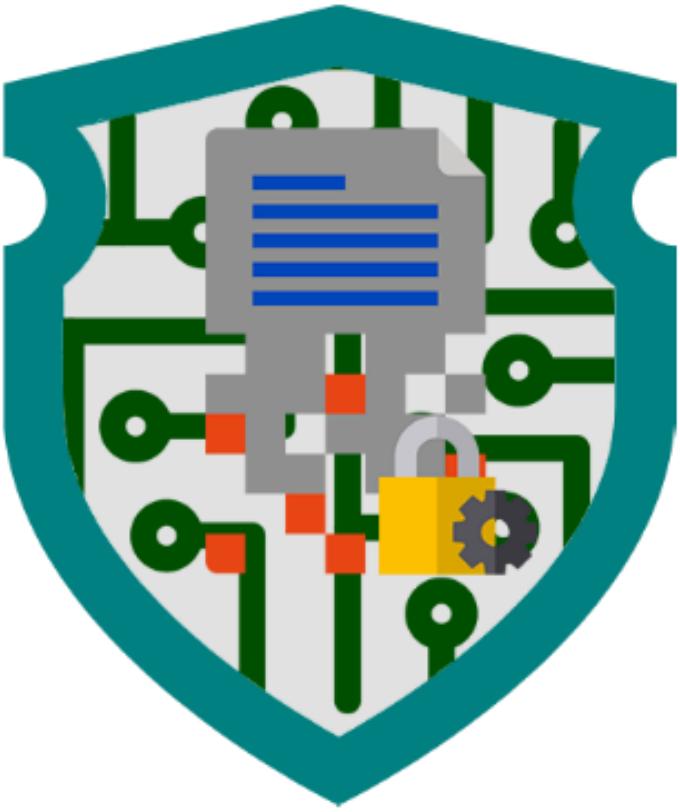


L.E.U.M.S.

Laboratory Equipment Usage Monitoring System

User Manual

Package List

1 x LEUMS Custodian Hardware

1 x LEUMS Application Software (Windows)

3 x LEUMS Laboratory Equipment Hardware

3 x Power Cable

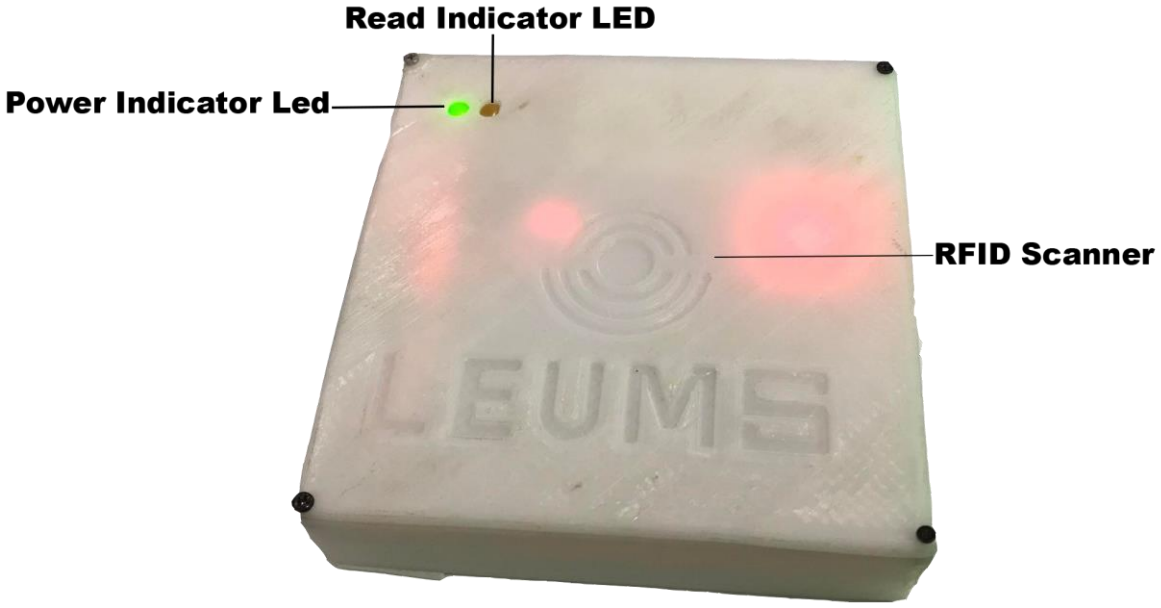
1 x Micro USB Cable

1 x USB Type B Cable

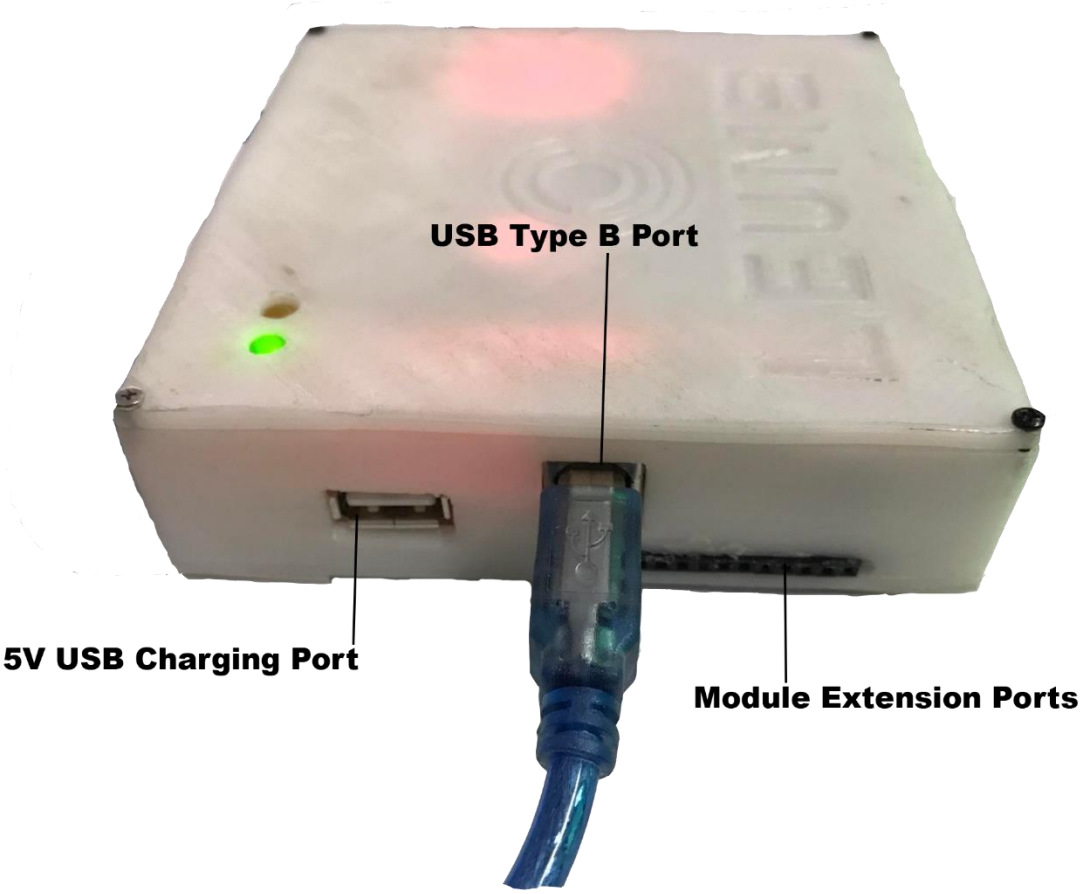
1 x User Manual

Product Overview

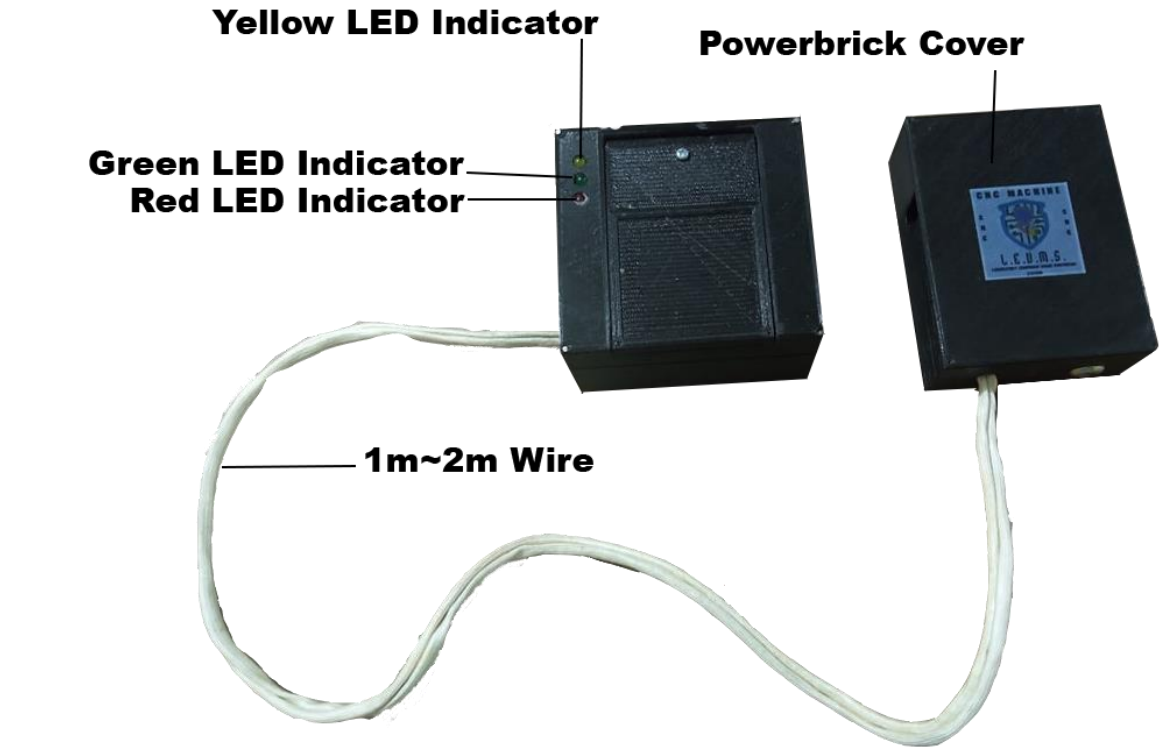
Top-Front Custodian Hardware:

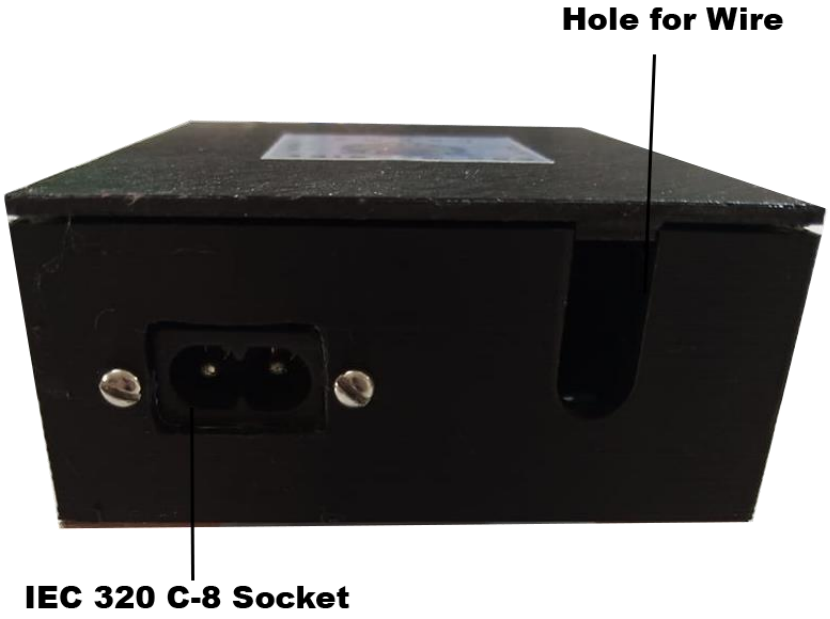


Top-Side Custodian Hardware:



Top-Side Laboratory Equipment Hardware:





Card Reader Slot

IP40 Key Switch

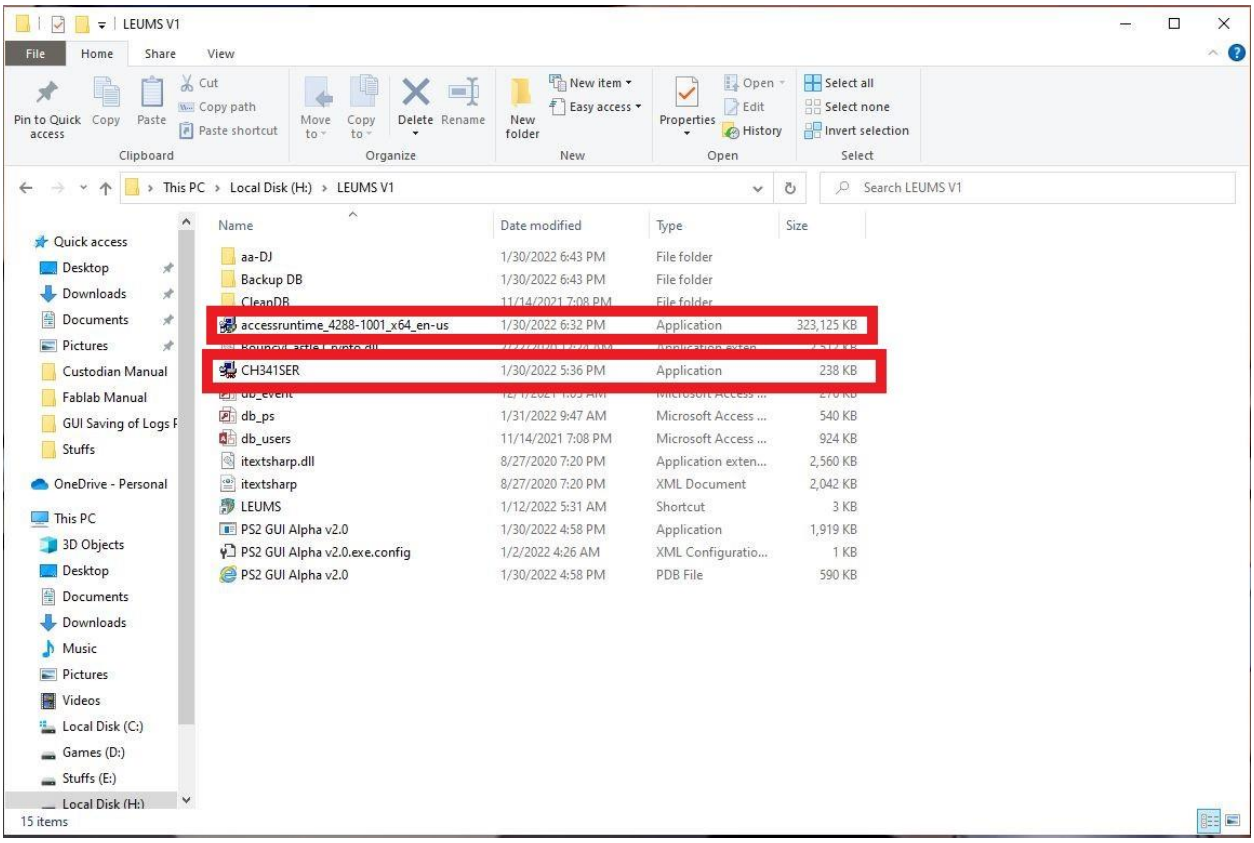
Specifications

LEUMS Application Software	
Minimum Requirements	
Operating System	Windows 10 (64-bit)
CPU	1GHz or faster processor
RAM	1GB (32-bit) or 2GB (64-bit) of RAM
Storage	500 MB of free disk space
NET Framework	.NET version 4.5 or above
LEUMS Custodian Hardware	
Compatibility	PC
Power Supply	+5v ⎓ 50mA
Microcontroller	ATmega328P @16MHz
SRAM	2 KB
EEPROM	1 KB
Flash Memory	32 KB
Read Range	Approx. 3cm with card
Data Transfer Rate	10Mbit/s
LEUMS Laboratory Equipment Hardware	
Power Supply	+5v ⎓ 19mA
Microcontroller	ATmega328 @16MHz
SRAM	2 KB
EEPROM	1 KB
Flash Memory	32 KB
Read Range	Approx. 3cm with card
Data Transfer Rate	10Mbit/s
Wire Length	1m ~ 2m

How to Connect LEUMS Custodian Hardware to PC

Connect via USB

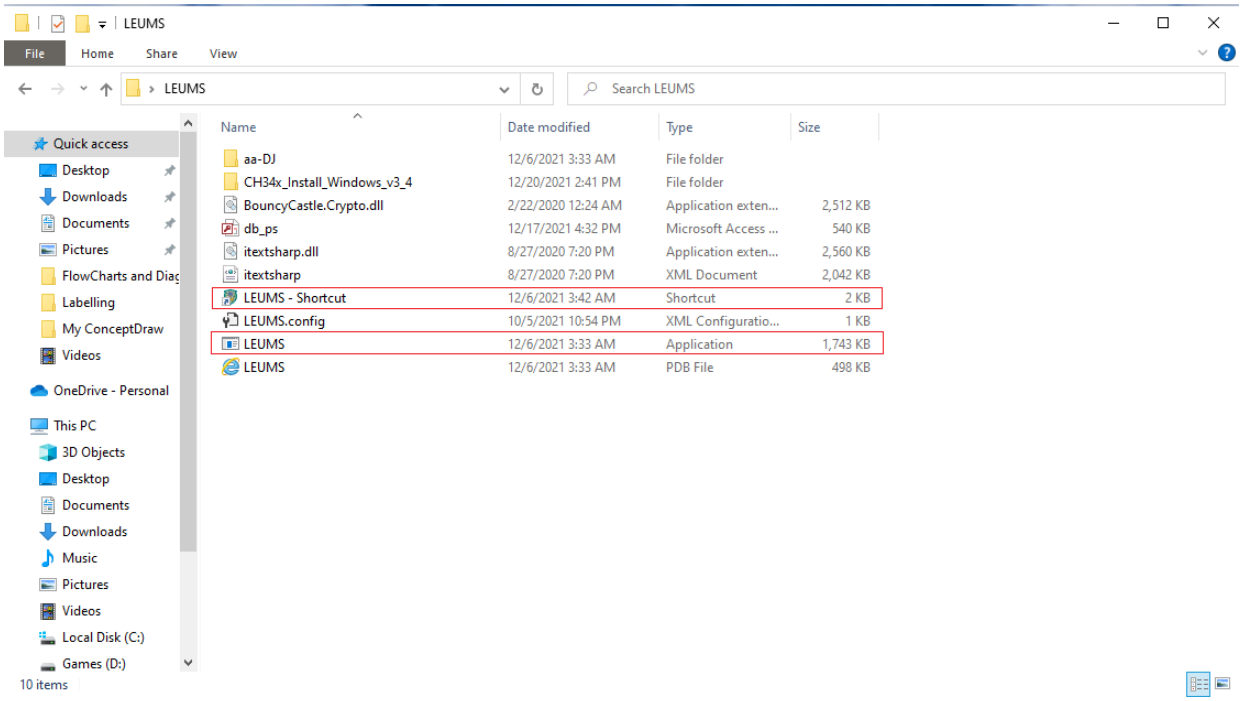
1. Navigate to the LEUMS folder. Open the CH341SER and accessruntime_4288-1001_x64_en-us. Install these files which are required in order to use the program.



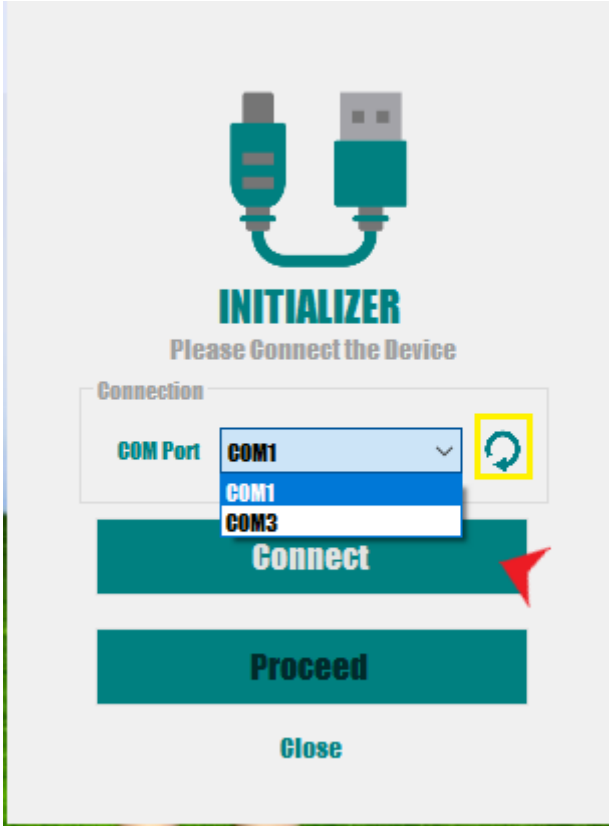
2. Locate the USB type B on the Left Side of the LEUMS Hardware.

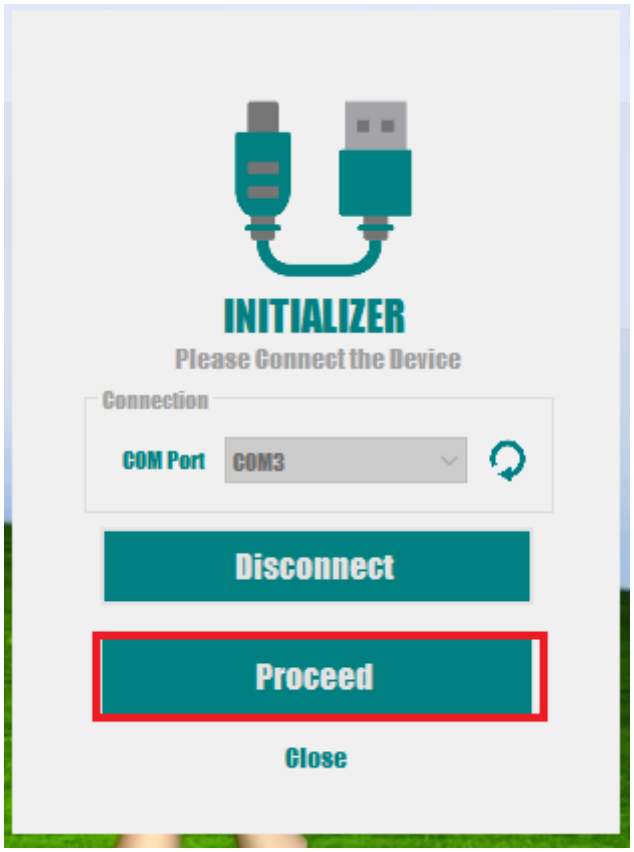
Connect the LEUMS Hardware to your PC with the USB type B connector. The Power Indicator LED (Green LED) should light up to indicate the connection was successful

3. Navigate to the LEUMS folder and Run the LEUMS Application.
   (Note: The Shortcut may be placed on the desktop for easier access)



4. Upon running the application, the initializer will now list the detected serial communication ports that the LEUMS Hardware is connected to. If there is no communication port detected or if the correct communication is not on the list. Please make sure the connection of the USB type B from the LEUMS Hardware to the PC is properly connected and press the refresh button highlighted by the yellow square.
   Once the correct communication port is selected you may click the Connect button.



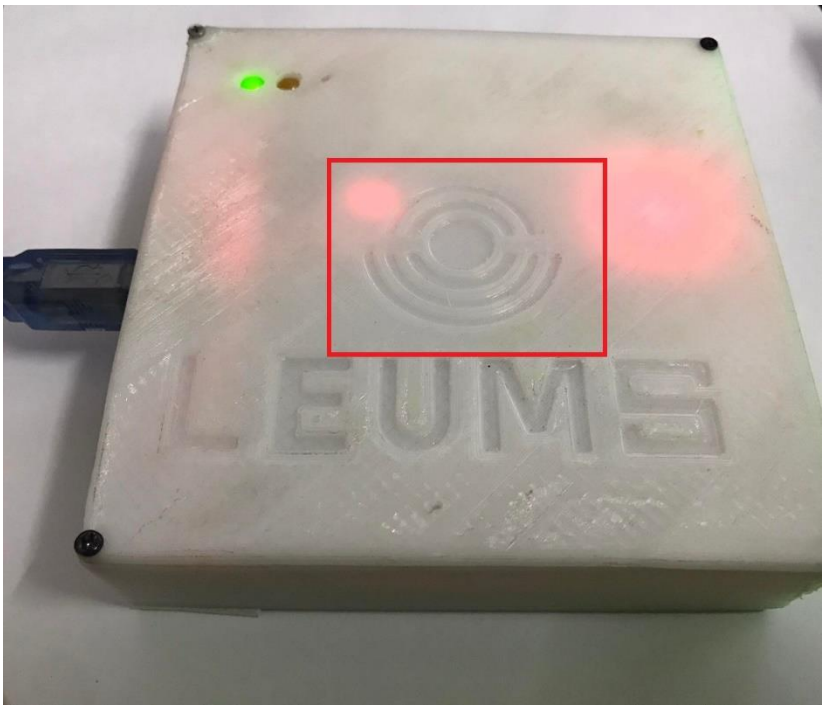


5. Once Connected, a Disconnect button is will be present in case of further changes to the communication port. If the correct communication port is already selected. Click on proceed and the connection from the LEUMS Hardware and the PC is now established and will now be directed to the Login Page.

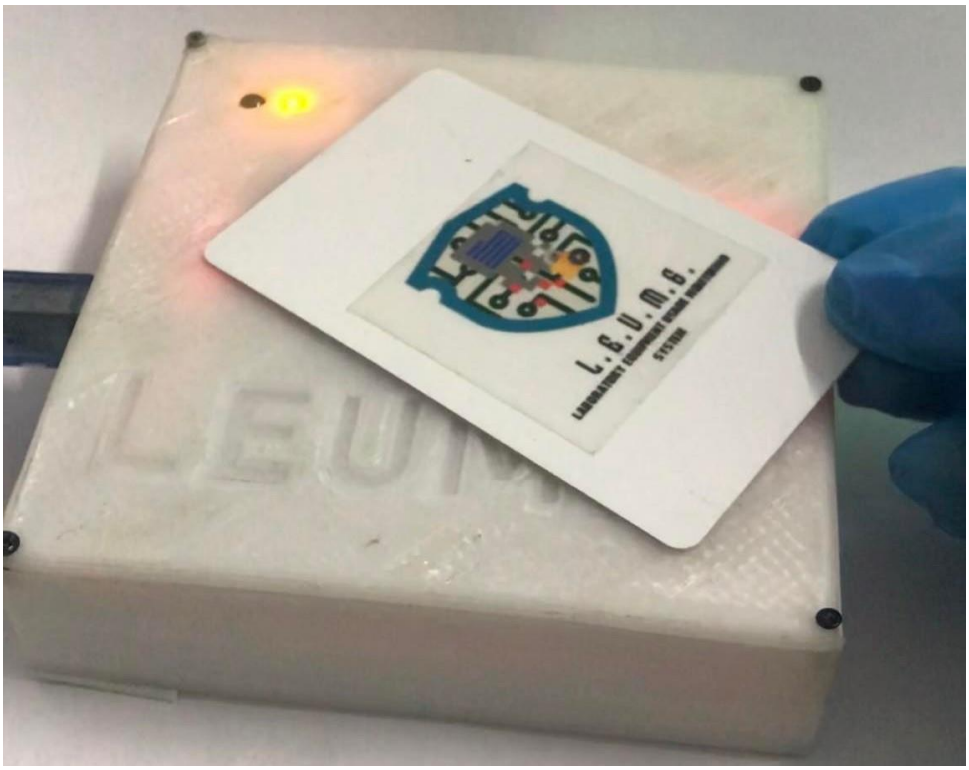
How to Scan RFID using the LEUMS Custodian Hardware

Tap the Card

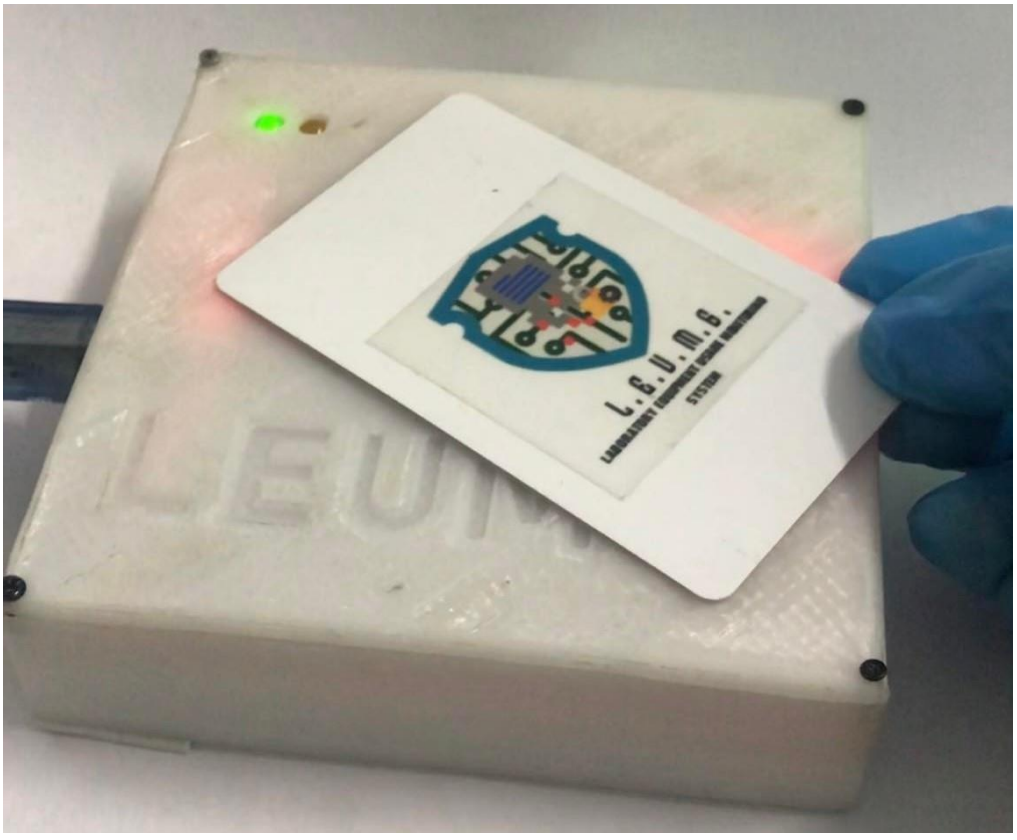
1. The location of the RFID scanner is directly under the embossed signal logo above the LEUMS embossed text. Which is where the user is designated to tap the card for a reliable scan.



2. Tapping a card or any RFID within the scanners frequency range on the scanner will temporary turn off the Power Indicator LED (Green LED) and turn on the Read Indicator LED (Yellow LED) indicating that the LEUMS Hardware have read the RFID data and has sent it to the GUI.



(Note: The turning off of the Power Indicator in this instance does not mean that the Arduino Uno is turned off, but is just an indicator that the LEUMS Hardware is in Read Mode)



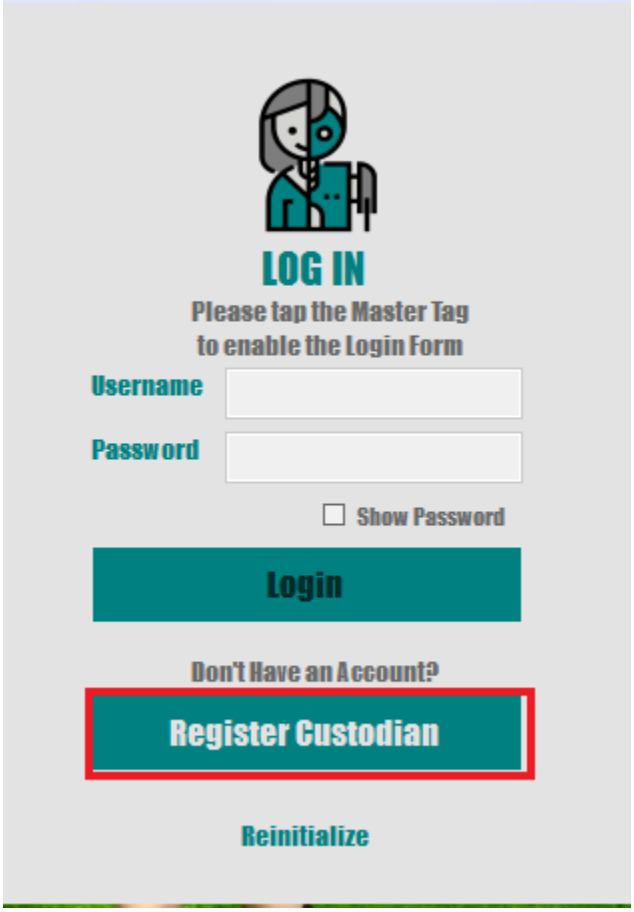
3. After an approximately 0.5s of tapping, the Power Indicator LED (Green LED) will turn back on and turns off the Read Indicator LED (Yellow LED) and will now be ready for another tap.

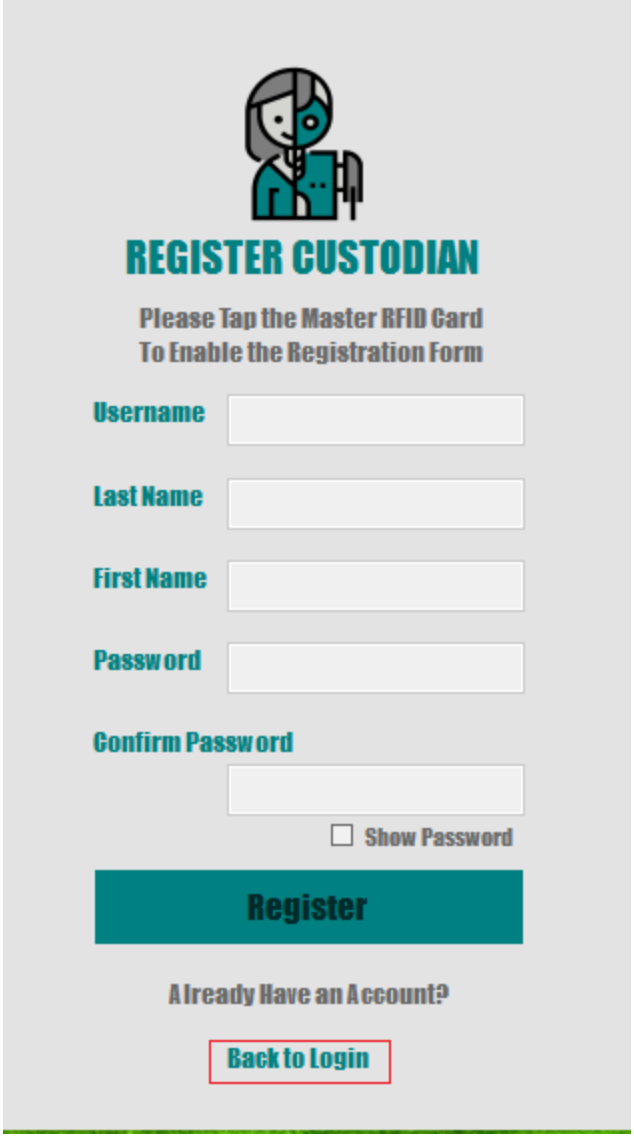
(Note: Leaving the card on top of the scanner is not considered a tap therefore the scanner will not read the card unless the user lifts the card away from the scanner range and tap again)

How to Register as a Custodian on the LEUMS Application Software

Register Custodian

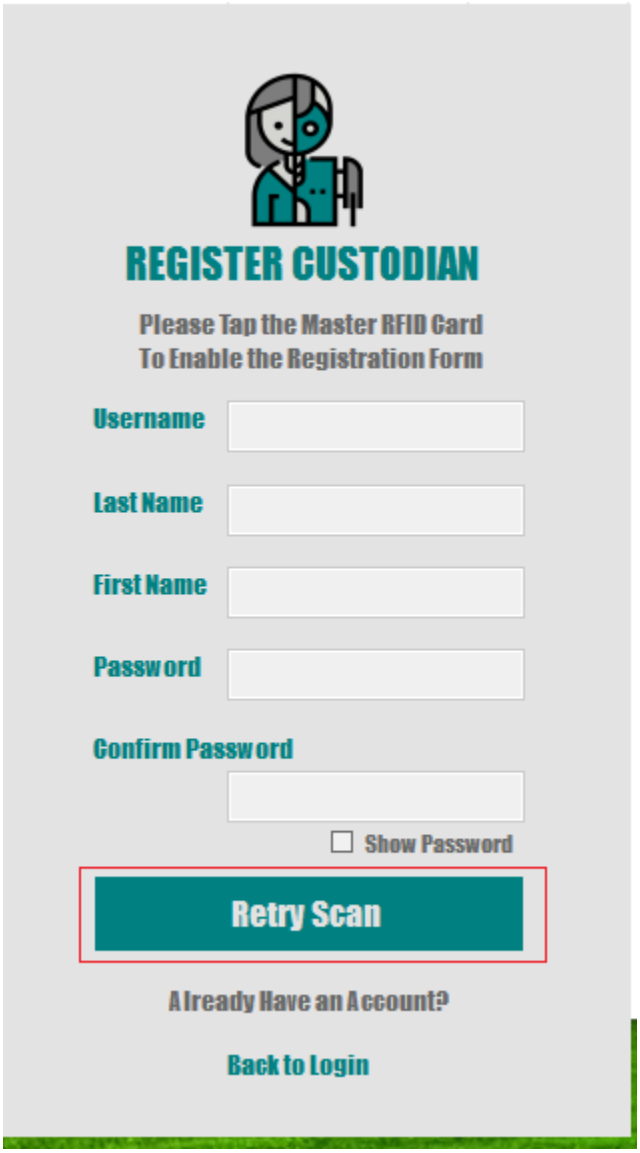
1. After proceeding the Initializer. The Login Page also contains the Register Custodian button. Click this button to register as a custodian in order to be able to Log in.

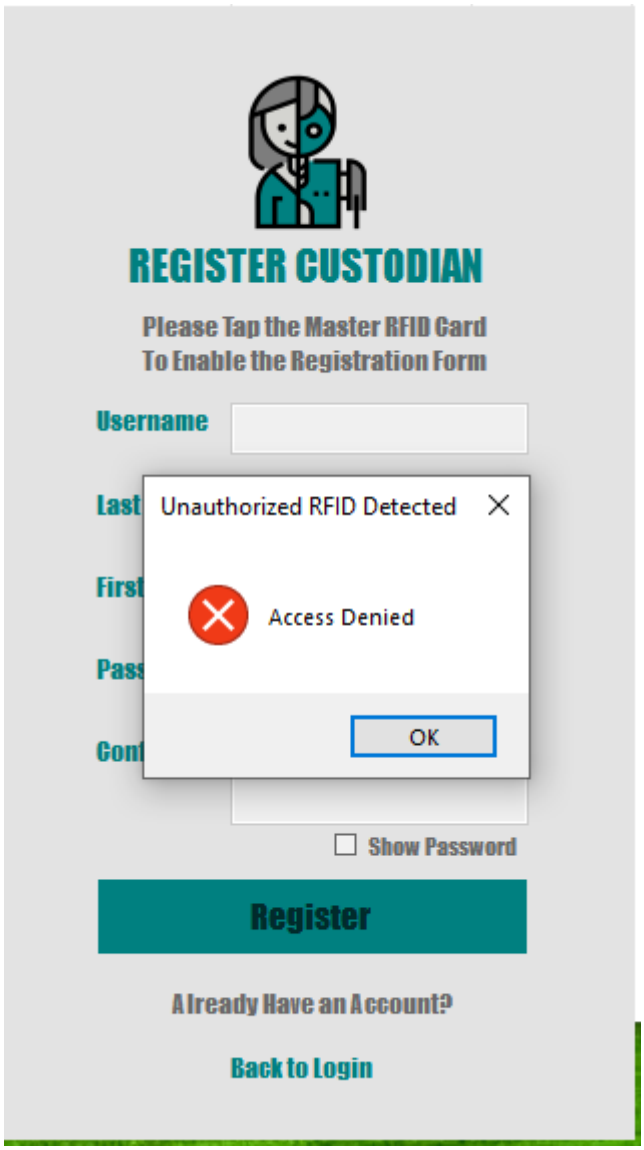


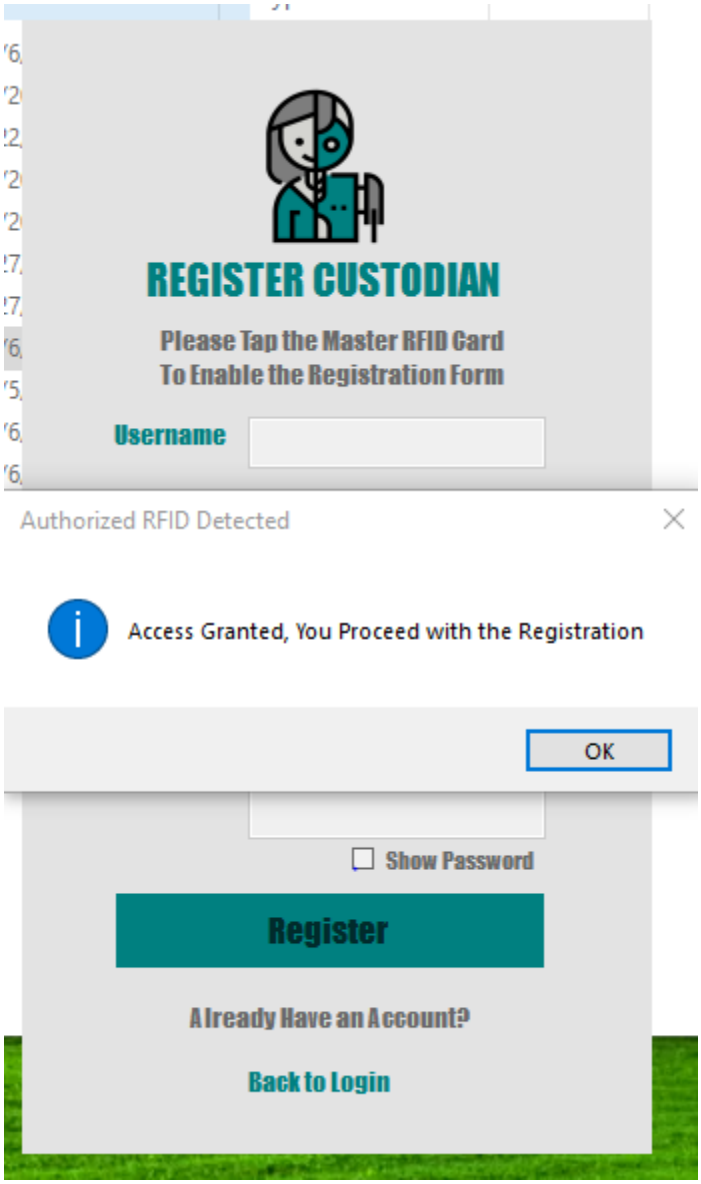


2. After loading the registration page. The user will be required to tap the Custodian RFID or also known as the Master RFID or Master Tag that is hard coded on the application. If the user is already registered and have an account clicking the **Back to Login** link will take the user back to the Login page.

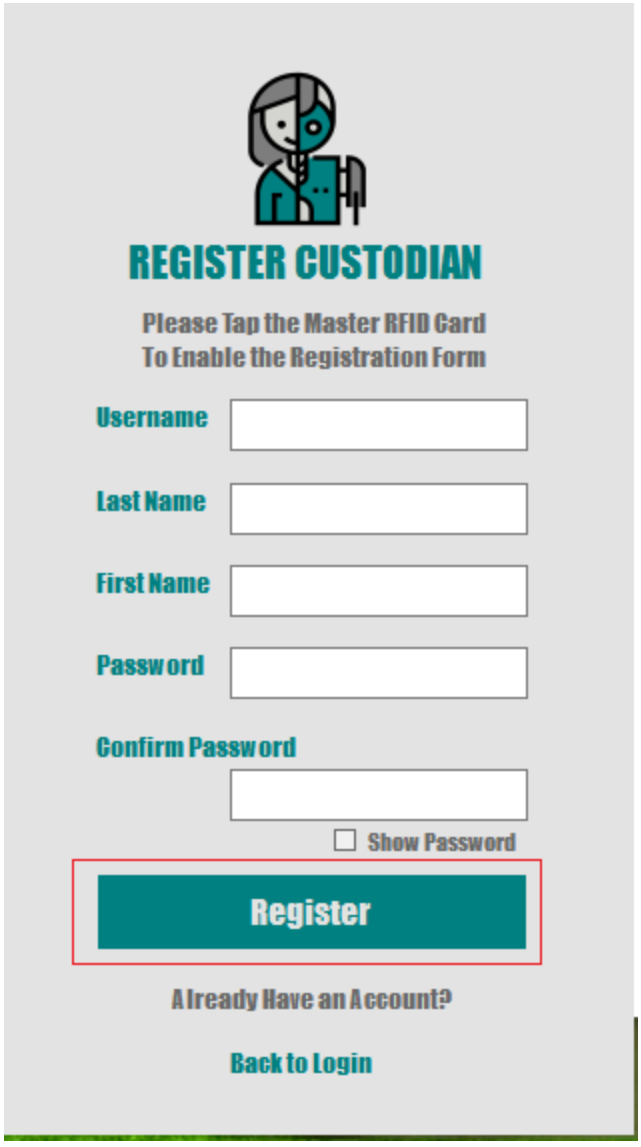
3. If the RFID card the user tapped on the scanner is not the Custodian Card/Master RFID/Master Tag the GUI will not give the user access to register and will have to click on the Retry button to tap the correct card/RFID tag which will show after the deny of access in place of the register button.







4. If the RFID card the user tapped on the scanner is the Custodian Card/Master RFID/Master Tag the GUI will detect it and will allow the user to register as a custodian.



5. If the required fields are filled out correctly, click the Register button and the GUI will prompt the user that the custodian has successfully registered. The user will automatically be redirected to the Login after a successful registration.

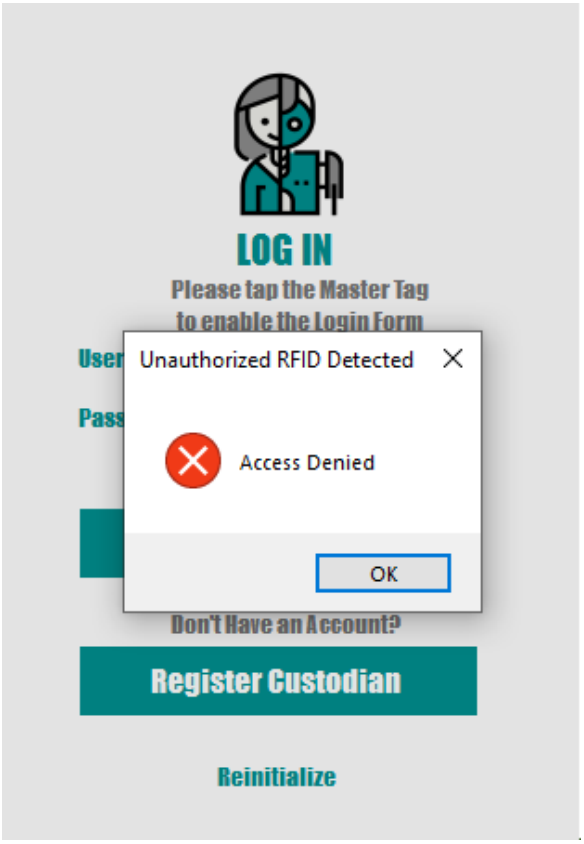
   (Note: The GUI will inform the user if the chosen username is already in use.)

How to Log in on the LEUMS Application Software

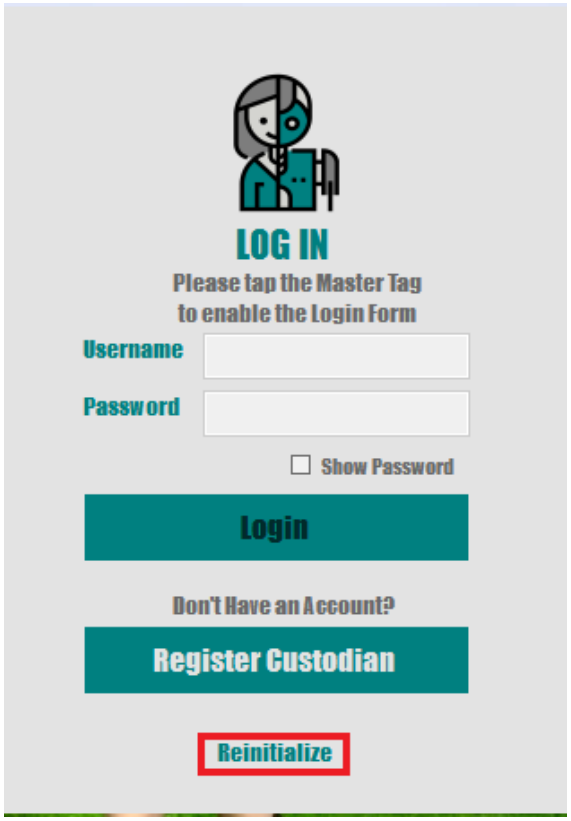
Login

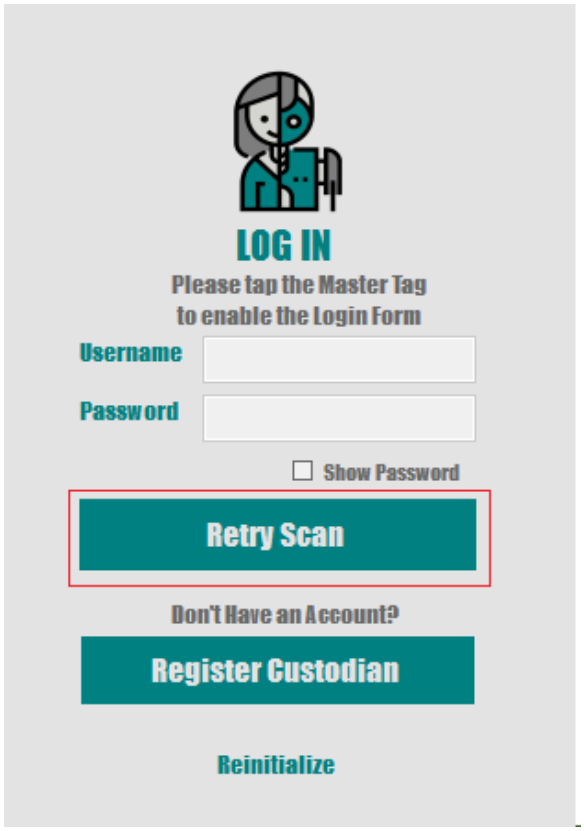
1. After loading the registration page. The user will be required to tap the Custodian RFID or also known as the Master RFID or Master Tag that is hard coded on the application.

2. If after tapping any card and the GUI does not detect any information about the card. It's advised to reinitialize and make sure the application is connected to the correct serial communication port.

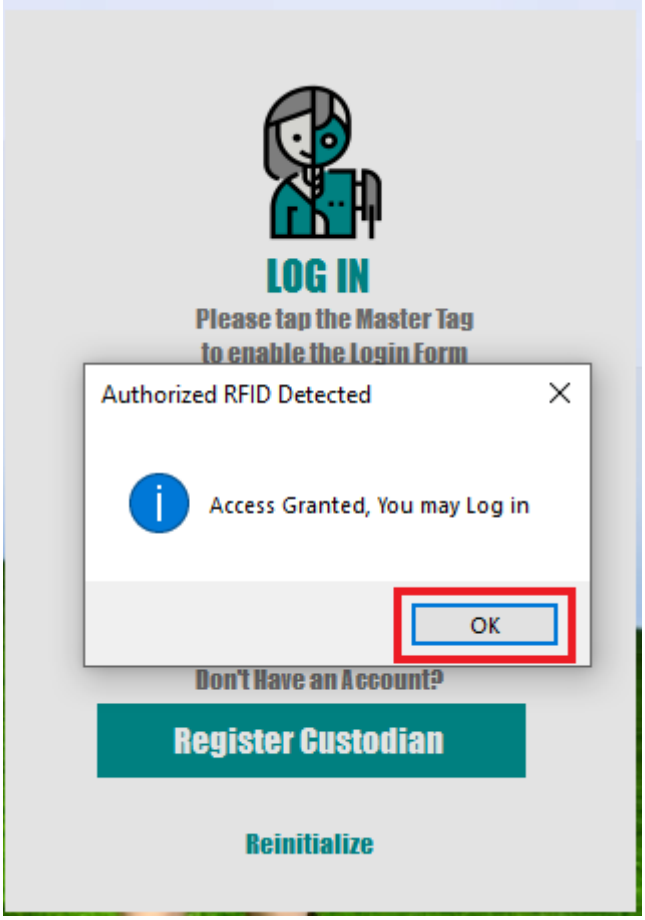


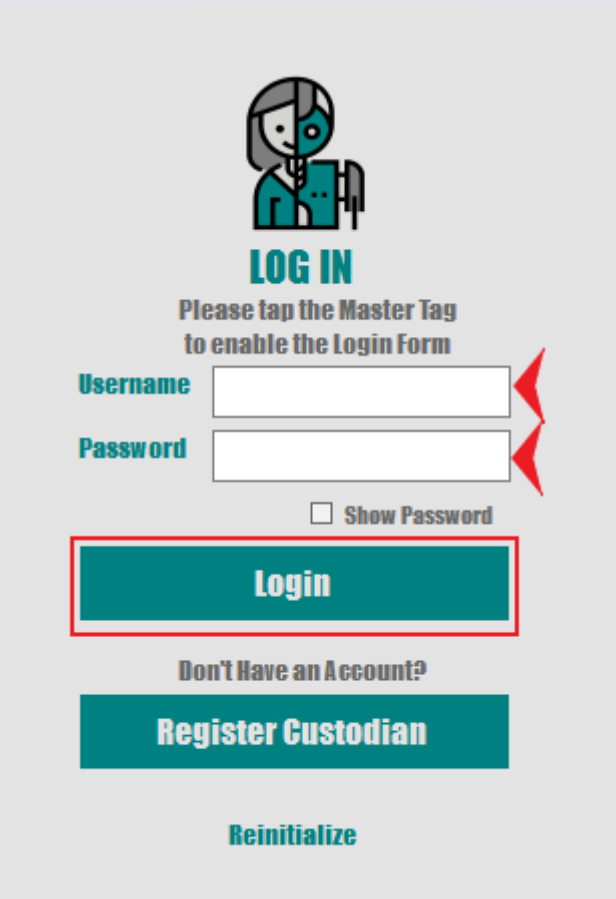
3. If the RFID card the user tapped on the scanner is not the Custodian Card/Master RFID/Master Tag the GUI will not give the user access to log in and will have to click on the Retry button to tap the correct card/RFID tag which will show after the deny of access in place of the login button.





4. If the RFID card the user tapped on the scanner is the Custodian Card/Master RFID/Master Tag the GUI will detect it and will allow the user to log in.



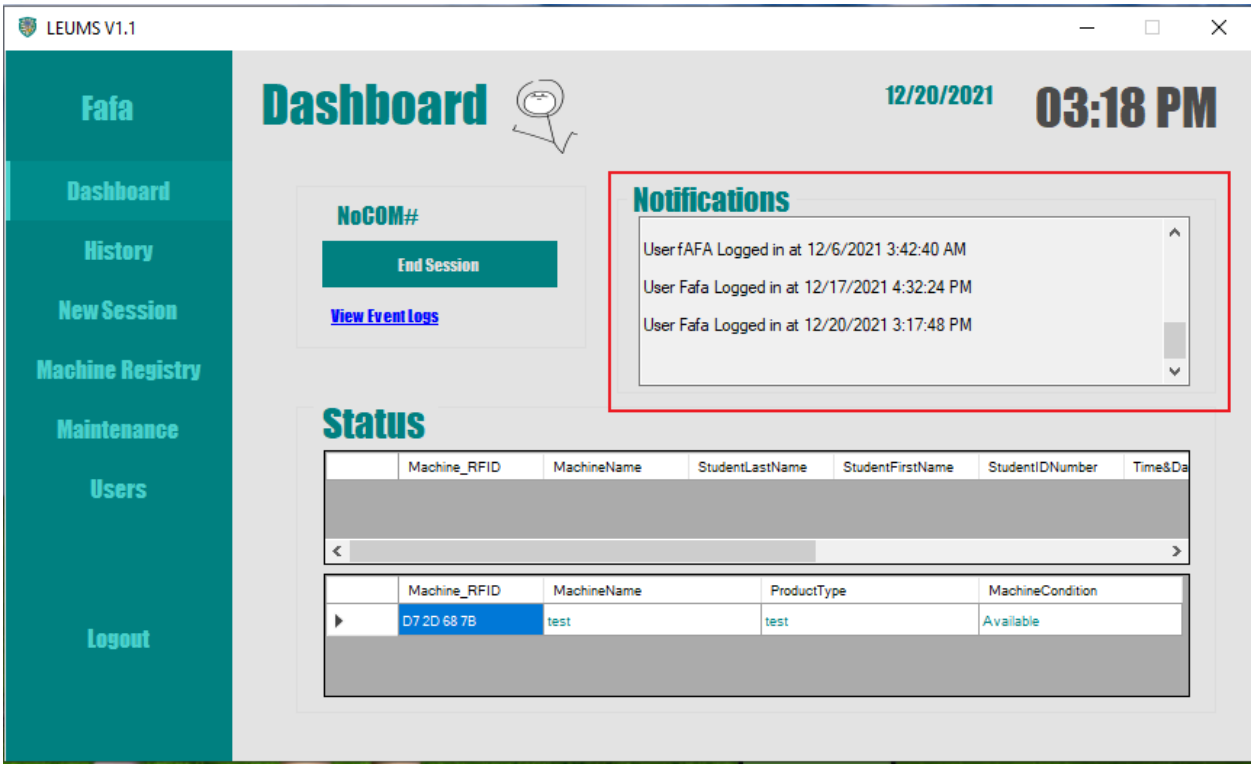


5. If the required fields are filled out correctly, click the Login button and will be able to proceed to the Dashboard.

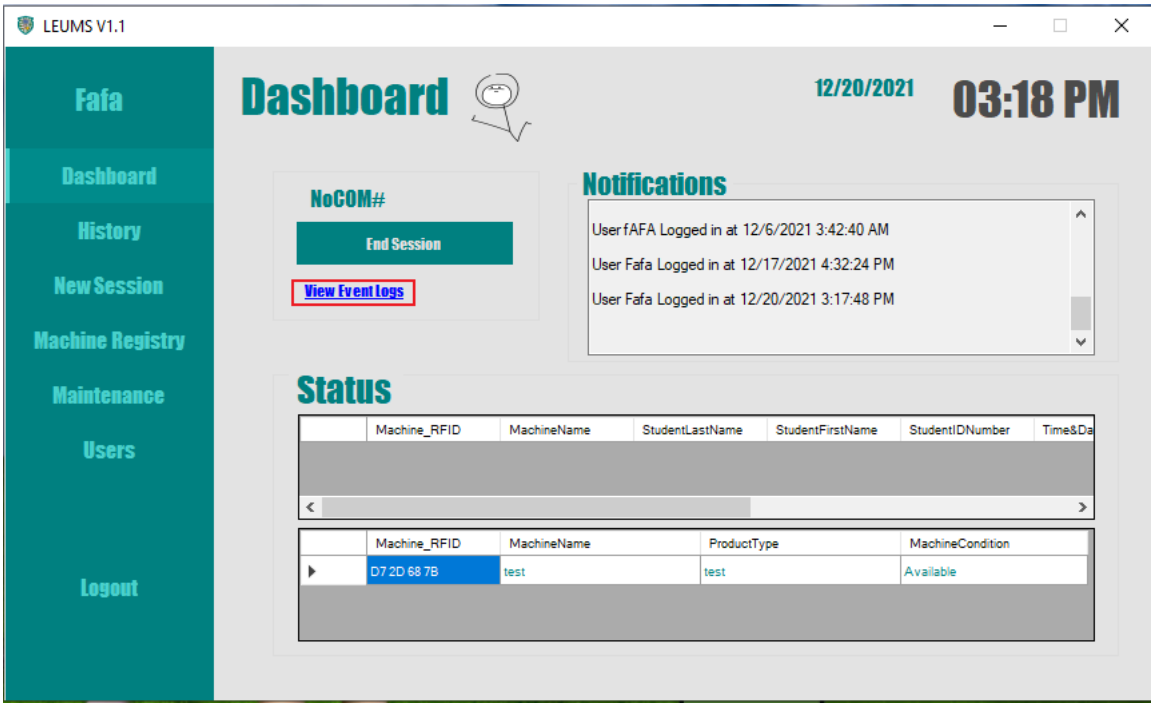
(Note: The GUI will inform the user if the written username & password combination is a registered custodian of this application.)

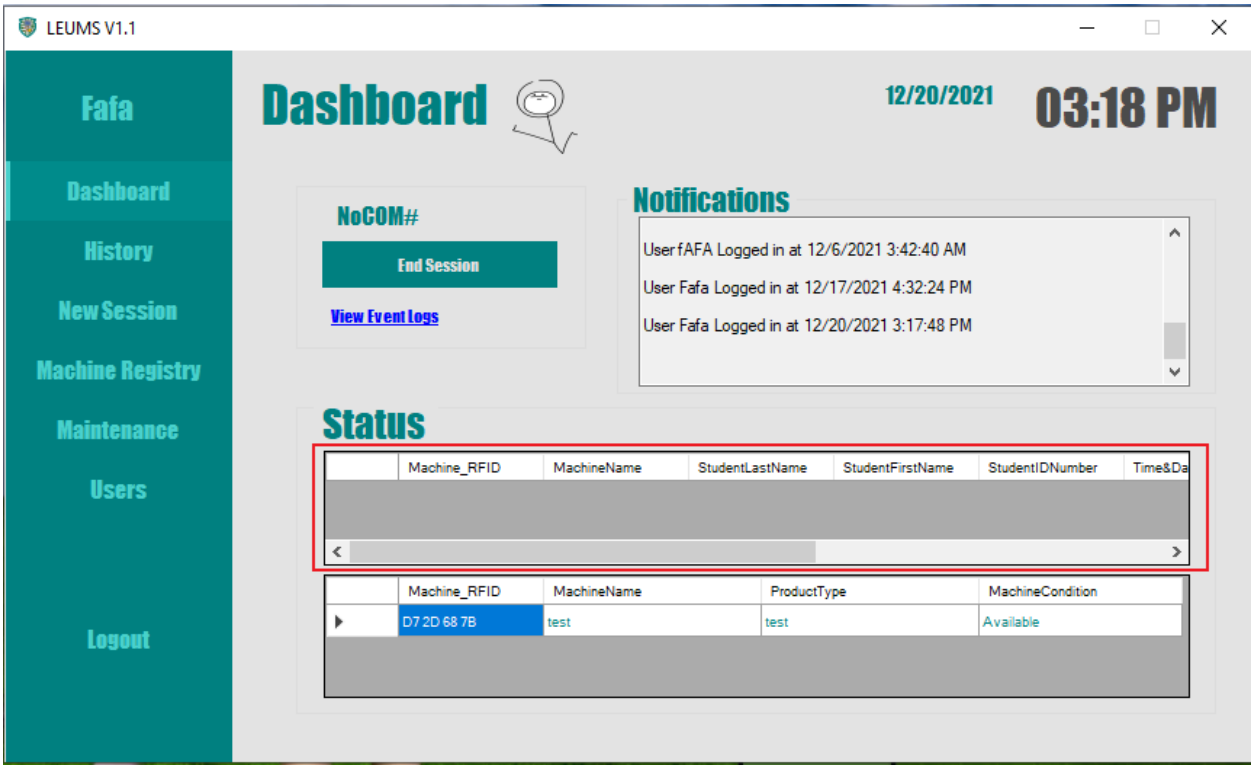
How to Navigate and Access the Main Features of the Dashboard

Dashboard Guide

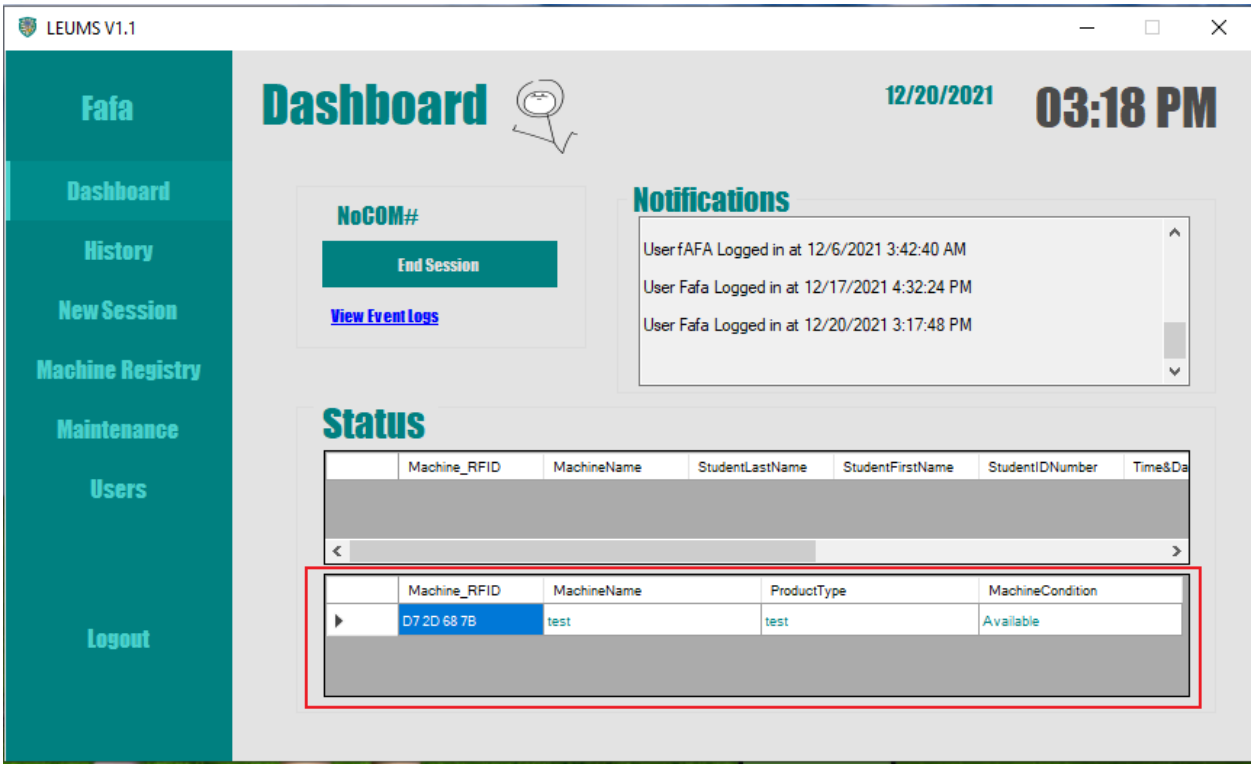


Within the dashboard is the Notifications Board which where all the actions and events that occurs within the application will be displayed and recorded which can be viewed in the **Event Logs**.

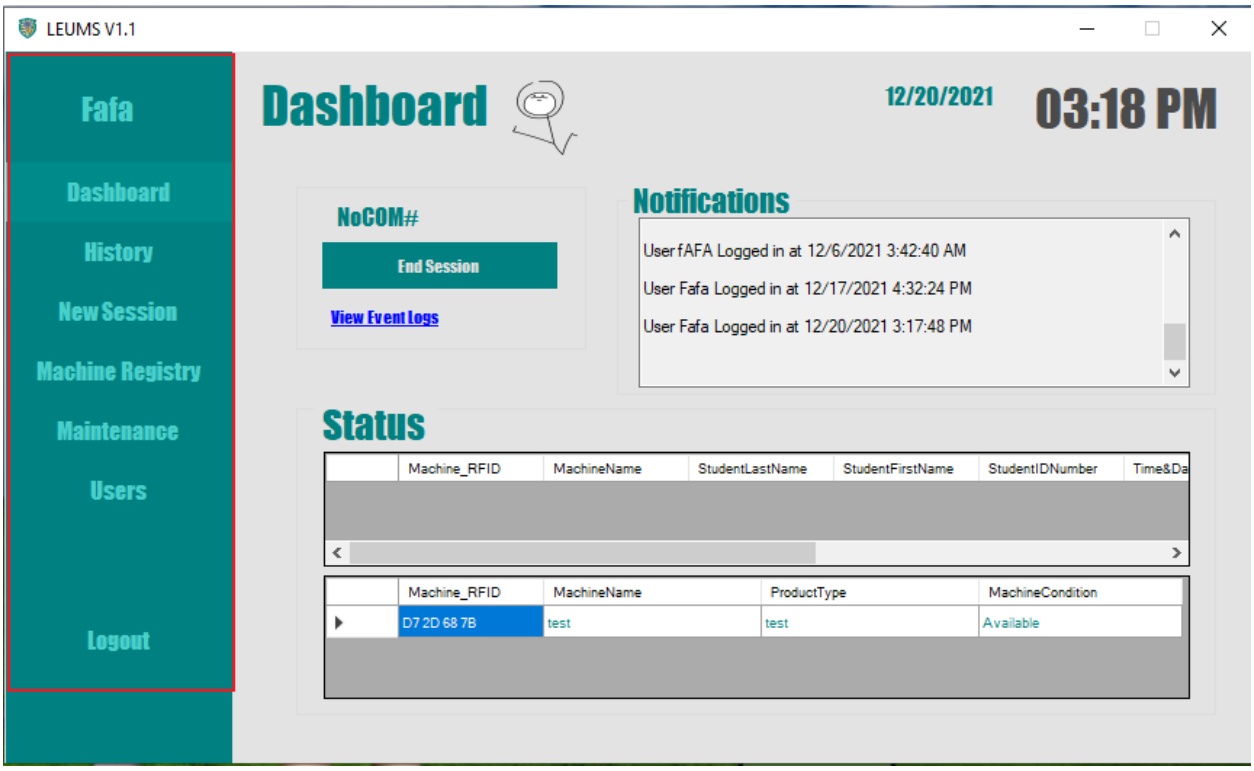




The dashboard contains the Status tables which displays the current session's information and also the list of machines and their brief information and conditions whether they are "In Use", "Under Maintenance", "Available" or "Out of Order".



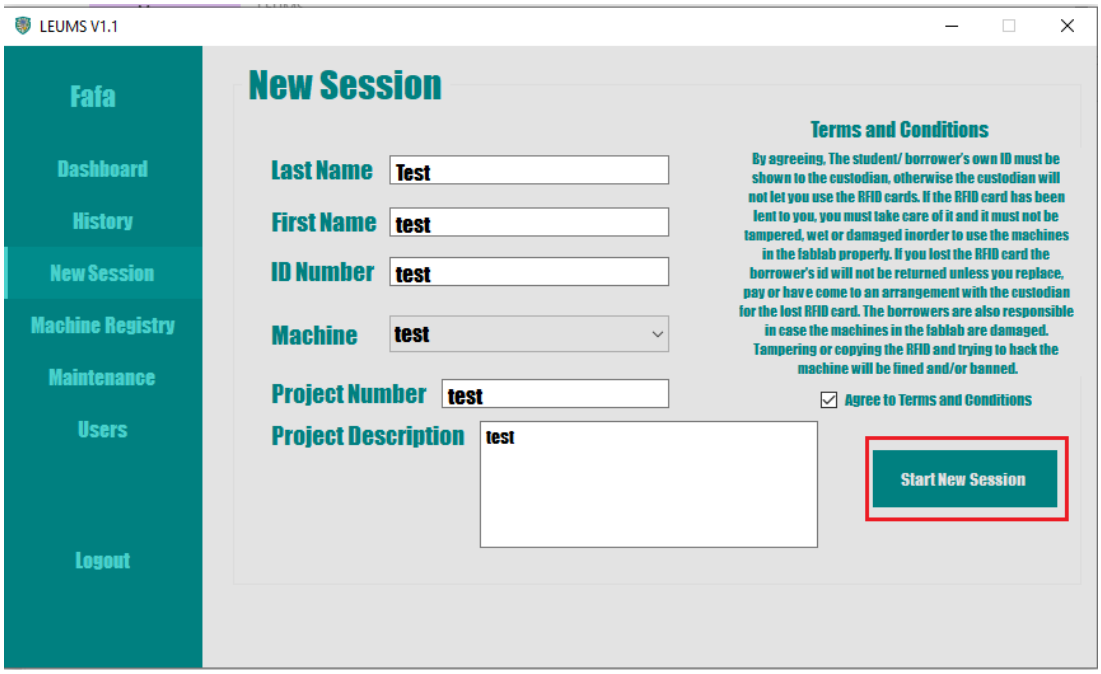
Lastly the bar tab is an extension of the dashboard which the user can navigate the different features the LEUMS Application Software can offer such as the “History”, “New Session”, “Machine Registry” and etc.



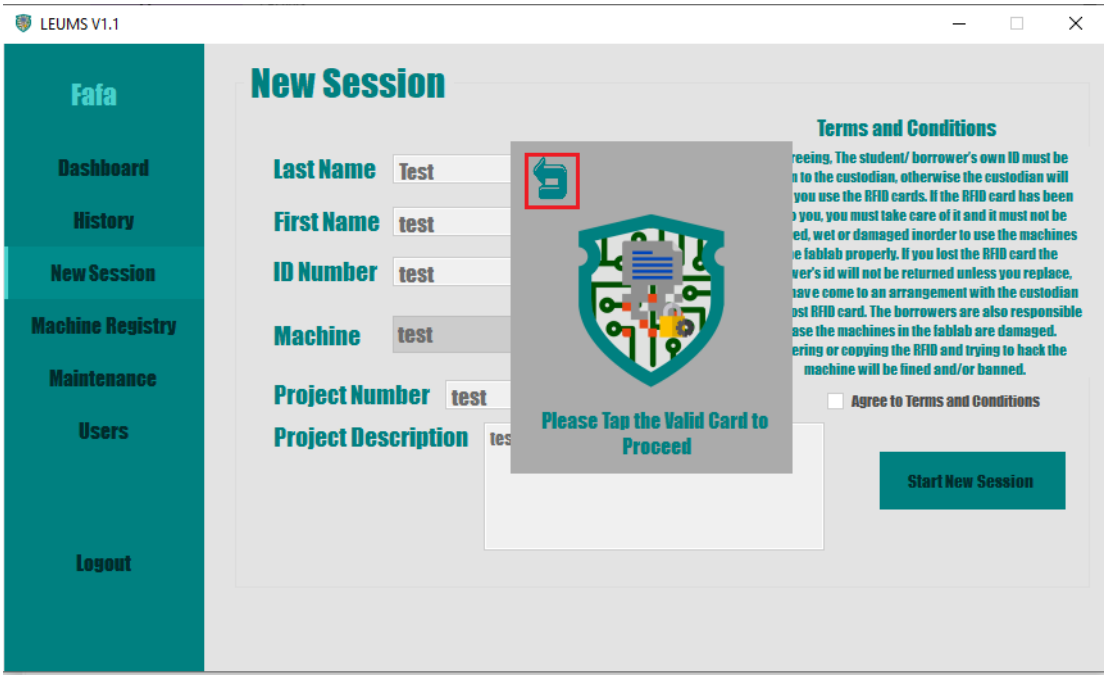
How to Start a New Session

New Session Guide

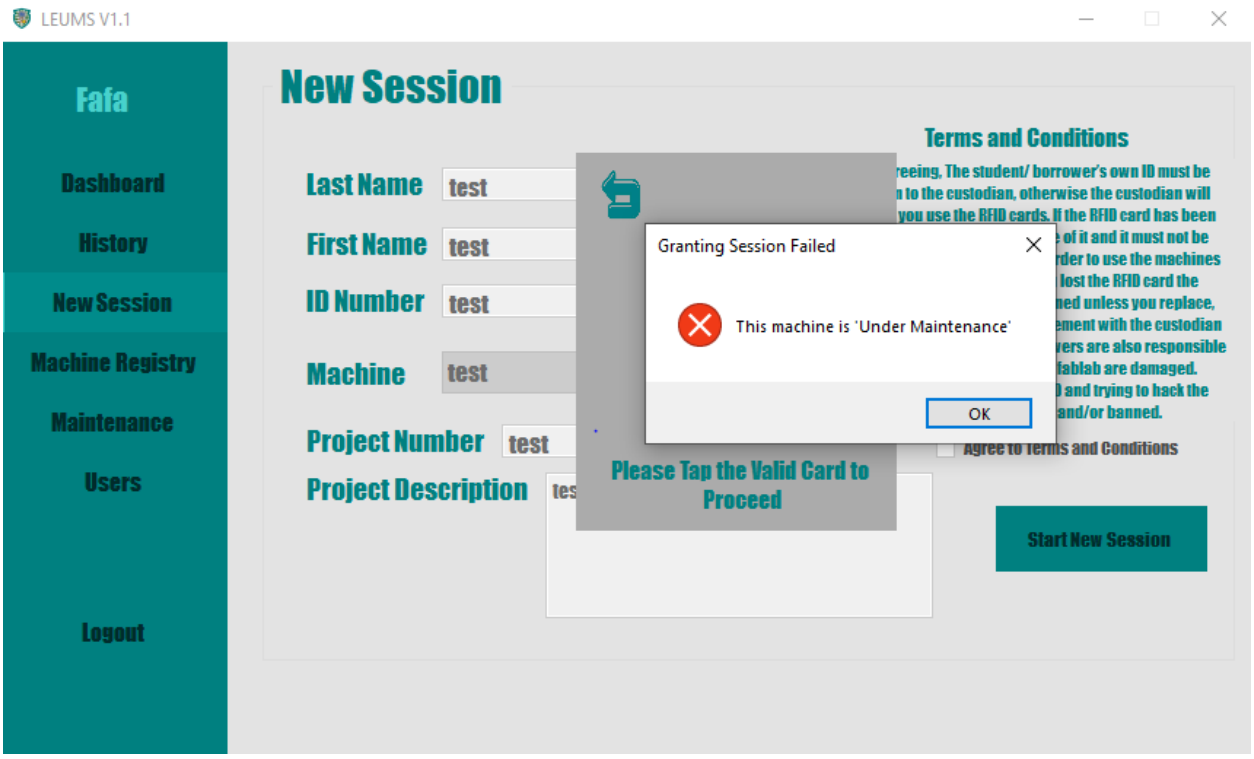
Starting a session is the custodian's way to grant access to a student or a borrower to log their activity before being able to access the laboratory equipment to be borrowed.

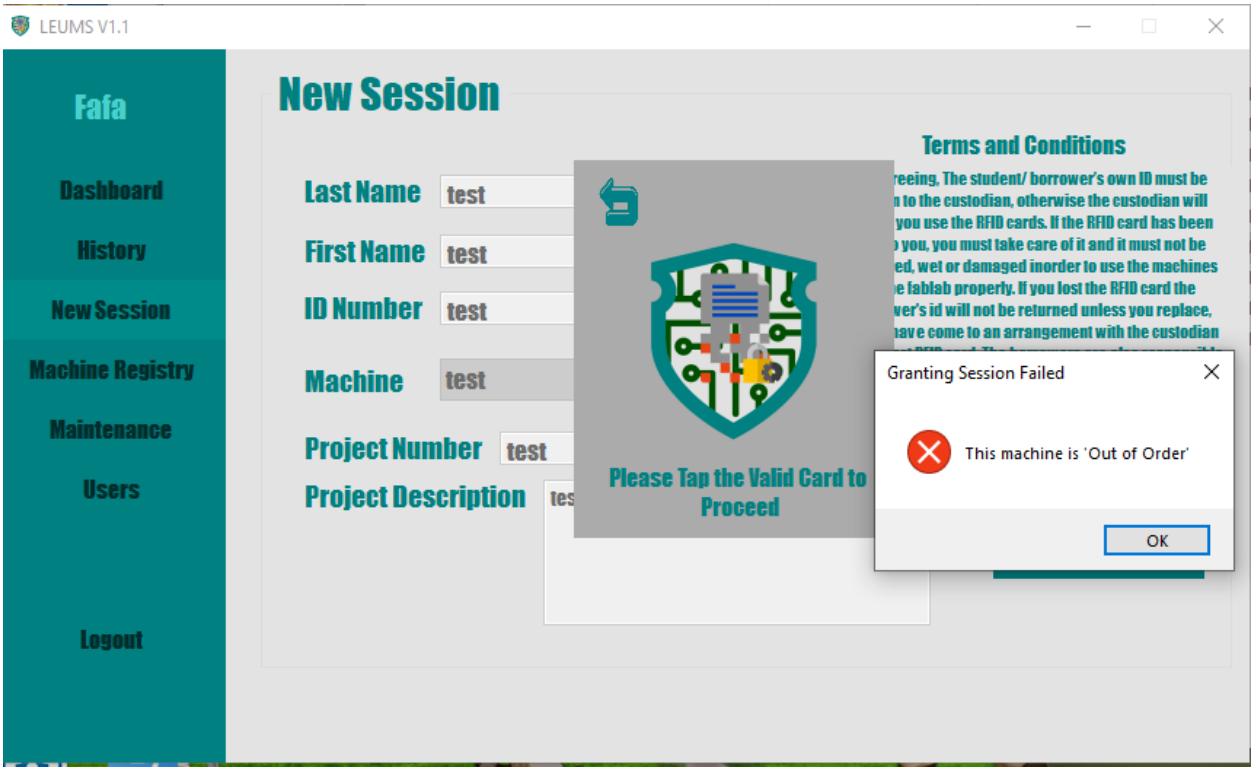


After filling the required fields, the borrower or student needs to agree to the terms and conditions set by the custodian before being able to click the "Start New Session" button then a confirmation panel will appear and the custodian will tap a registered card or custodian card to grant this session. The user can press the back button to cancel.



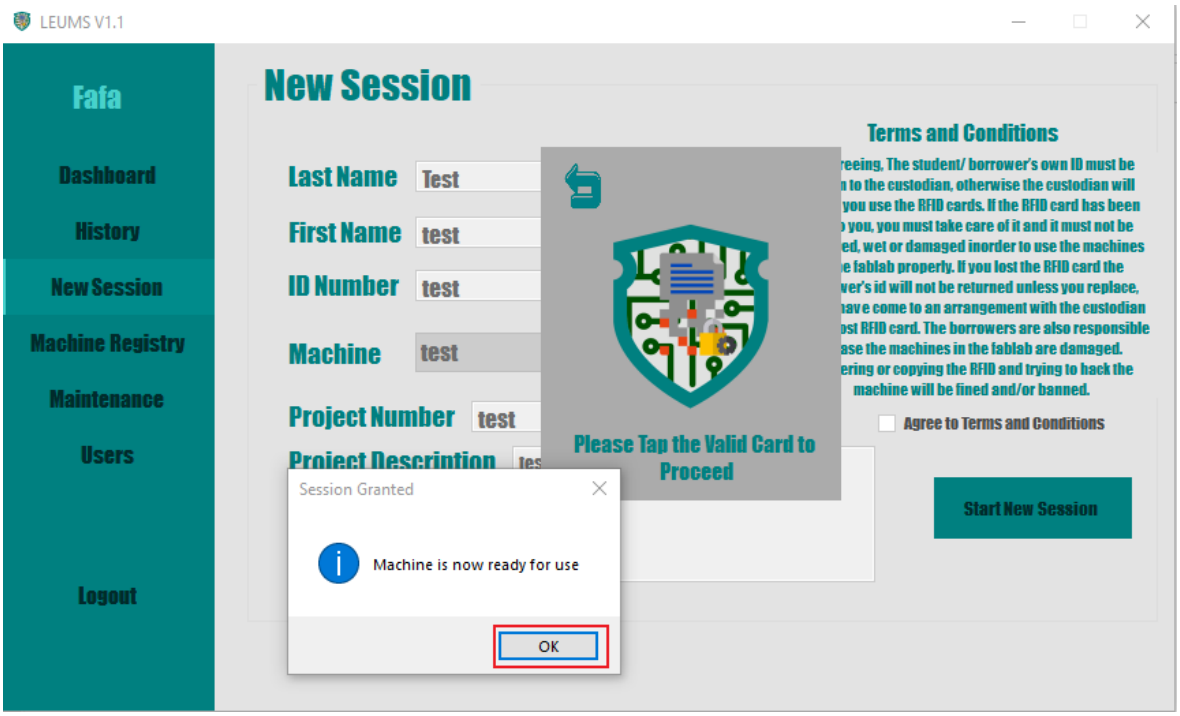
If the custodian taps an unregistered card or the incorrect registered card for the chosen machine filled out on the required field it will prompt that the session is not granted. Session can't also be granted if the selected machine is "In Use", "Out of Order" or "Under Maintenance" under any circumstances.



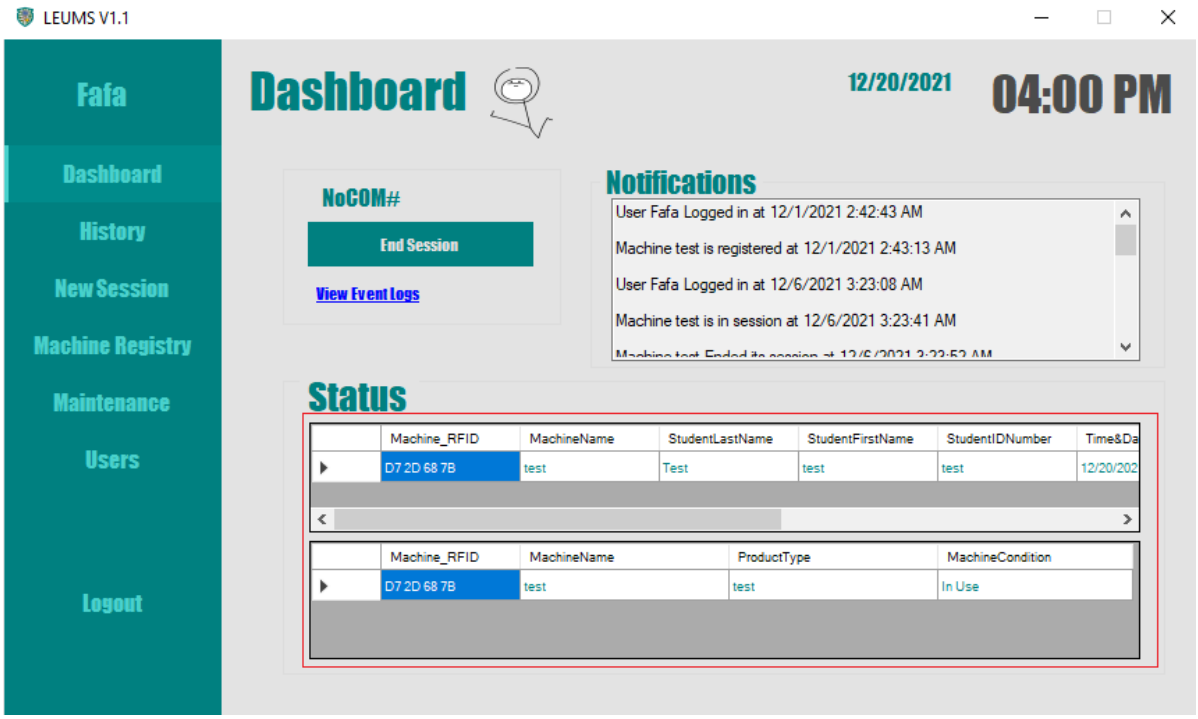


2 Ways to Grant a New Session

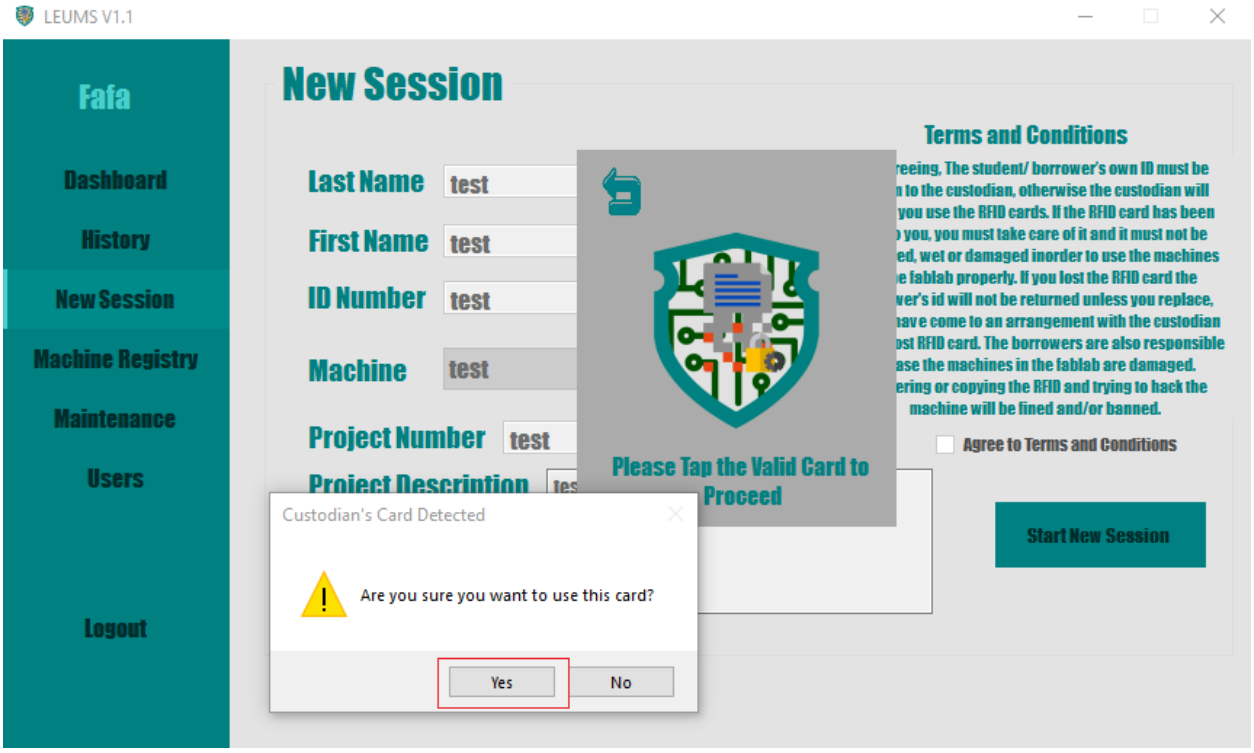
Using the Registered Machine Card – If the custodian taps the registered card for the chosen machine filled out on the required field it will prompt that the session is granted and the machine is now ready for use and already is updated on the status table and the machine status as “In Use”.



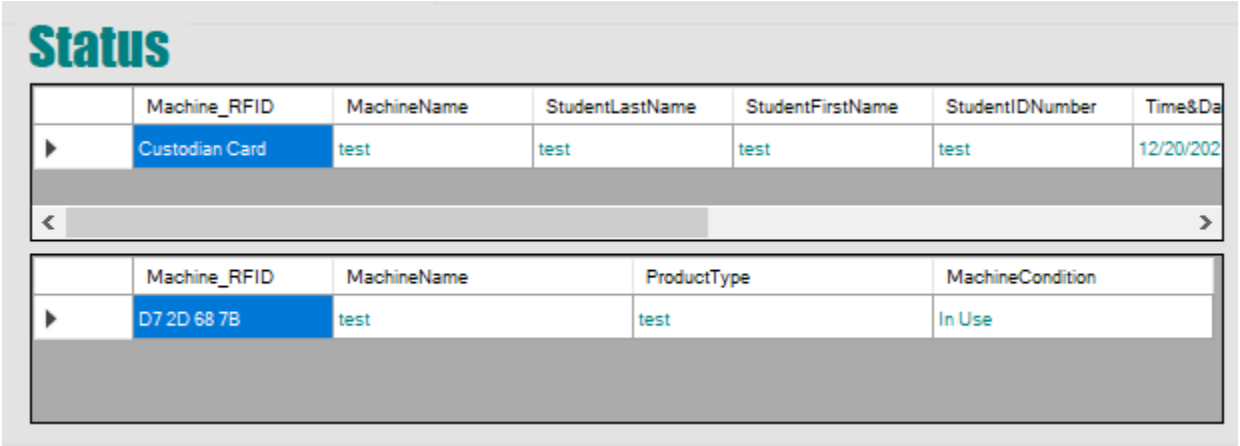
When using the registered card for the specific machine to grant the session. The machine RFID will match the machine RFID on the machine status below it.



Using the Custodian's Card - If the custodian taps the custodian's card which can be used on all existing machines registered within the application. It will prompt the custodian to confirm this action as this will result to giving a borrower/student special and universal access to all machines registered within the application.



When using the custodian's card for the specific machine to grant the session. The machine RFID will indicate "Custodian's Card" instead of matching the machine RFID on the machine status below it.

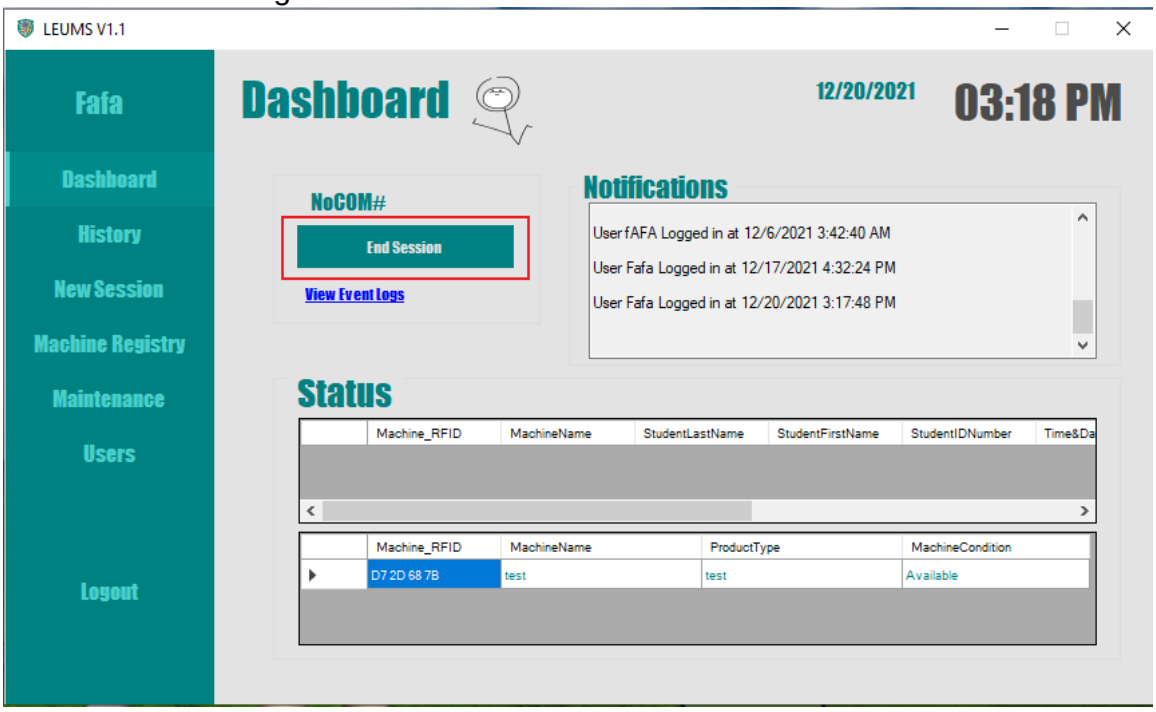


This will also be recorded to History to separate special granted sessions and regular granted session by the custodian.

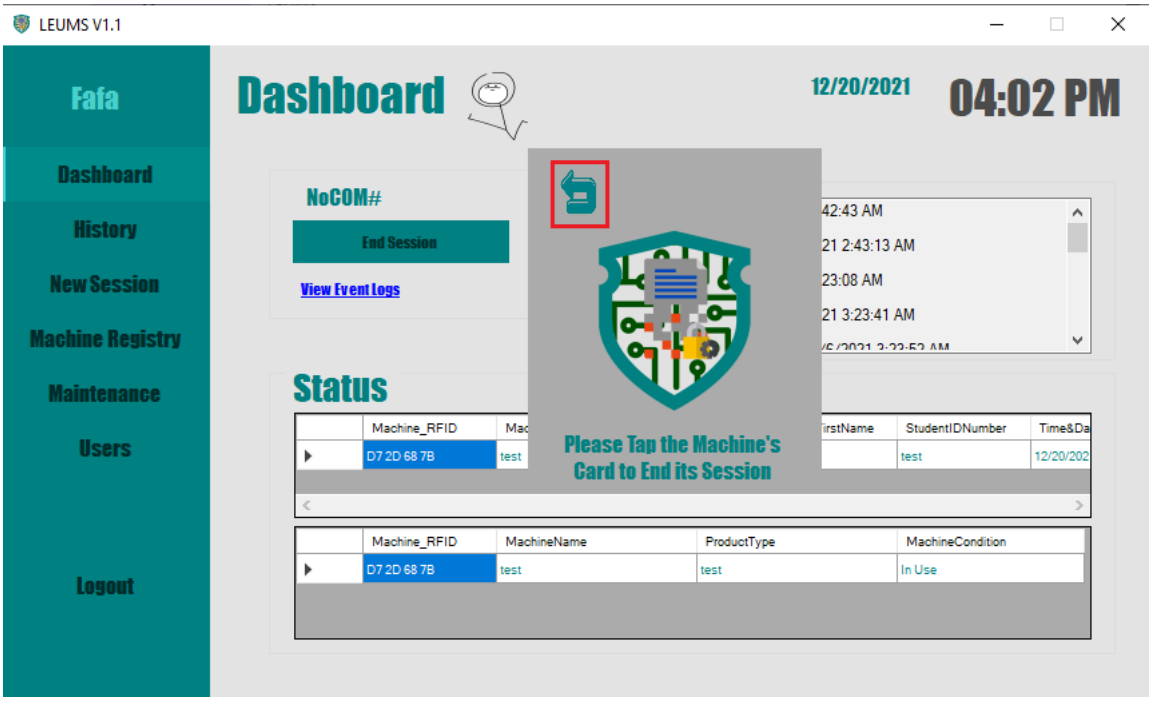
How to End a Session

End Session Guide

Ending a session is the custodian's way to record the transaction into the history database and also grants access to the next student or borrower for a new session.

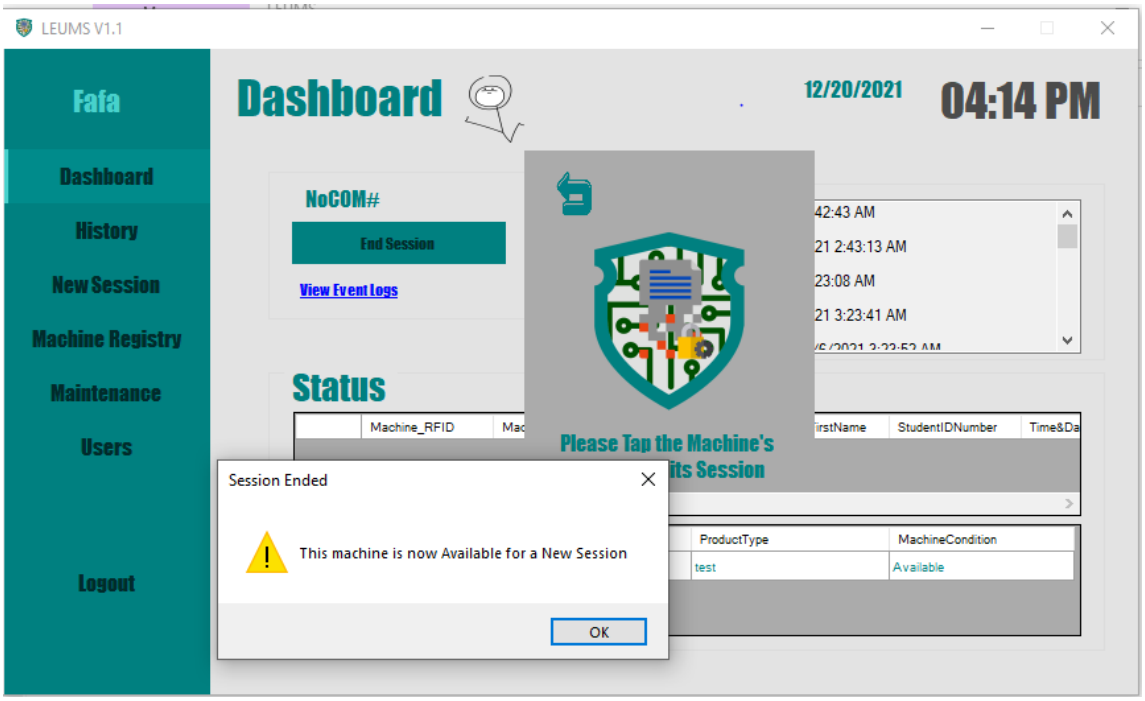


Clicking the "End Session" button which is located at the dashboard tab pops out the End Session Panel which requires the custodian to tap the returned Machine Card or Custodian Card to end the session. Can be canceled by clicking the back button.

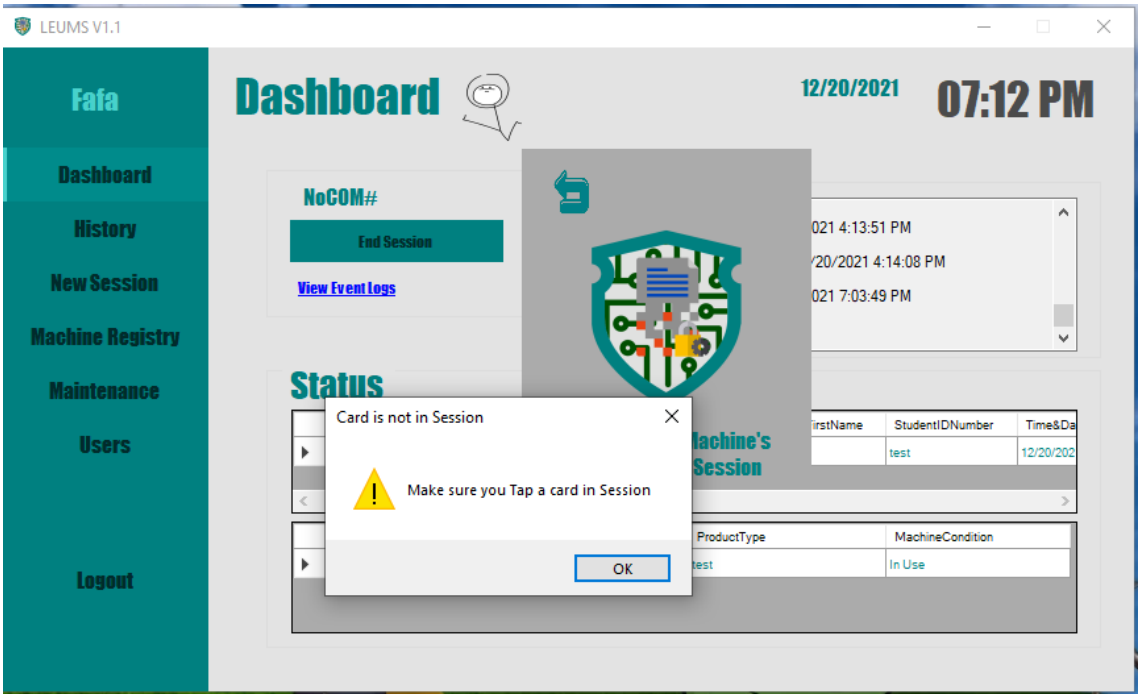


2 Ways to End a Session

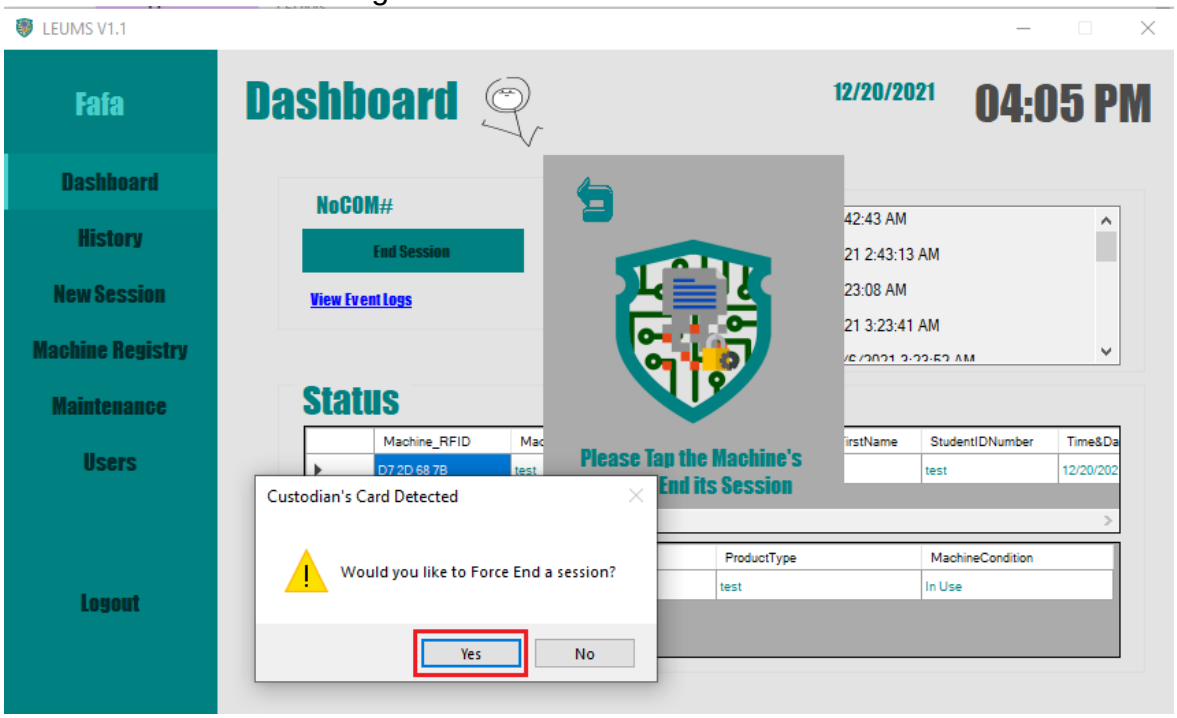
Using the Registered Machine Card - If the custodian taps the registered card, it will automatically end the session of the machine that is linked to the tapped card and updates the machine status to “Available”.



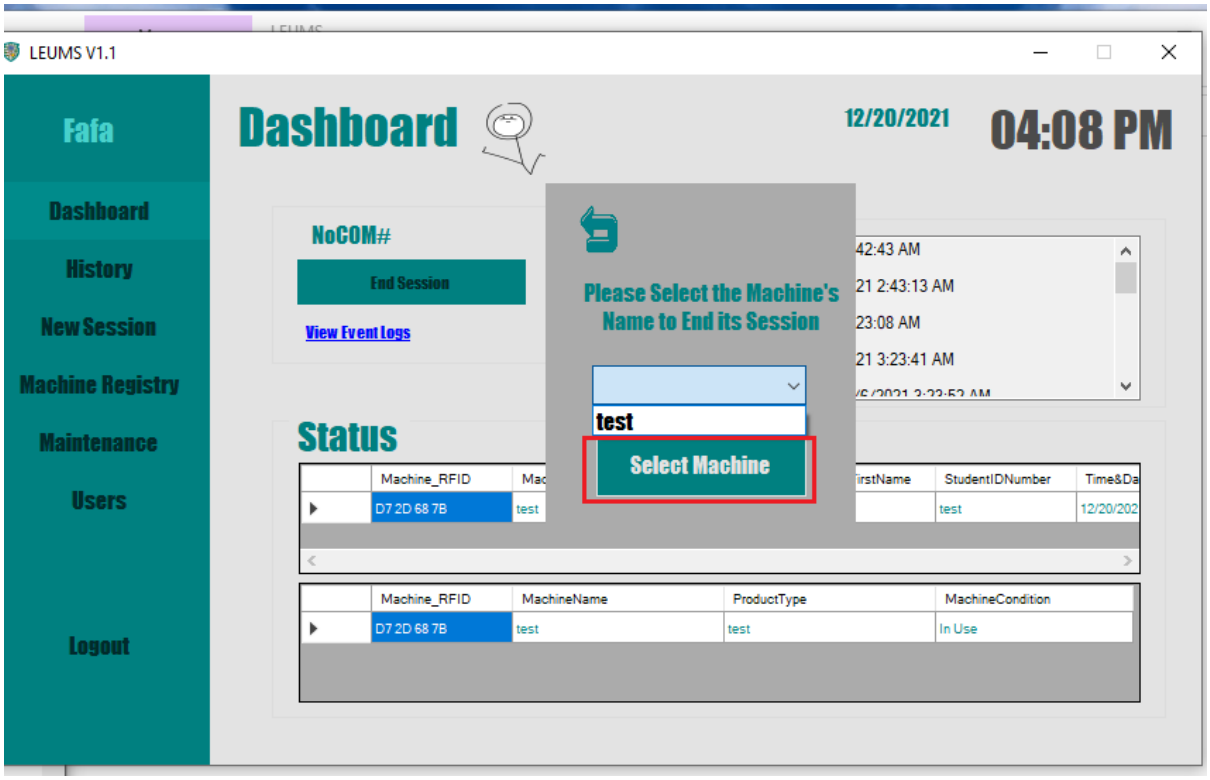
If the linked machine to the tapped card is not in session the GUI will prompt the user that the tapped card is not in session. This also shows up if the linked machine to the tapped card’s session was granted using a custodian’s card. Indicating that the registered card cannot override a custodian’s special granted session.



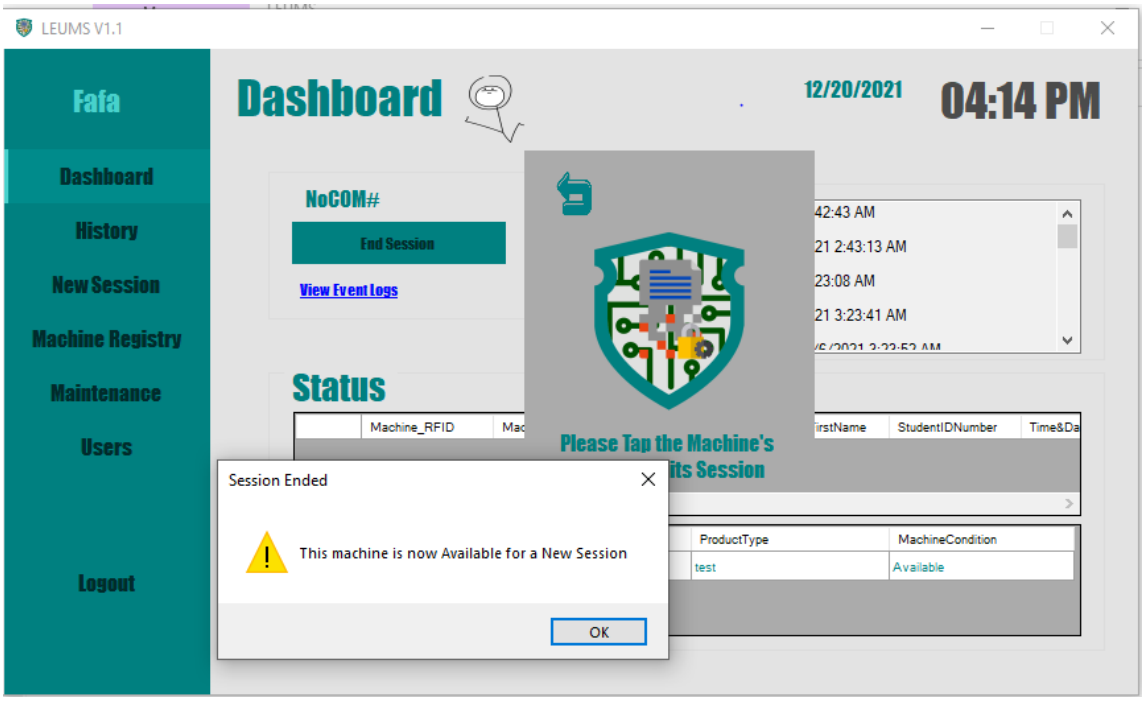
Using the Custodian's Card - If the custodian taps the custodian's card which can be used on all existing machines registered within the application. It will prompt a "Force End" and pops out the Force End Menu which can end any on-going session regardless how those sessions were granted.



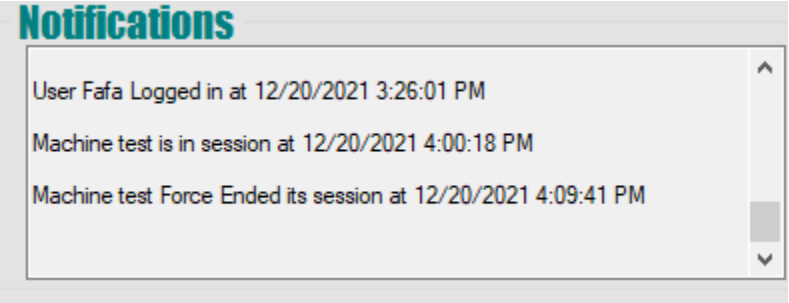
On the Force End Menu the user may select a currently active session and click "Select Machine" to force end the selected machine being used on the selected session.



Force ending also frees the machine from a session and will now be on “Available” status. The session is also recorded in the History database but whether the custodian ended the session the regular way or force end. It will still record the RFID used in granting the session on the History database.



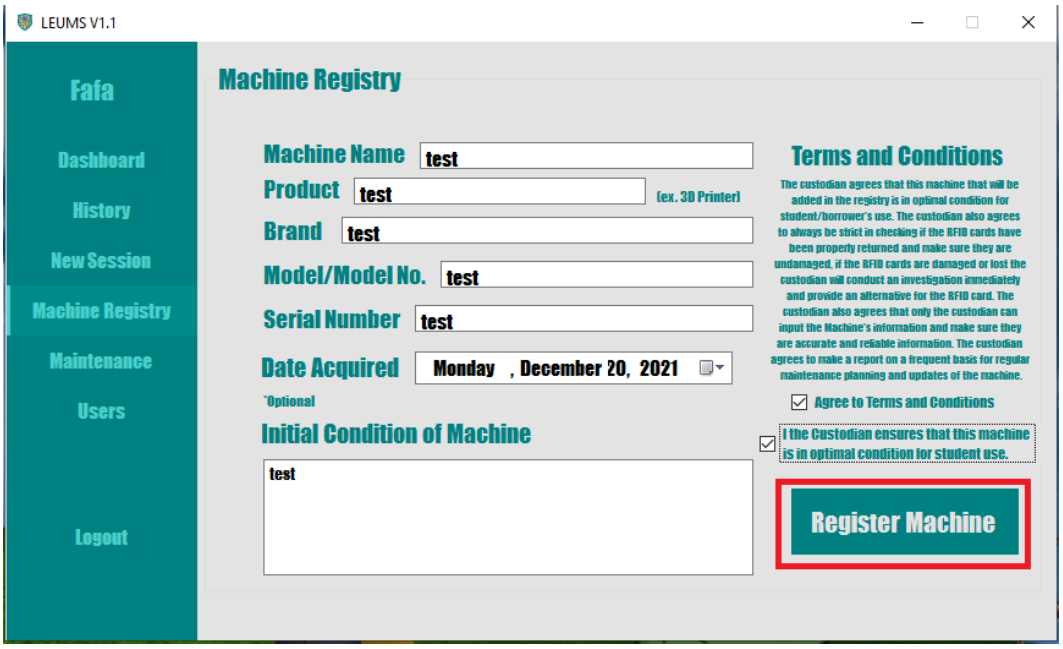
However, Force End will be recorded on the event logs as such



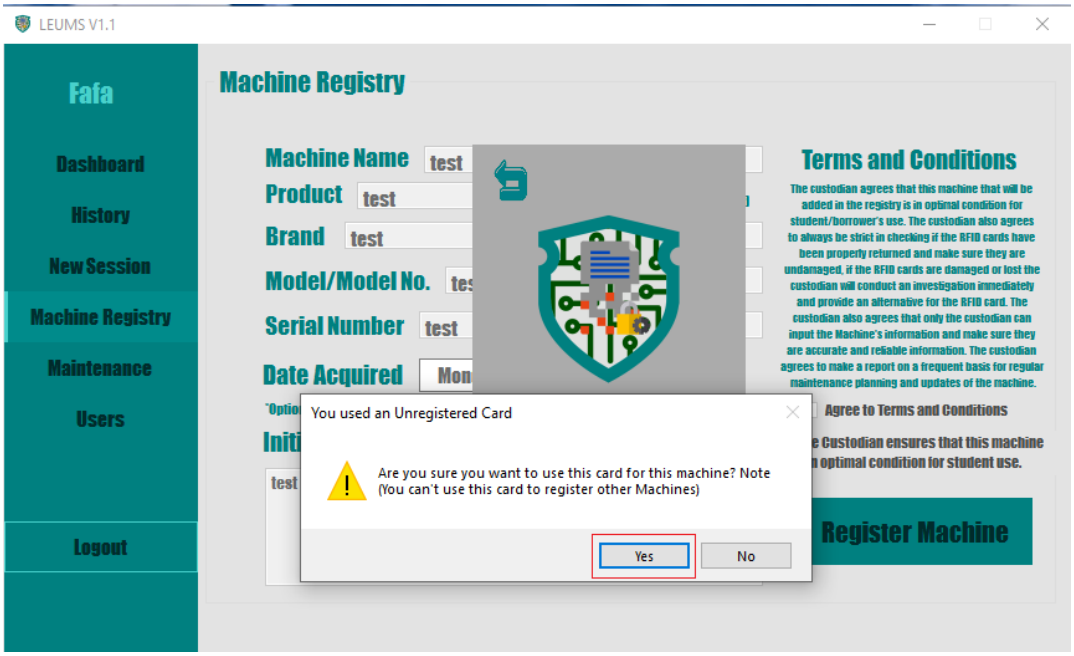
How to Register a Machine

Machine Registry

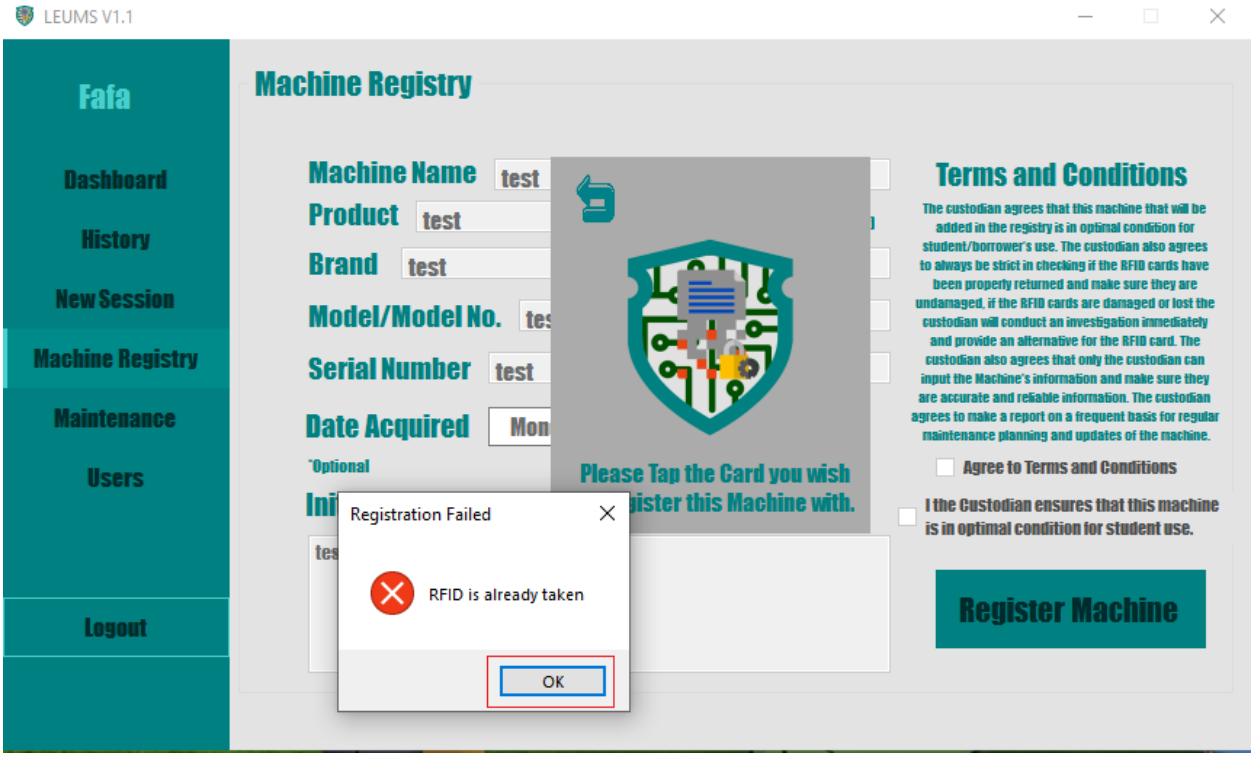
Machine Registry is the custodian's way to add a machine and link it to a card or RFID for the student or borrower to be able to avail for use.

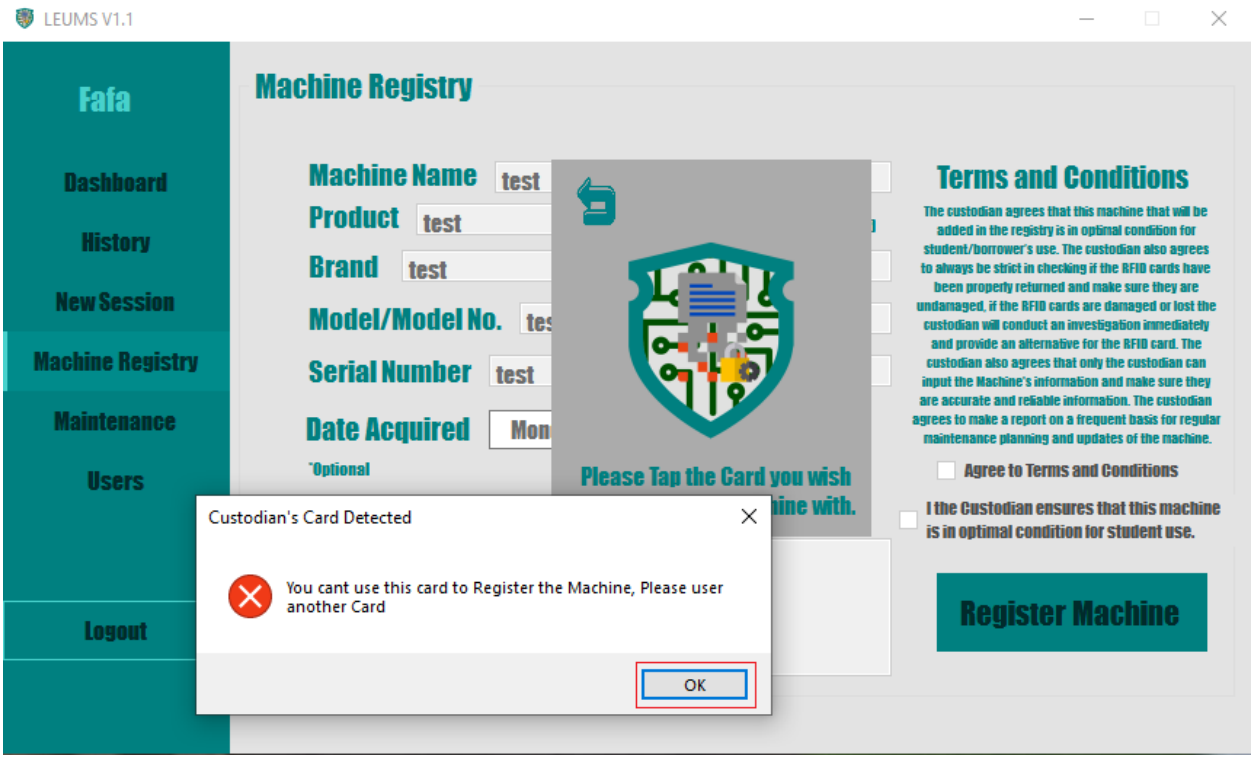


Upon filling up the required fields for the machine registry agreeing to the terms and conditions will enable the "Register Machine" button. Clicking the "Register Machine" button will pop out the Machine Registry Panel that will require the custodian to tap a non-Registered & non-Custodian Card.

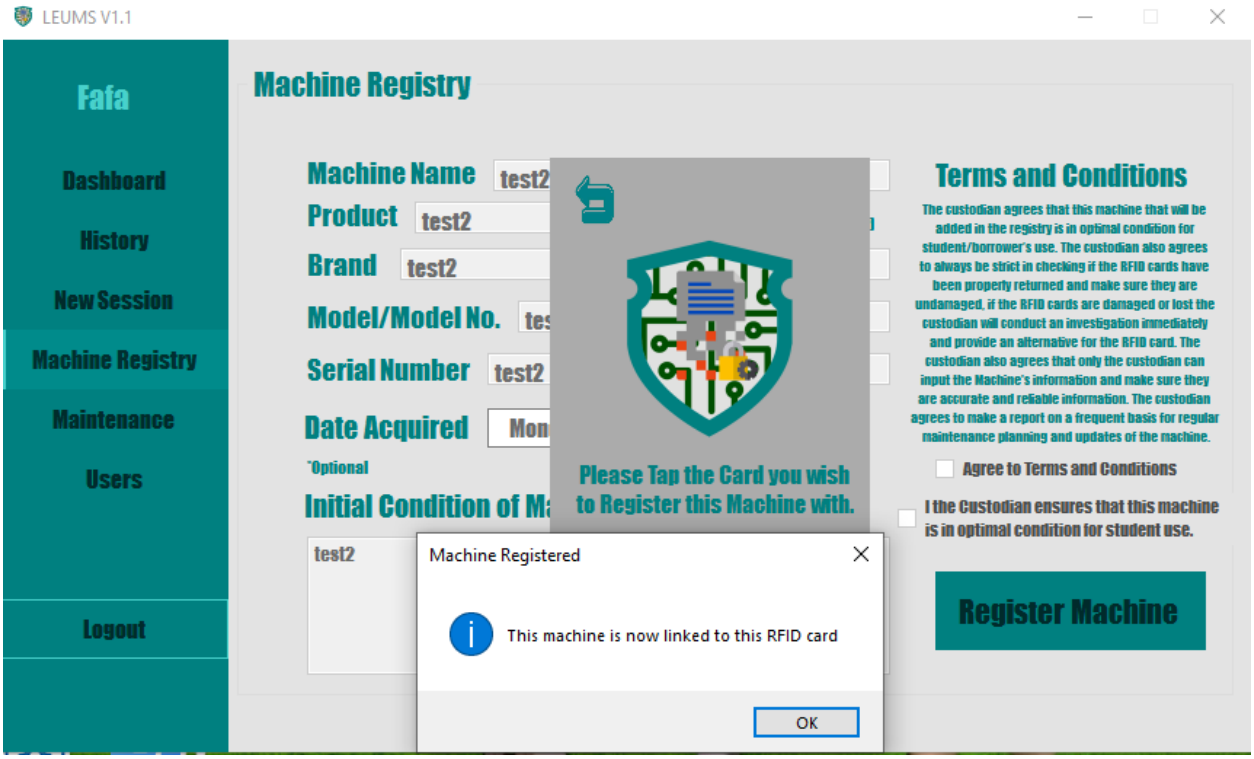


If the tapped card was a custodian's card the GUI will not link the Machine ongoing registration to it. Likewise if the tapped card already has a linked machine to it.

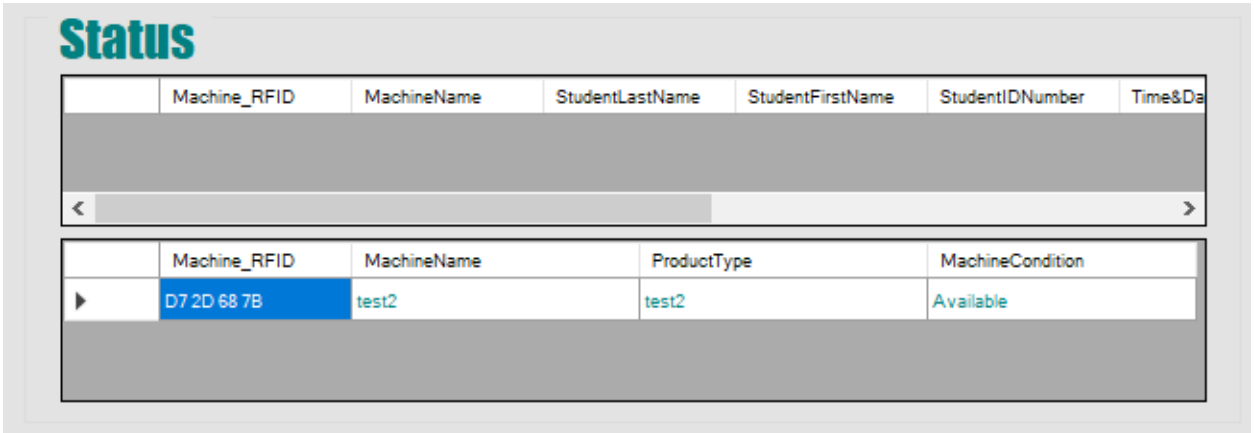




If the tapped card was neither an already linked card nor a custodian's card the machine will be linked to the tapped card.



After Registration it will automatically be added to the machine registry and machine status table.

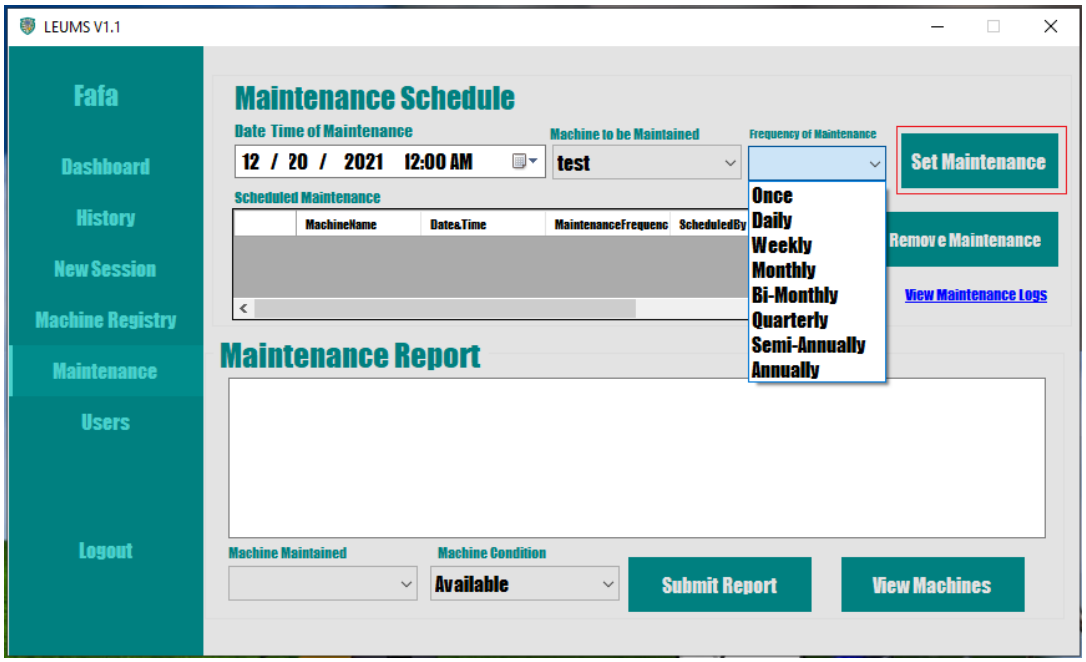


(Note: Accurate information filled out on the machine registry will make the maintenance for the machine smoother)

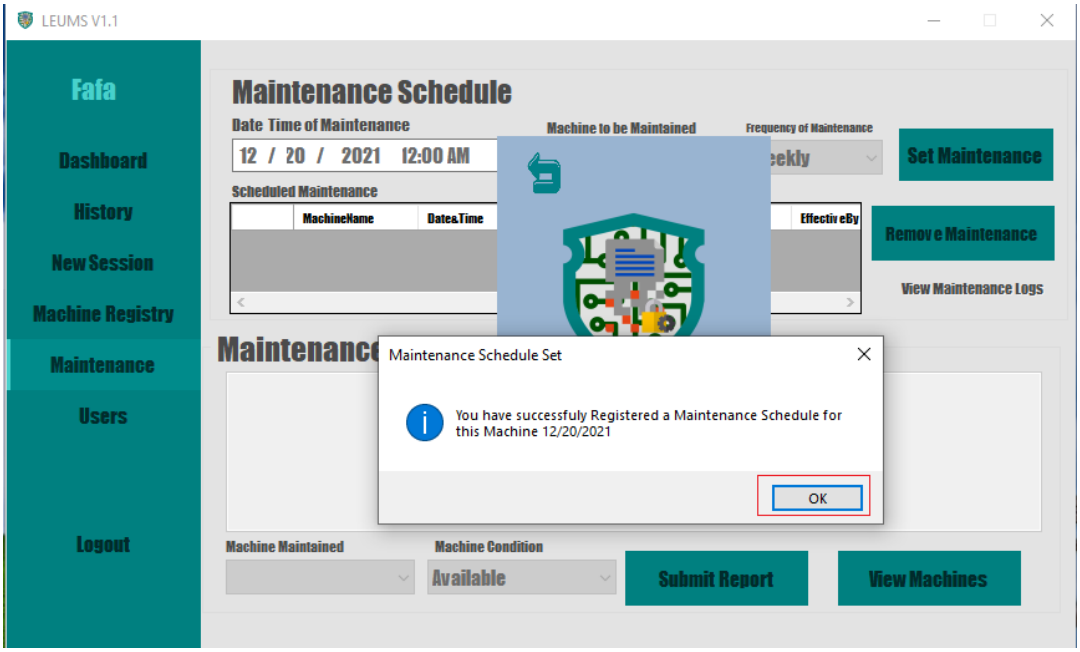
How to Make a Maintenance Schedule

Maintenance Schedule

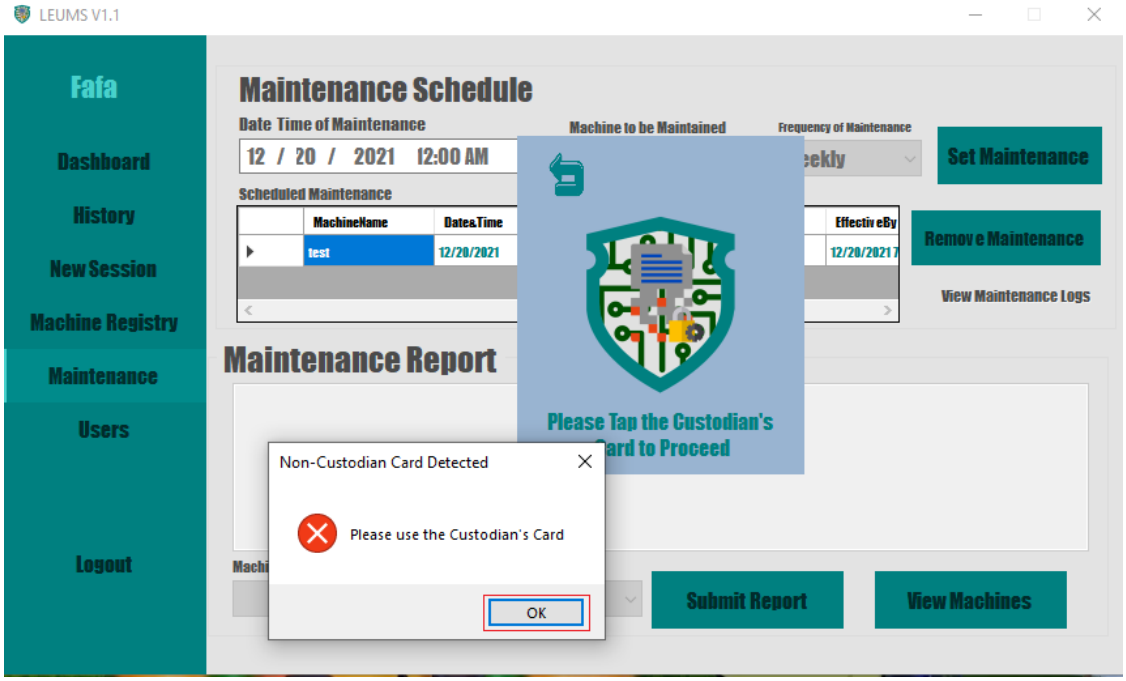
Maintenance Schedule is the custodian's way to make an automated reminder and ensures that the machine will not be in used during the maintenance time period until a maintenance report have been submitted that the machine is good to continue its operation.



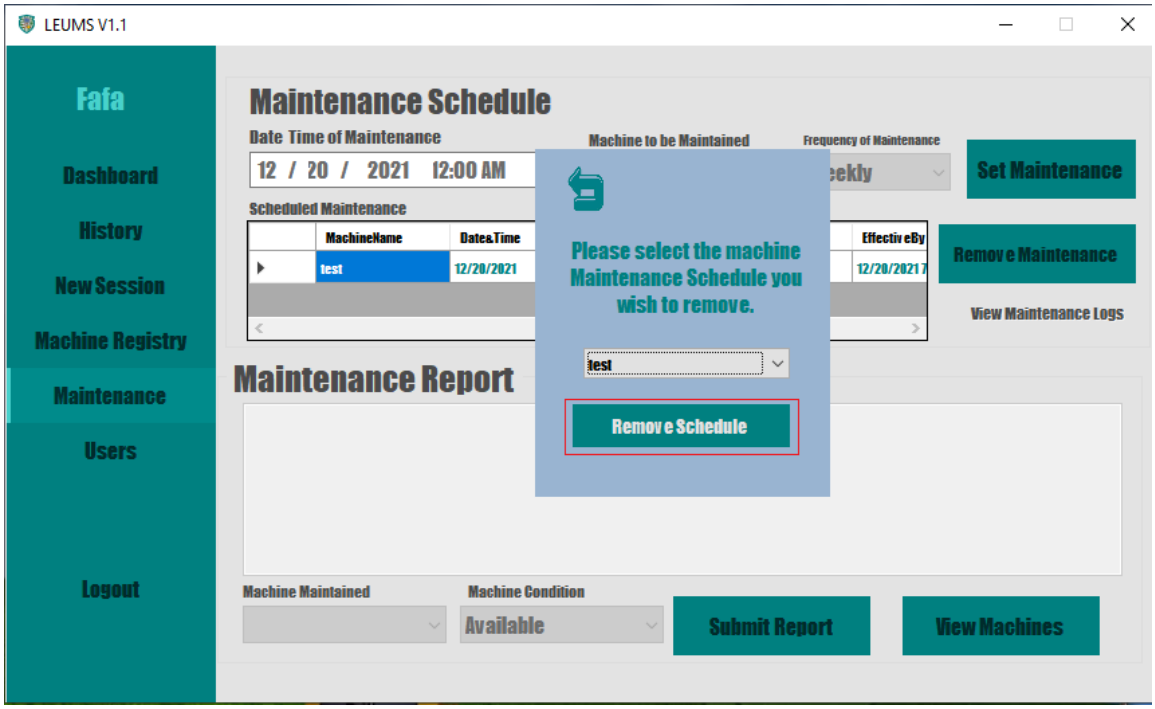
After the custodian sets the time and the frequency of maintenance of a specific machine. Clicking the "Set Maintenance" button pops out the Security Panel that requires the custodian to tap the custodian's card to set the maintenance schedule.



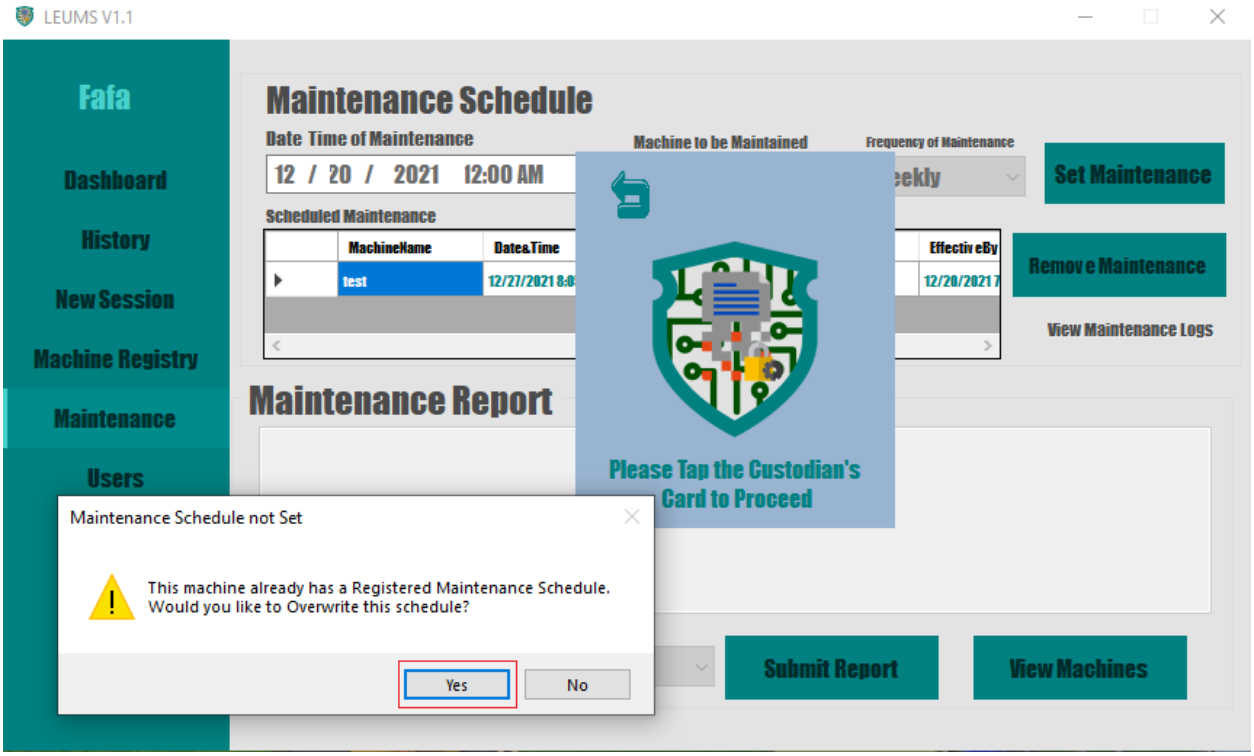
If the user taps a non-custodian's card for the Security Panel, It will deny any action that will require a custodian's card such as viewing of machines, view maintenance logs, setting or removing maintenance schedules and most save to PDF functions.



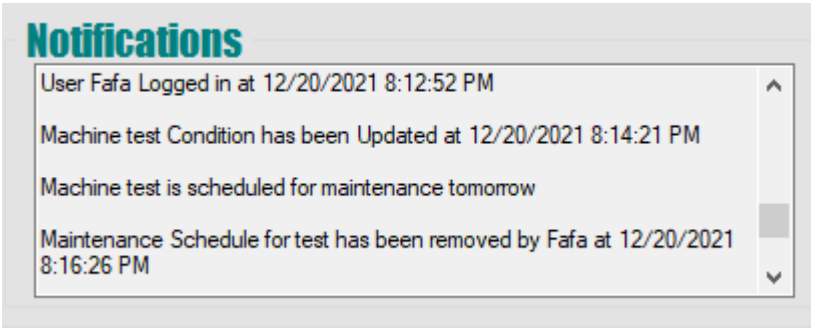
In case there is a need to remove a recurring maintenance schedule clicking the remove button and tapping the custodian's card will unlock the remove machine schedule options. Just choose which machine you would like to remove its maintenance schedule and click "Remove Schedule".



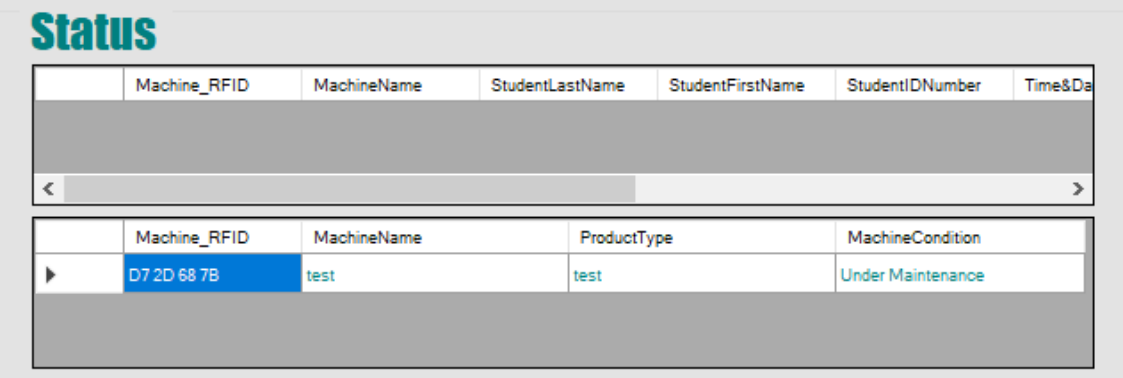
In case there's a need for overriding an already existing or a recurring maintenance schedule. By filling out the required fields and click "Set Maintenance" and tap the custodian's card. And this will replace the existing maintenance schedule.



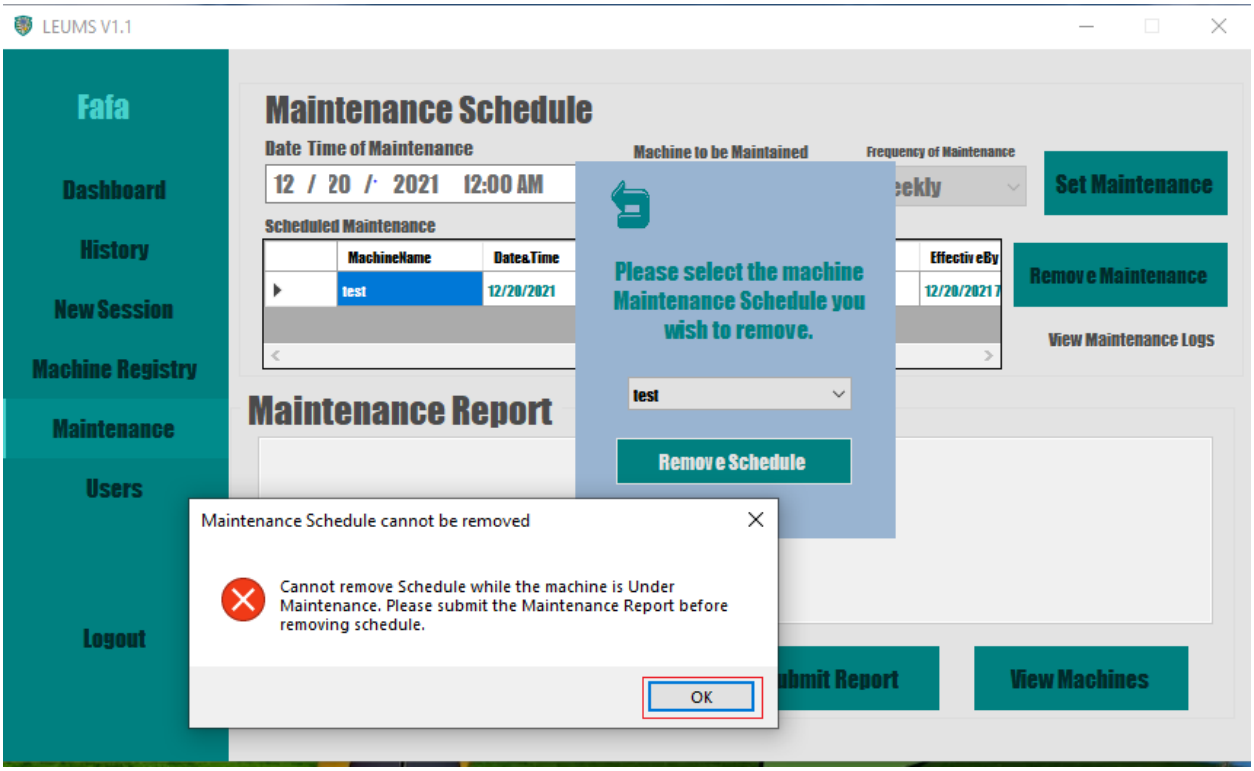
1 Day before the actual Maintenance Schedule. The GUI will notify the user that a specific machine is scheduled for maintenance tomorrow in order to have time to prepare but not too much time for the custodian to possibly forget.



Within the day of the actual maintenance schedule of the machine. The machine condition will automatically change to "Under Maintenance" during its scheduled time.



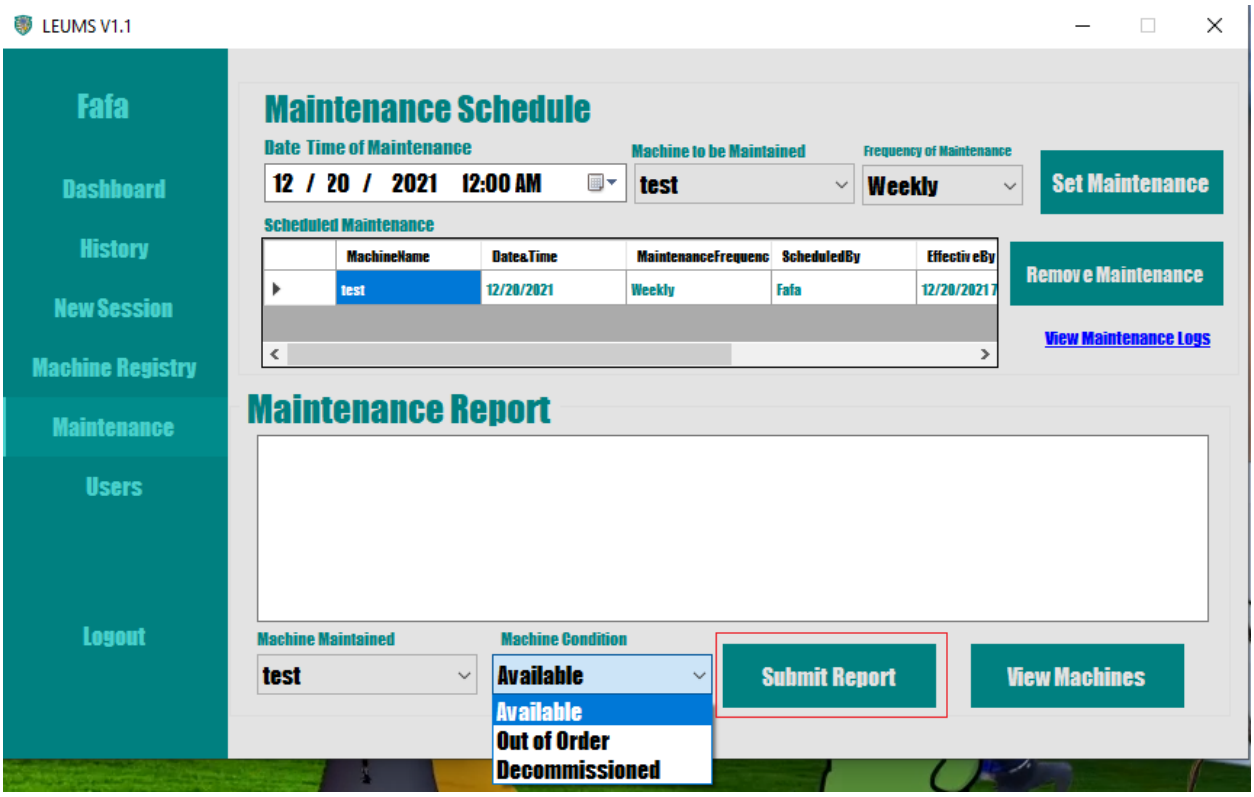
Overriding or removing the maintenance Schedule while the machine is “Under Maintenance” as such. Will not be allowed so the user must first submit a maintenance report to remove the under maintenance status of the machine.



How to Make a Maintenance Report

Maintenance Report

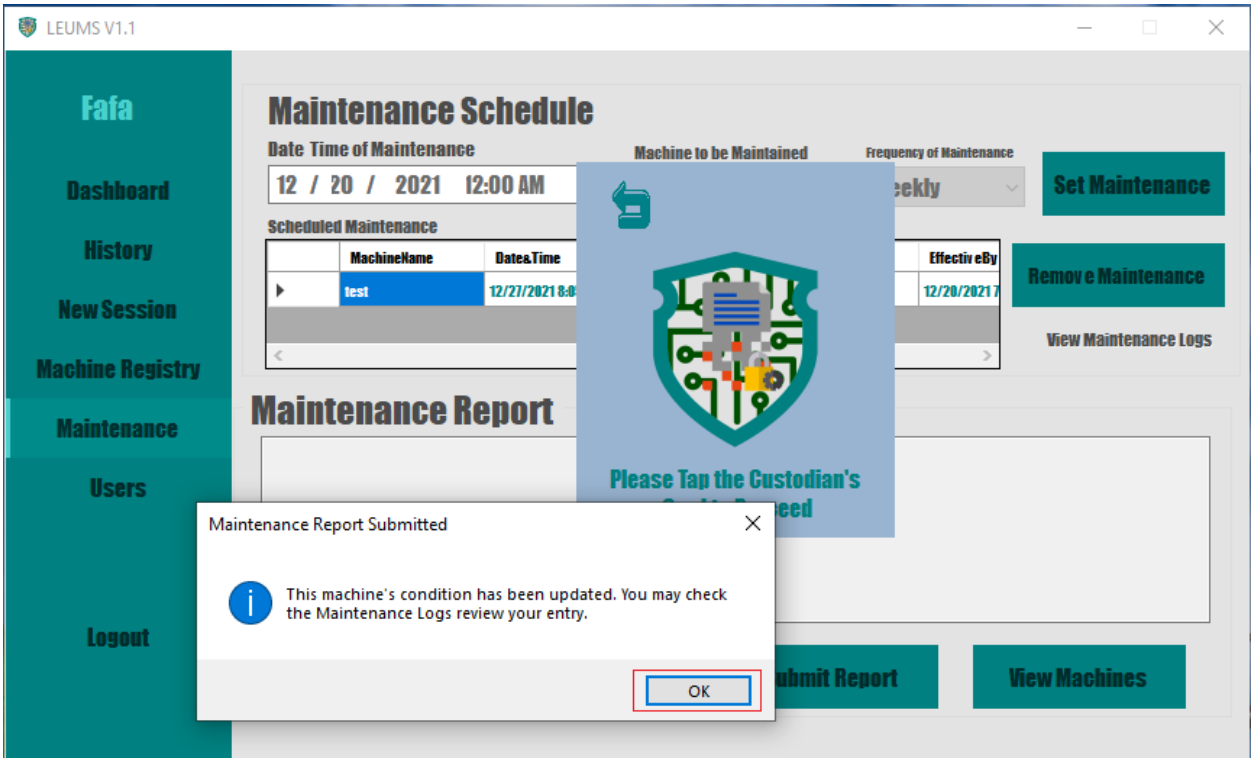
Maintenance Report is the custodian's way to make logs on maintenances done on scheduled or unscheduled manners. This helps the custodian to keep track on the condition of the machine



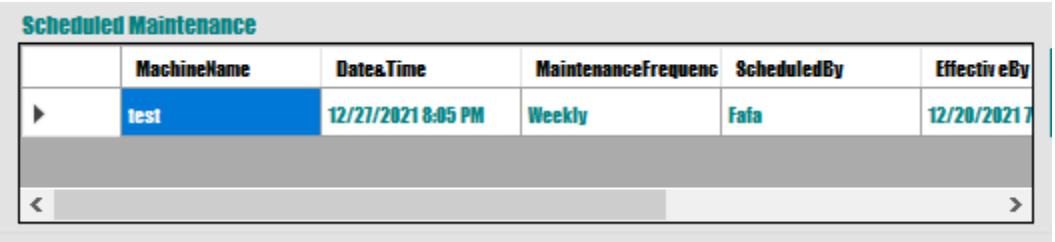
After choosing a Machine Maintained. The custodian now picks the summary of the machine condition after the maintenance. Whether if it's now **Available** for use or **Out of Order** due to still being unusable but can be fixed or will be fixed. **Decommissioned** machines however are for machines that are for write off due to being sold or being completely unusable. And accompanied by a detailed maintenance report on the provided textbox.

(Note: Accurate information filled out on the Maintenance Report will make the maintenance for the machine smoother in the future)

Clicking the Submit report button and tapping the custodian's card will successfully submit the maintenance report, updating the machine condition and logging the records of the maintenance on the **Maintenance Logs**.



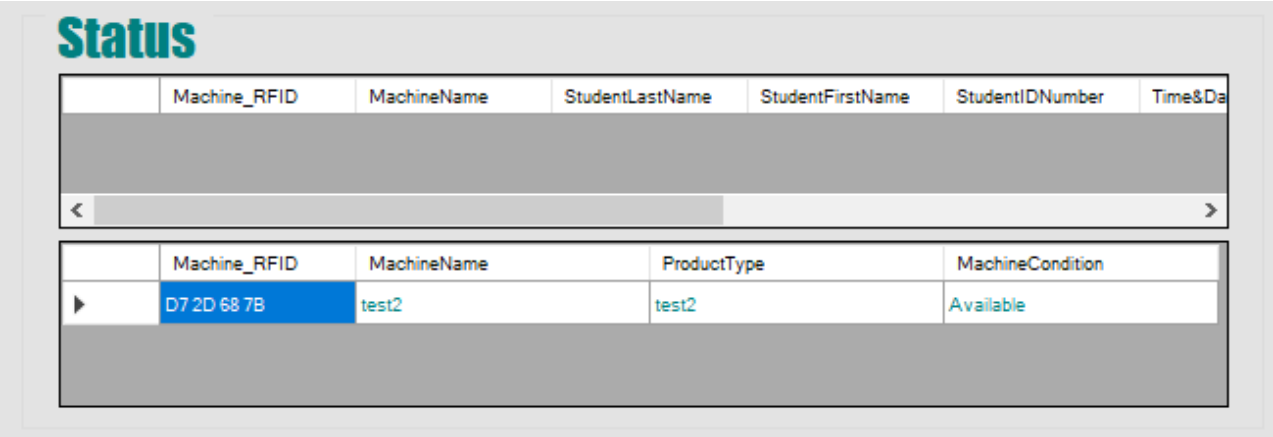
After submitting the maintenance report. The maintenance schedule tied with the chosen machine maintained will update according to its maintenance frequency.



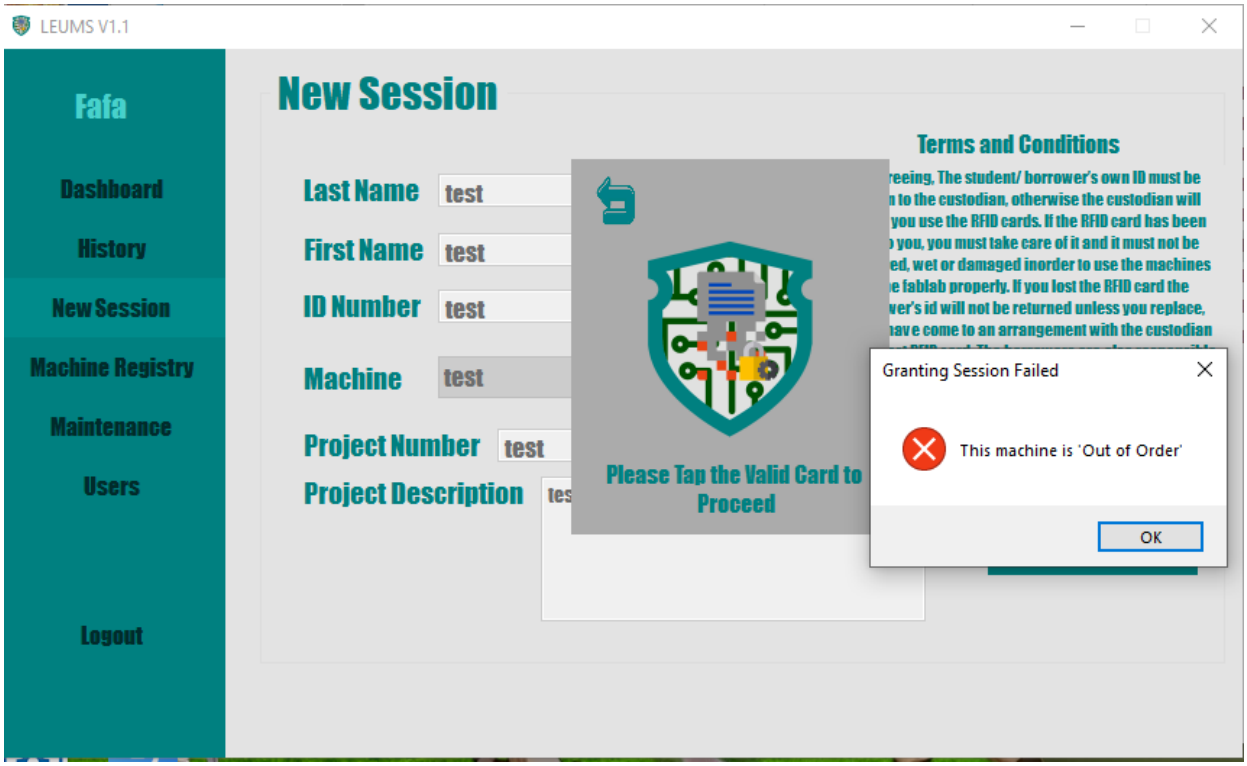
(Note: If a breakdown maintenance happened before a periodic maintenance and causes the maintenance schedule to change after submitting the report. The custodian can just override the changed maintenance schedule to keep the correct periodic maintenance for calibrations and etc.)

3 Machine Conditions

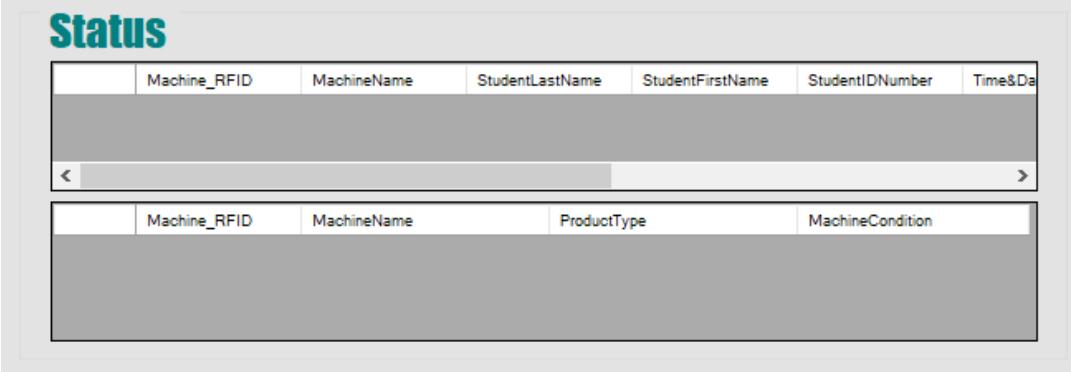
Available- If the submitted report contains this machine condition. It will make the machine maintained to be available for use again.



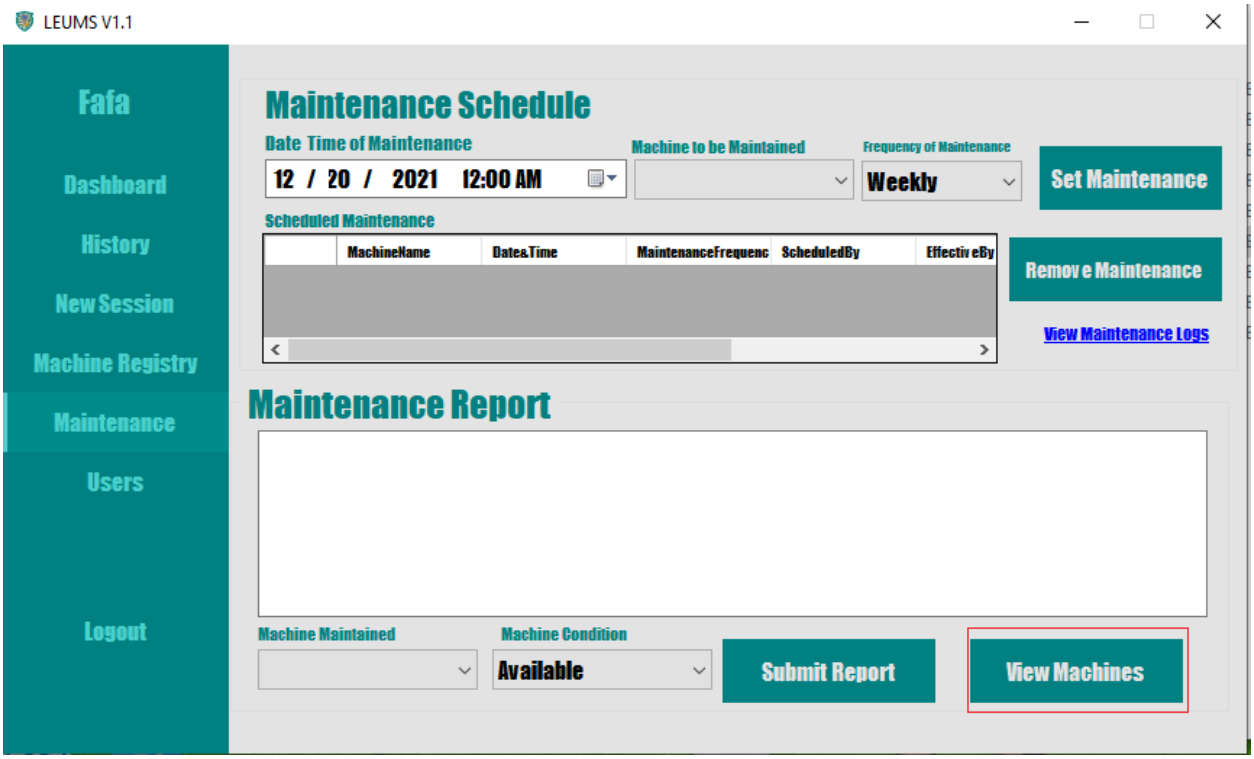
Out of Order- If the submitted report contains this machine condition. The machine will continue to be unusable for students or borrowers.



Decommissioned- If the submitted report contains this machine condition. The GUI will all registry of this machine except from the history tab and information of this machine will now be moved to the Decommissioned Machines Tab which is located on the Machine registry tab

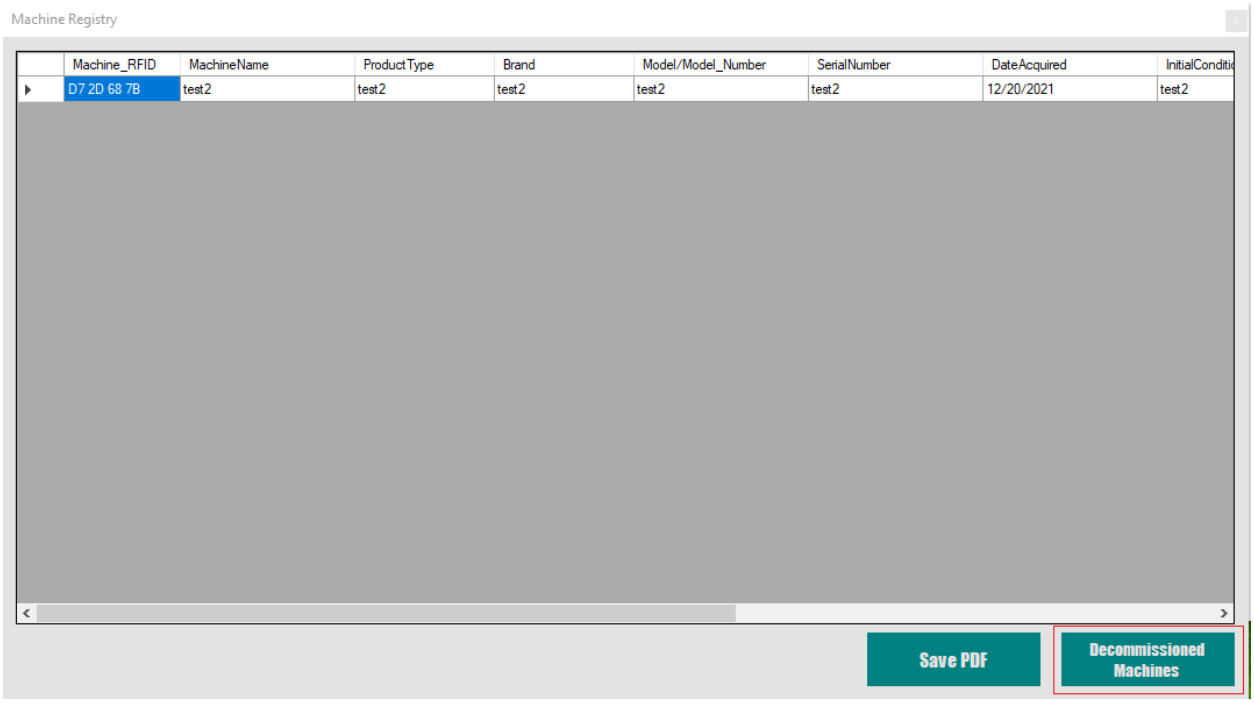


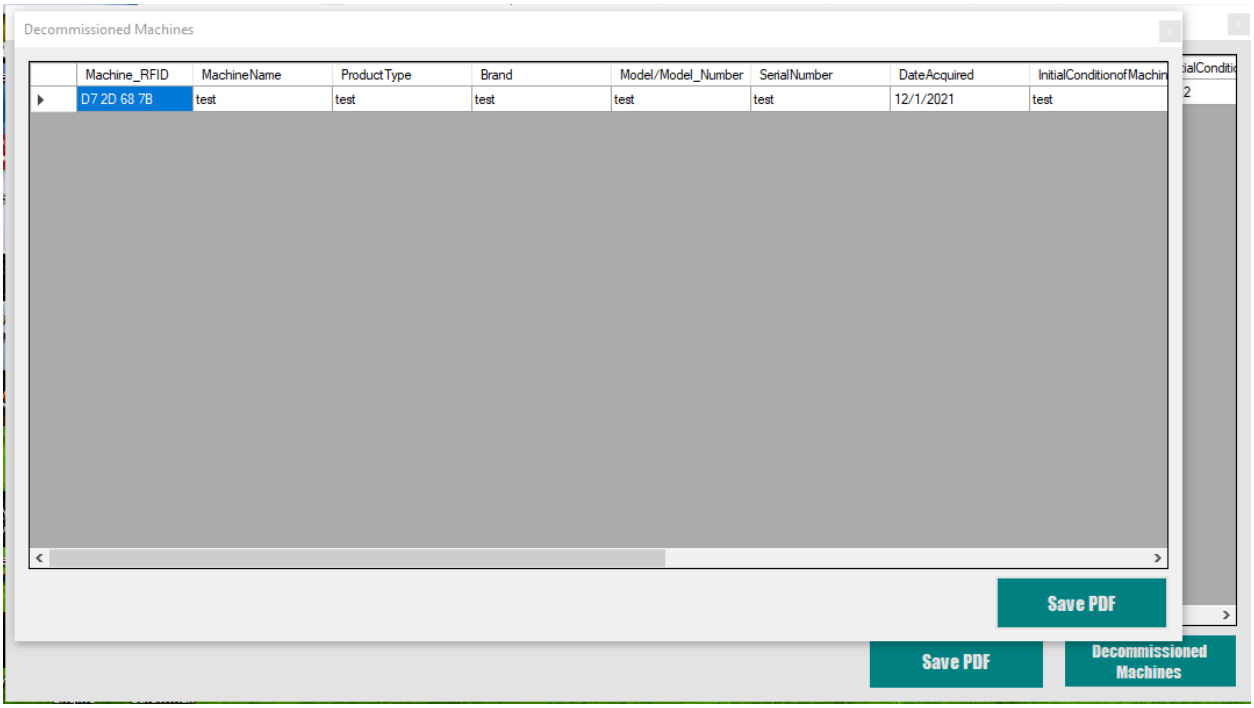
Click the “View Machines” and tap the custodian’s card to access Machine registry



The machine registry contains the complete details of all the registered machines.

Clicking the Decommissioned Machines opens the information on all the former equipment that are tied and have been registered on this application.



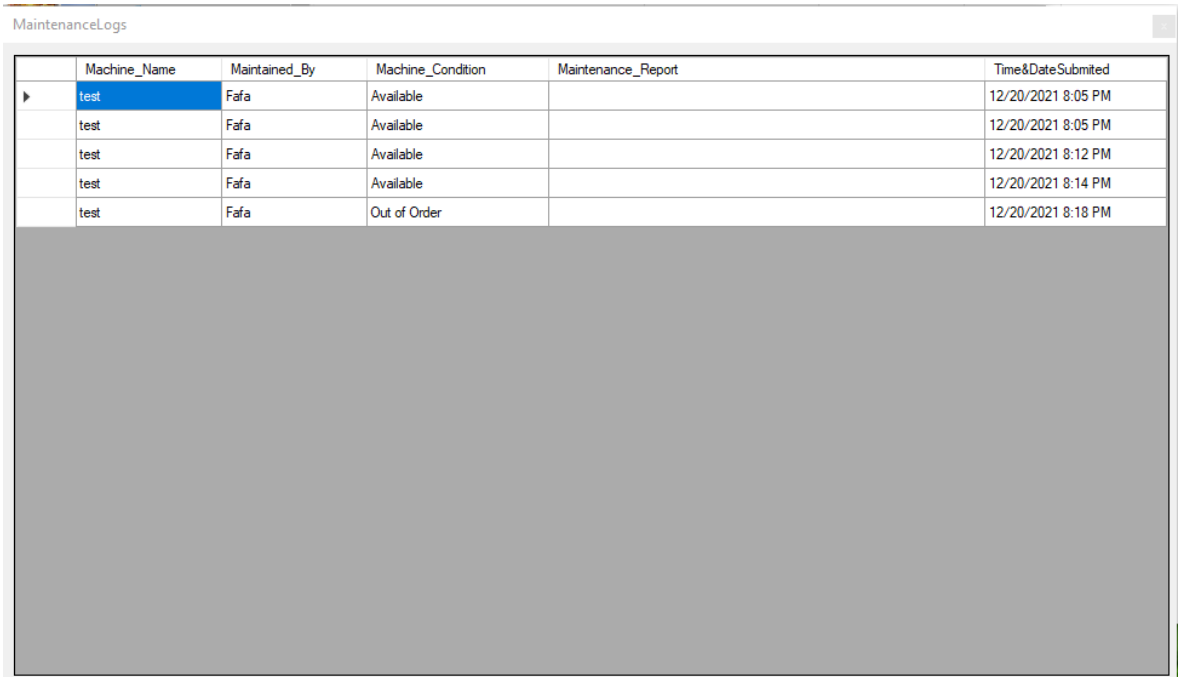


How to Use the Data Table Filter System

Search & Filter

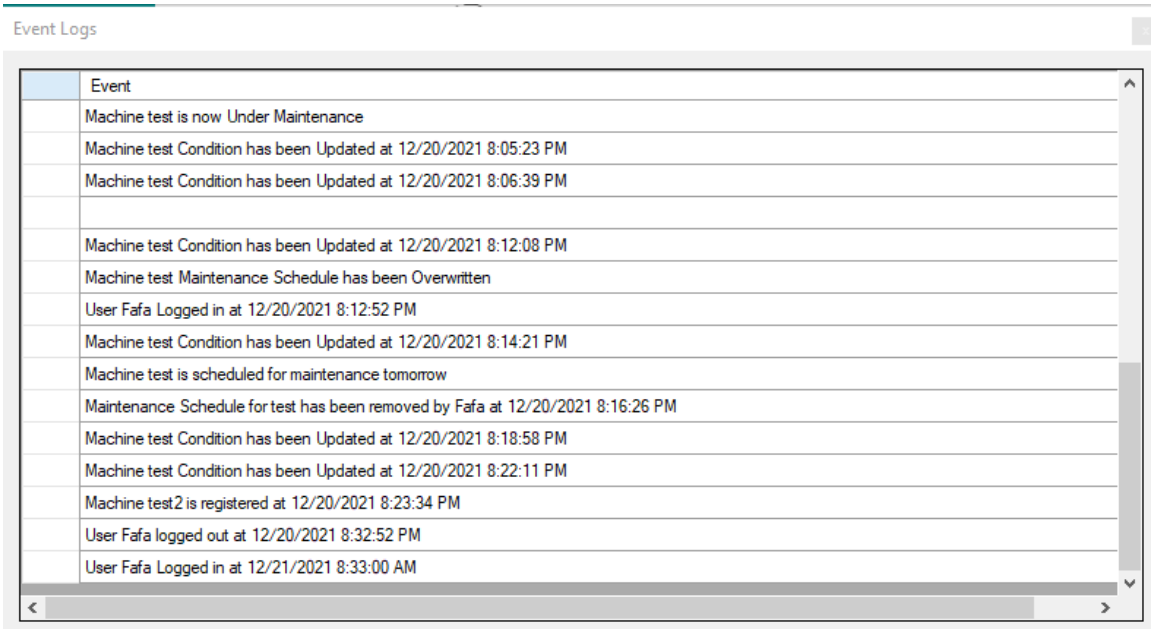
Search & Filter is the custodian's way to make finding and analyzing all the logs and data from its usage be more efficient and easier to pull data from these tables such as:

Maintenance Logs:



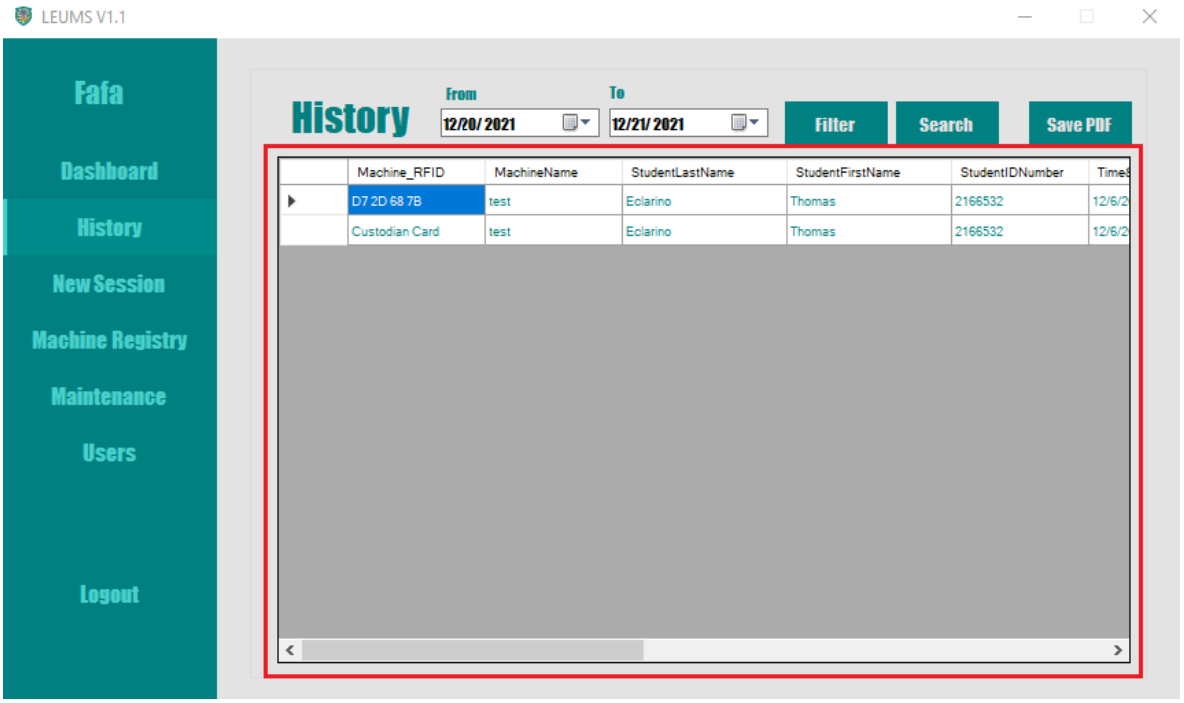
Machine_Name	Maintained_By	Machine_Condition	Maintenance_Report	Time&DateSubmited
test	Fafa	Available		12/20/2021 8:05 PM
test	Fafa	Available		12/20/2021 8:05 PM
test	Fafa	Available		12/20/2021 8:12 PM
test	Fafa	Available		12/20/2021 8:14 PM
test	Fafa	Out of Order		12/20/2021 8:18 PM

Event Logs:



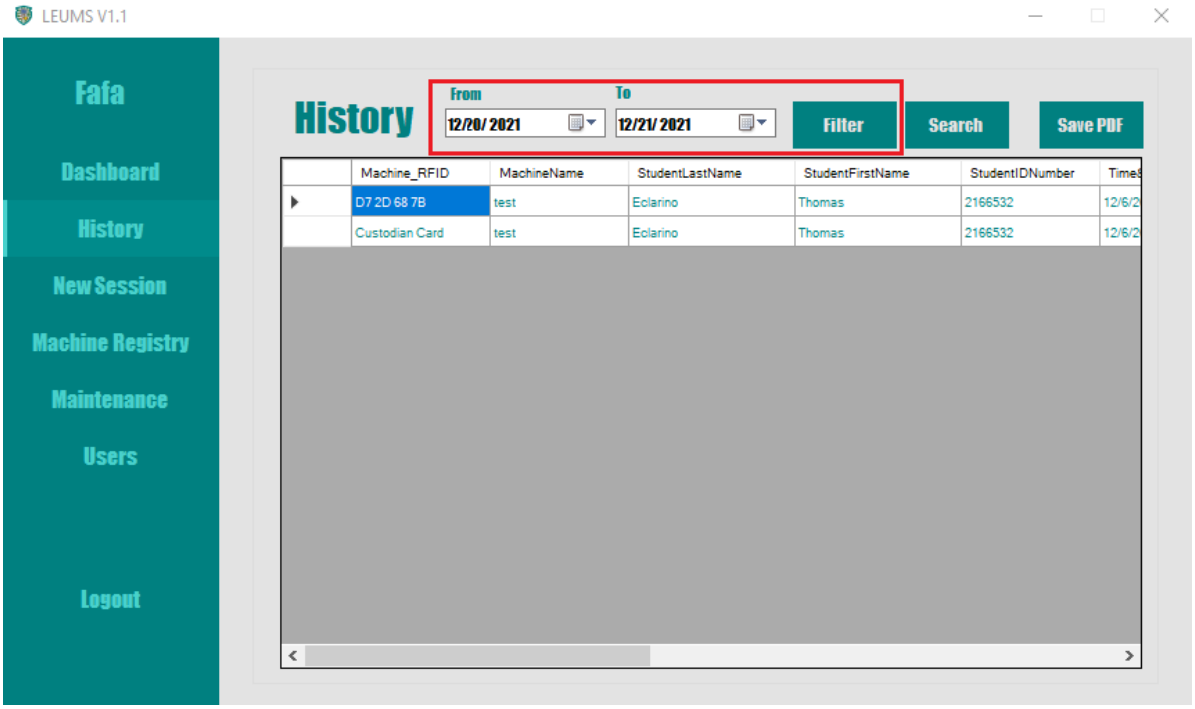
Event
Machine test is now Under Maintenance
Machine test Condition has been Updated at 12/20/2021 8:05:23 PM
Machine test Condition has been Updated at 12/20/2021 8:06:39 PM
Machine test Condition has been Updated at 12/20/2021 8:12:08 PM
Machine test Maintenance Schedule has been Overwritten
User Fafa Logged in at 12/20/2021 8:12:52 PM
Machine test Condition has been Updated at 12/20/2021 8:14:21 PM
Machine test is scheduled for maintenance tomorrow
Maintenance Schedule for test has been removed by Fafa at 12/20/2021 8:16:26 PM
Machine test Condition has been Updated at 12/20/2021 8:18:58 PM
Machine test Condition has been Updated at 12/20/2021 8:22:11 PM
Machine test2 is registered at 12/20/2021 8:23:34 PM
User Fafa logged out at 12/20/2021 8:32:52 PM
User Fafa Logged in at 12/21/2021 8:33:00 AM

History Logs:

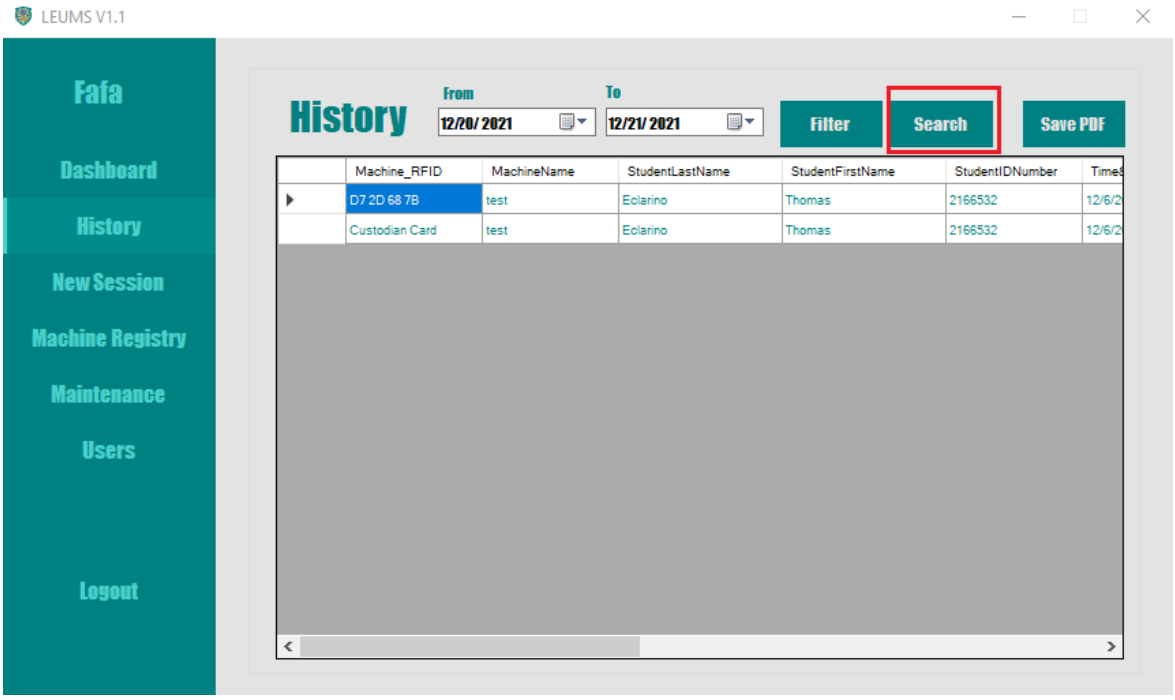


Using Search & Filter

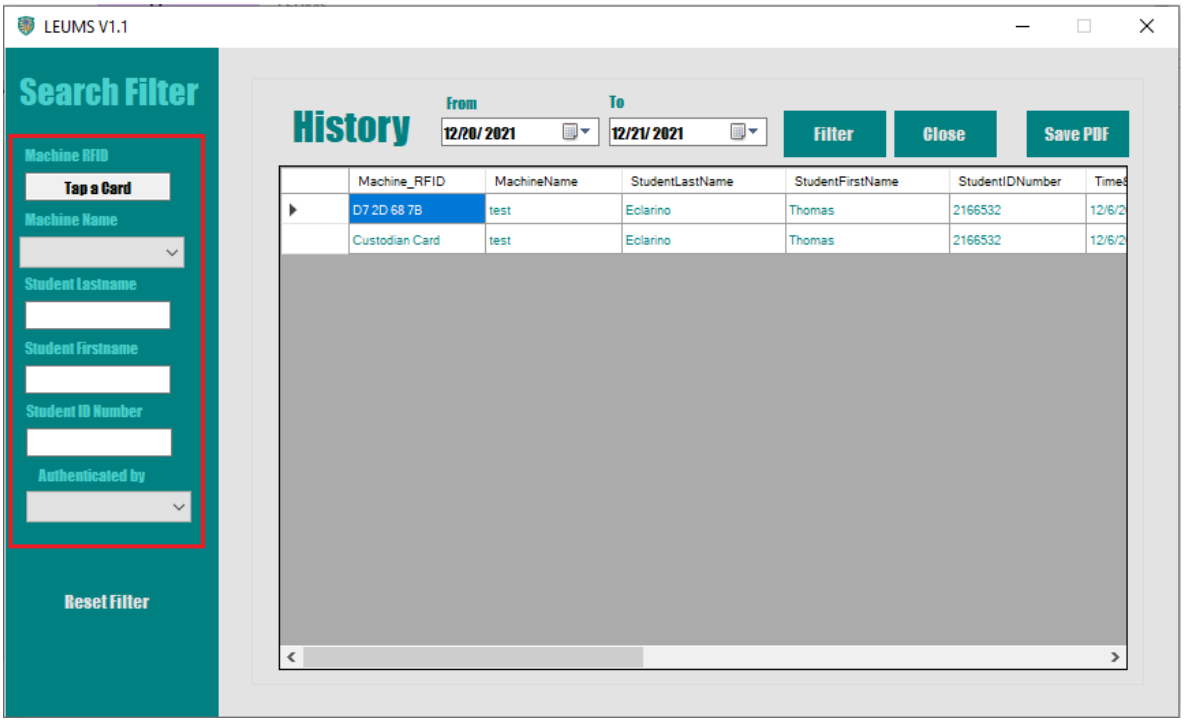
By selecting a range of date and clicking the “Filter” button. The user can filter the items on the table that fit the criteria.



By clicking the “Search” button. The search filter panel with take the place of the dashboard tabs until the user closes the search filter panel.



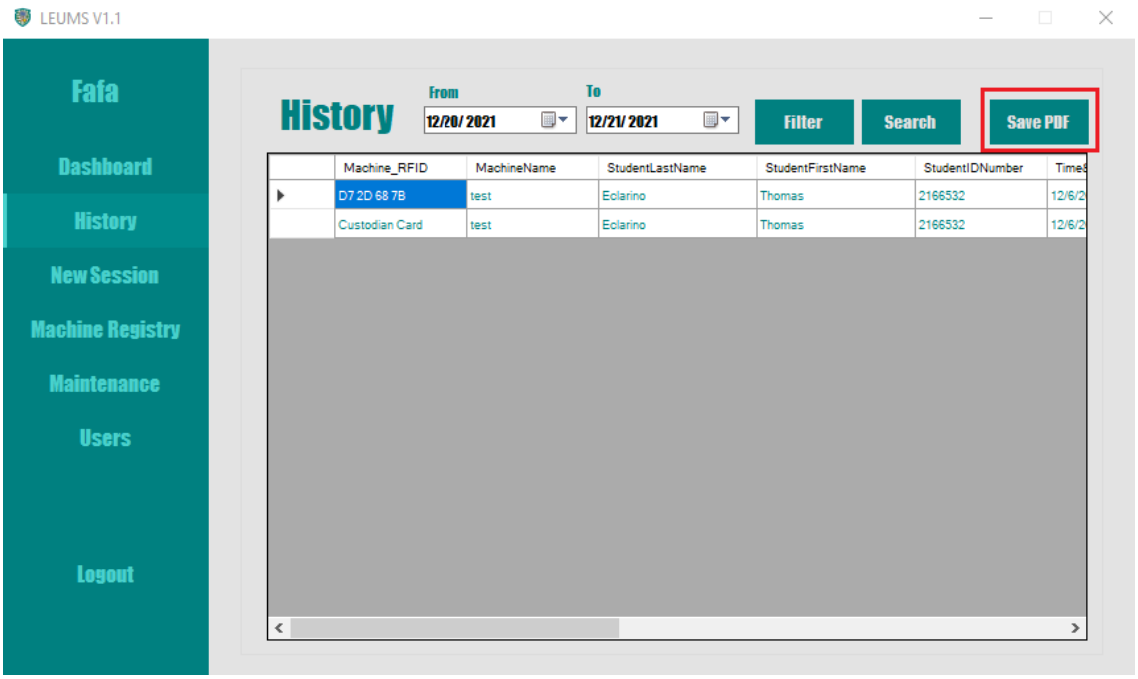
With this search filter panel the user can now filter the displayed data that satisfies all the search parameters for a more accurate result. Changing the search filter parameters will automatically search similarities in its database. But clicking the “filter button” will combine all the parameters to give a more specific sets of data.



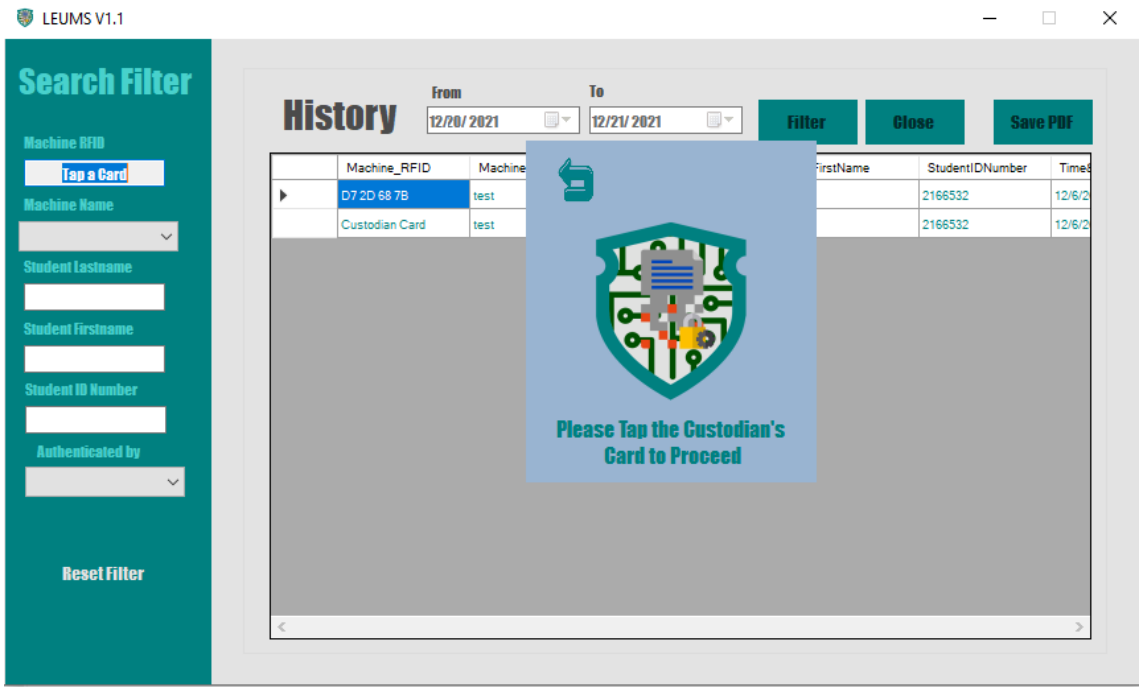
How to Save Data Table to PDF

Save to PDF

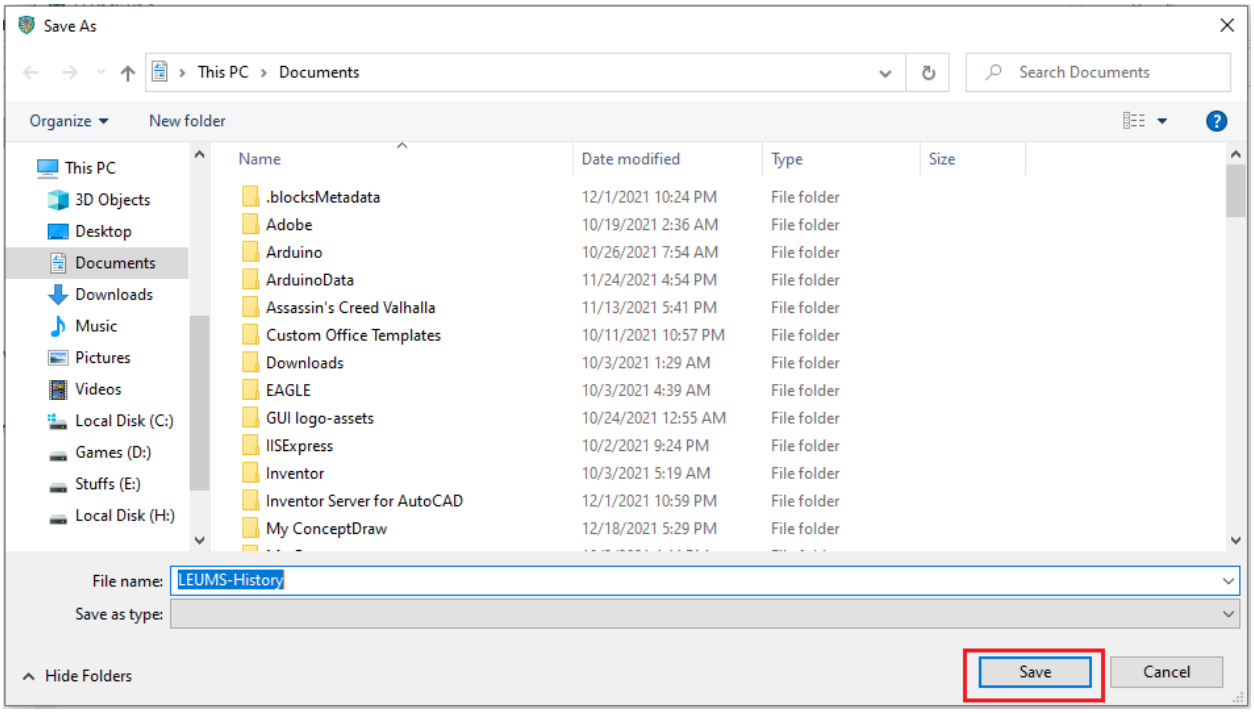
Click the Save PDF button. And whatever the displayed data on the data table will be saved in pdf form and is already format for easy printing at A4 size.



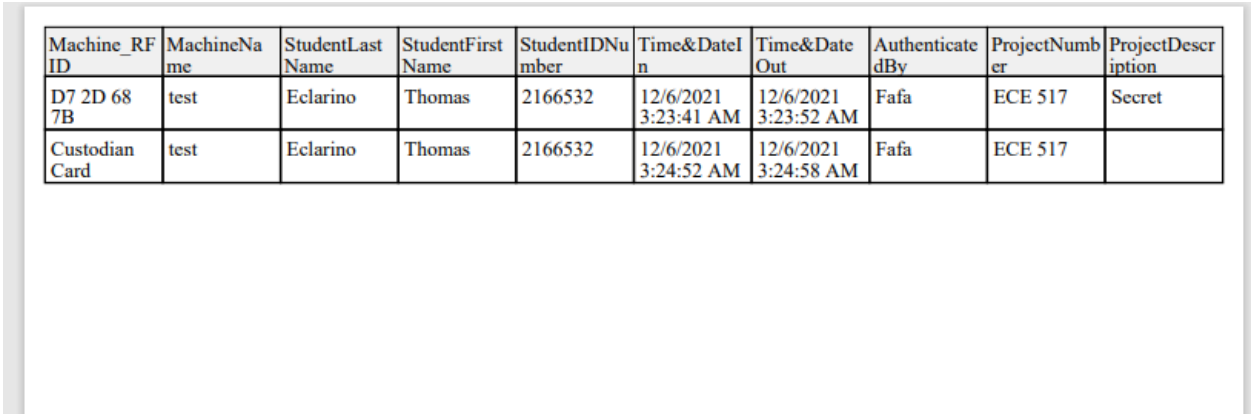
Tap the custodian’s card to access the feature.



Click on Save. Automatically saved in PDF file.



And will be saved as

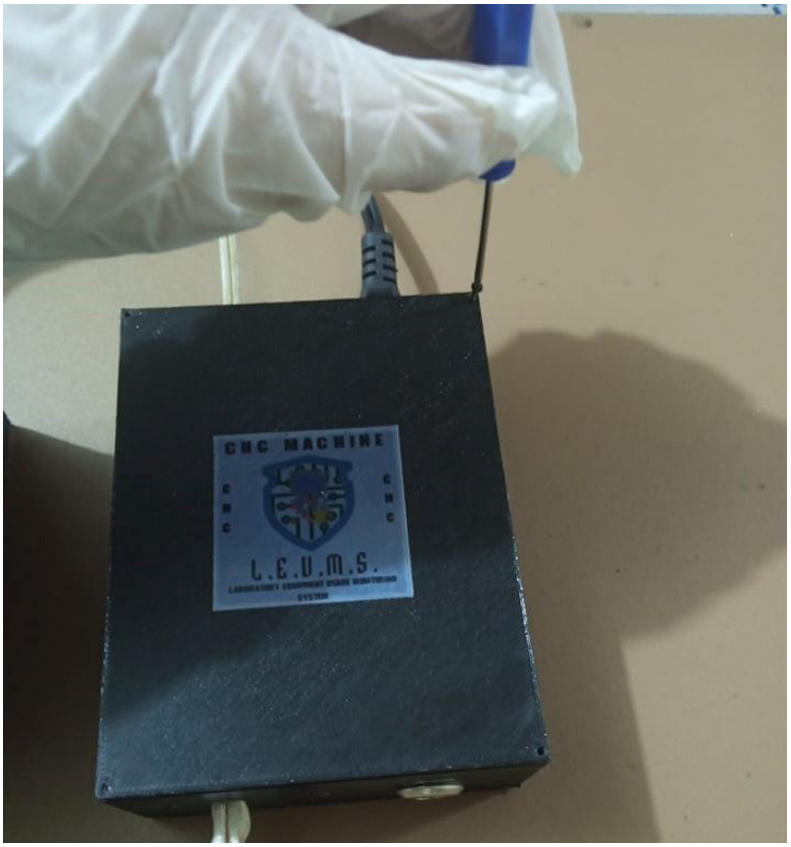


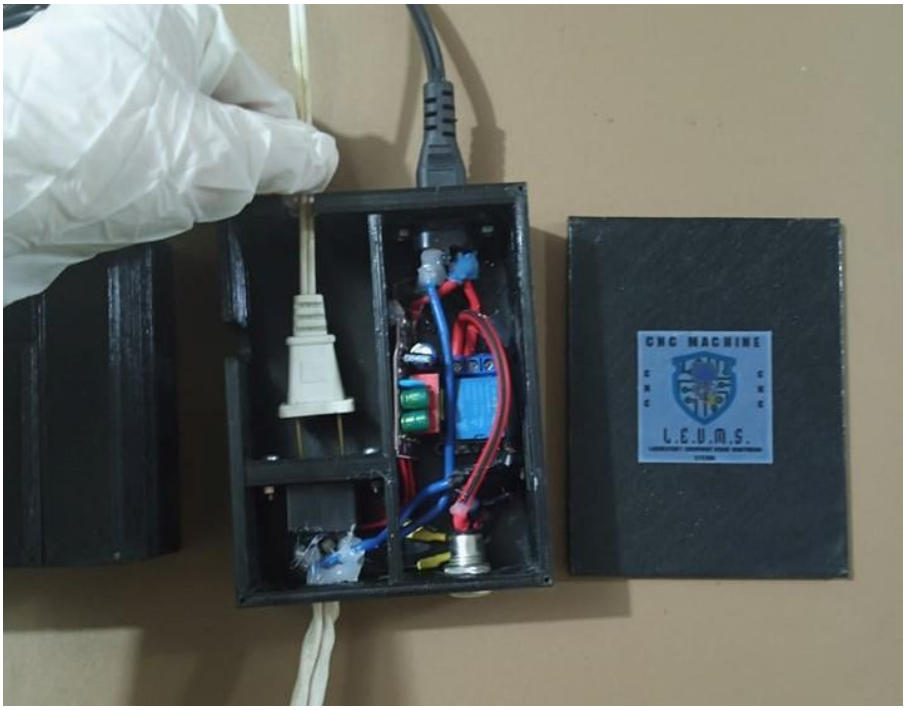
Machine_RFID	MachineName	StudentLastName	StudentFirstName	StudentIDNumber	Time&DateIn	Time&DateOut	AuthenticatedBy	ProjectNumber	ProjectDescription
D7 2D 68 7B	test	Eclarino	Thomas	2166532	12/6/2021 3:23:41 AM	12/6/2021 3:23:52 AM	Fafa	ECE 517	Secret
Custodian Card	test	Eclarino	Thomas	2166532	12/6/2021 3:24:52 AM	12/6/2021 3:24:58 AM	Fafa	ECE 517	

How to Setup LEUMS Laboratory Equipment Hardware

Setup

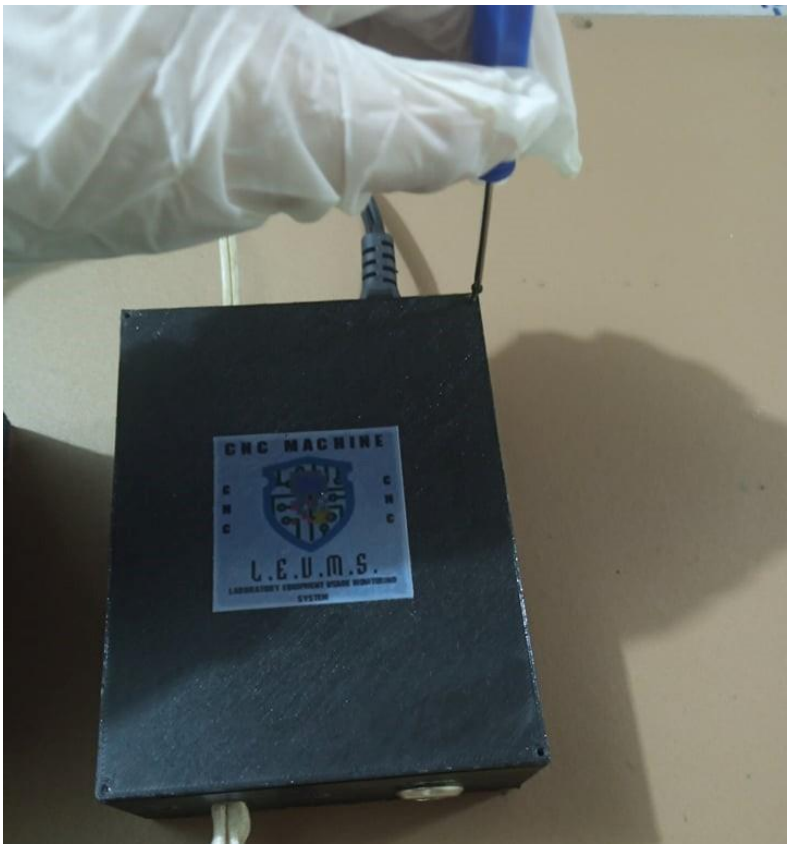
1. Unscrew and Remove the Power Brick cover





2. Plug the Machine to be powered by the LEUMS by plugging it into the TL2031 NEMA socket inside the LEUMS Laboratory Equipment Hardware Power Brick.

3. Screw in the Power Brick cover to secure the machine power plug.



4. Insert the EIC 320C-8 connector to the Power Brick socket and Plug in into 220V AC

How to Operate LEUMS Laboratory Equipment Hardware

Operation

1. A yellow LED indicator should light up upon plugging in the Power Brick to 220V AC. This indicates the device is ready to receive and read a card.

2. Insert the card in the Reader Card Slot until you feel a clipping motion on the card and hear an audible click and the Yellow LED indicator will turn off.

3. If the Card inserted in the Reader Slot is the Custodian’s Card or the registered Card that is hard coded on the Arduino. The green LED indicator will light up, hear an audible click and current is now flowing to the machine.

4. If the Card inserted in the Reader Slot is neither the Custodian’s Card nor the registered Card that is hard coded on the Arduino. The red LED indicator will light up, hear no audible click and no current will be flowing to the machine.

5. In case of the absence of an authorized RFID card. A manual Bypass has been added. And can be accessed from the power brick with a key.

6. Turning the key will turn on the machine regardless the condition of the Arduino.