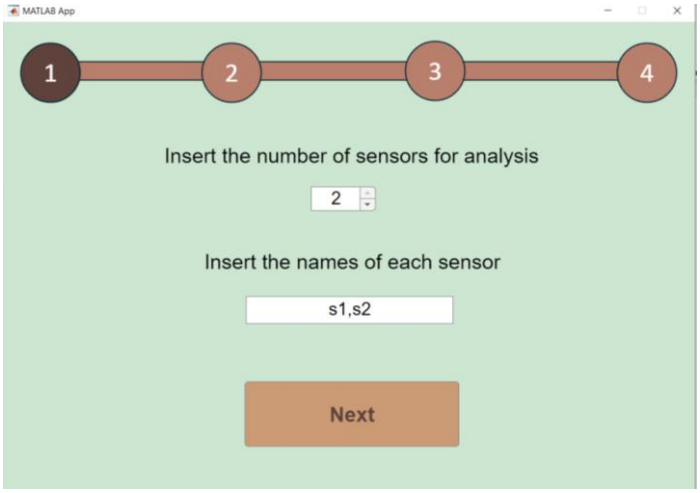
6. After following these steps, FreeSens software is ready to use.
Note: To Unistall Follow the path: FreeSens > unistall > bin > win64 and open “Uninstall_Application” file.

FreeSens user guide

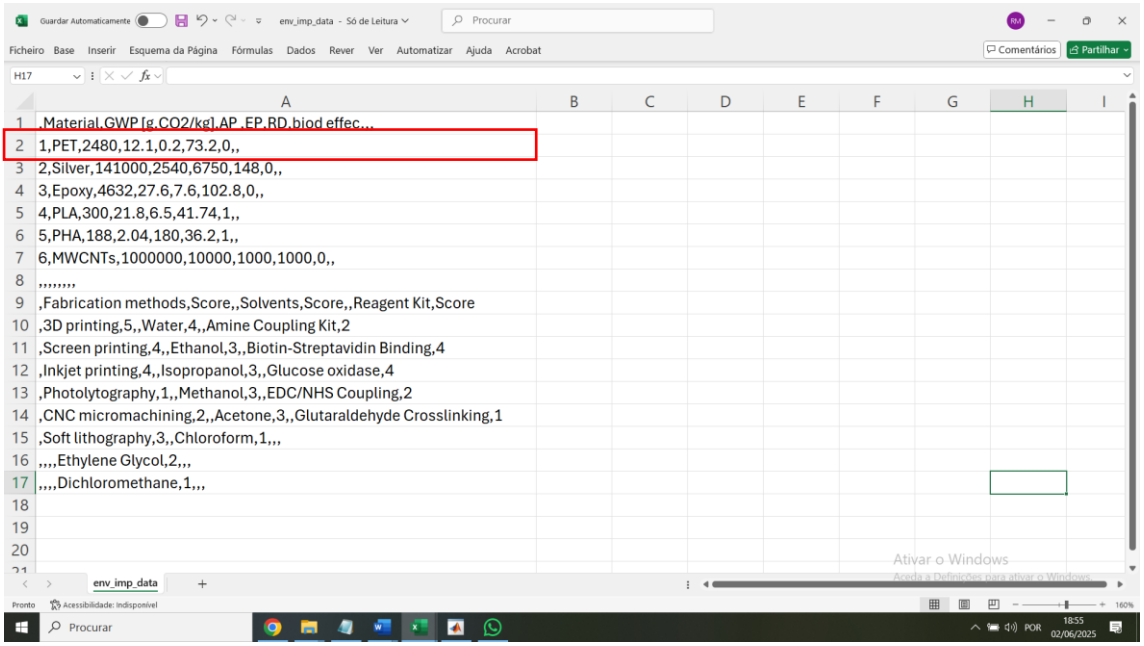
Step 1: Open the software: FreeSens > application > FreeSens
Press the button “Get started”.



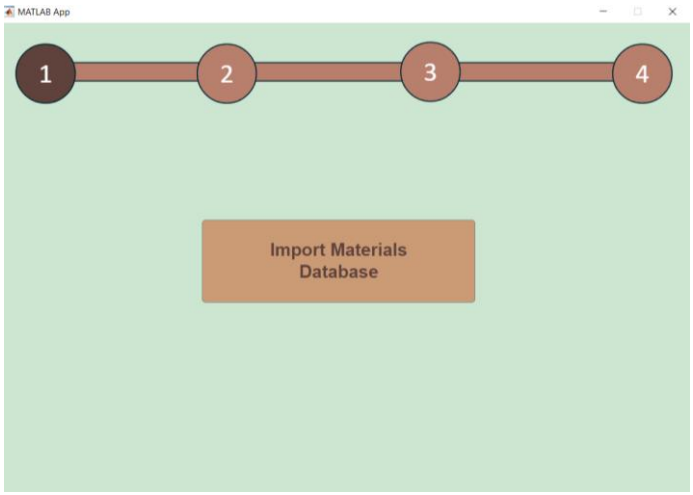
Step 2: Insert the name of each sensor separated by a comma and press the button "Next".
Note: In this version it is only allowed to compare two sensors. Do not edit the upper text box.
Example: First sensor name s1; second sensor name: s2.



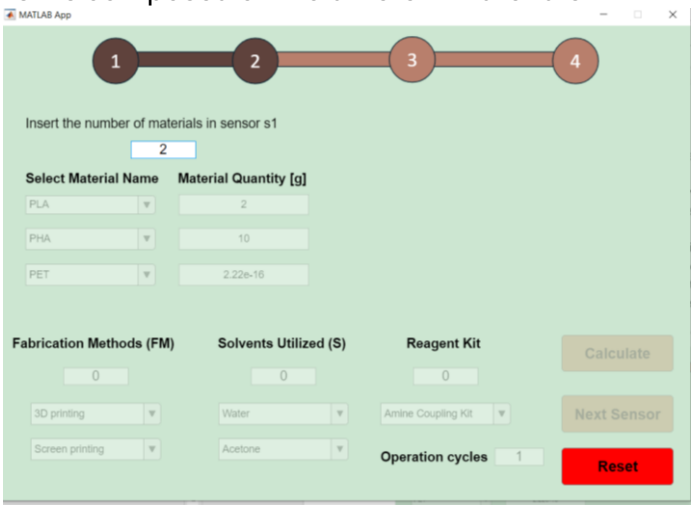
Step 3: Import the materials database. In the software file is provided a database in in ".xls" format named "env_imp_data". The LCA values can be changed by the user using excell software, as long as the names are kept unmodified. Be aware that the position of the numbers indicates the value of each LCA category. The numbers follow the order: GWP value, AP value, EP value, RD value, and biodegradability. Biodegradability is 0 in case the material is not biodegradable or 1 in case it is biodegradable.



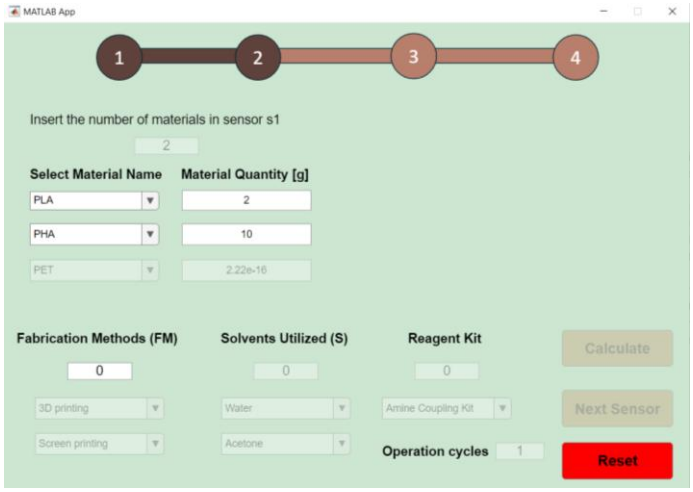
Example: 1,PET,2480,12.1,0.2,73.2,0.
Material name: PET
GWP:2480 g CO2 eq. / kg
AP:12.1 g SO_2 eq./kg
EP:0.2 g P eq./kg
RD: 73.2 MJ/kg
Biodegradability: 0 (not biodegradable)
Note: All the changes to the database must be made before importing it into the software.
To import the database, click on the button “Import Database” and follow the path FreeSens > application, select “env_imp_data” file and press the button “open”.
A second window will open where the user will input all the information regarding the first sensor.
Note: Do not close the first window. Closing the first window will close the software.
In case of importing the wrong data file, close the second window and follow again Step 3.



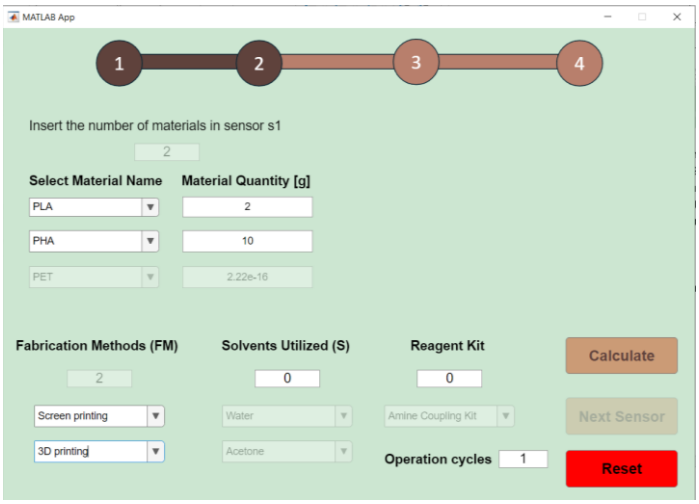
Step 4: Insert the number of materials utilized in the first sensor, which can variate between 1 and 3. Click “enter” after writing the number.
Example: sensor s1 is composed of two different materials



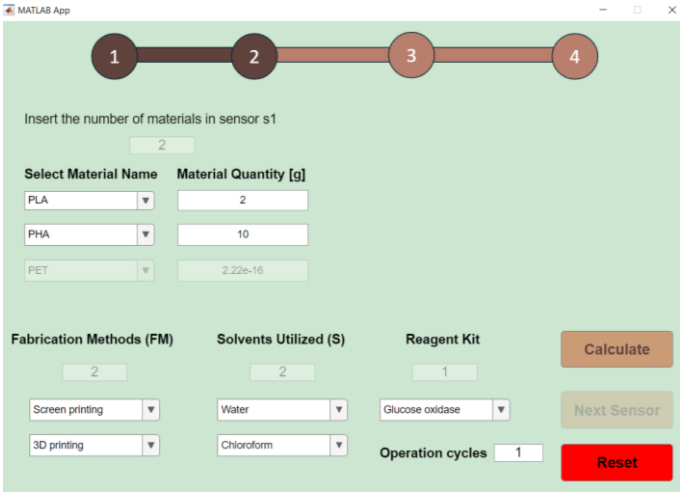
Step 5: Select the names of the materials from the list buttons on the left and define the quantity (in grams) used from each material in the text box placed in front of its name. Press “enter” to define the numbers.
Example: Sensor s1 is composed of 2 grams of PLA and 10 grams of PHA.



Step 6: Choose the fabrication methods by writing in the text box placed under “Fabrication methods (FM)” a number between 1 and 2, correspondent to how many different fabrication methods (FM) used to manufacture the sensor and press “enter”. Afterwards, choose the type of FM used from the list button.
Example: Sensor s1 was fabricated using screen-printing and 3D printing.

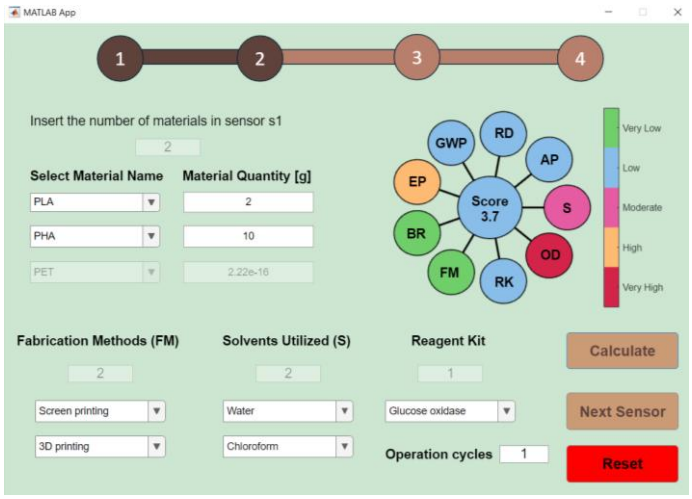


Step 7: Follow the same steps for the solvents, reagents kit, and operation cycles. Do not forget to click “enter” after inserting the numbers.
Example: Sensor s1 used 2 different solvents: Water and chloroform; 1 reagent kit: Glucose Oxidase; and performs 1 operation cycle.



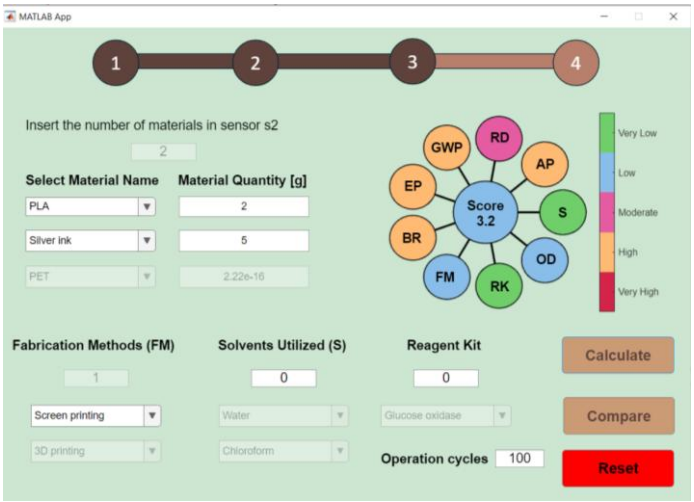
Note: The user can click in the button “Reset” at any time in order to correct the input values. By pressing “Reset” button the user will start again from step 4.

Step 8: After all the fields are edited, press the button “Calculate” in order to save and visualize the sensor scores for each category.
Note: It is possible to edit all the fields after pressing the “Calculate” button. After editing the variables, do not forget to press the button “Calculate” to update the sensor score values.

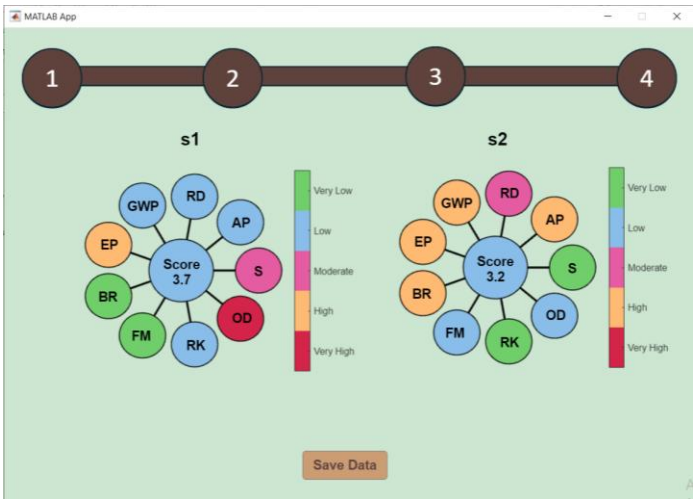


Step 9: Click the button “Next Sensor” to move to the next sensor information.
Note: After pressing the button “Next Sensor”, all the information about the first sensor is saved in the software and there is no possibility of changing it again, unless the program is restarted.

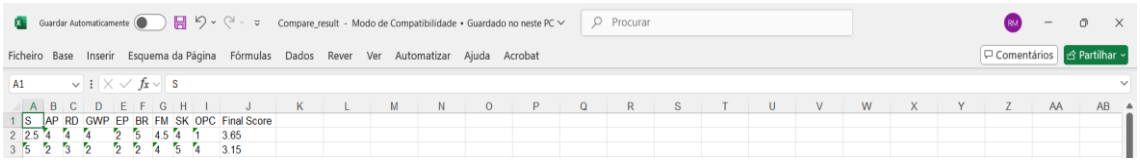
Step 10: Repeat steps 4 to 8 regarding the information of the second sensor.
Example: sensor name s2; composed of 2 grams of PLA and 5 grams of silver ink; fabricated by screen printing; does not use solvents or reagents kits; performs 100 operation cycles.



Step 11: Press the button “Compare” to visualize the score results of both sensors. After pressing it, the second window will close, and the results will be shown on the first window, as shown below.



Step 12: Save the sensor scores by pressing the button “Save Data” and choose the folder where the results file will be saved. A file named “Compare_result.xls” will be created with the Freescore and the scores of each criterion for each sensor. The first row corresponds to the first sensor and the second row to the second sensor.



Step 13: Press the button “Close” to close the program.