

L.E.U.M.S.

Laboratory Equipment Usage Monitoring System

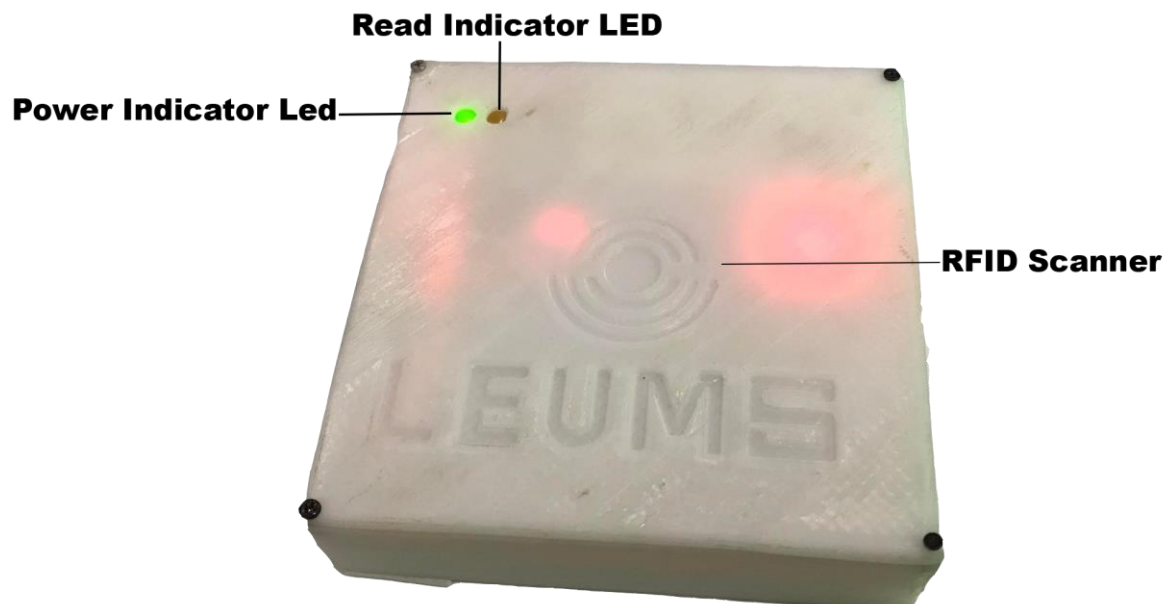
User Manual

Package List

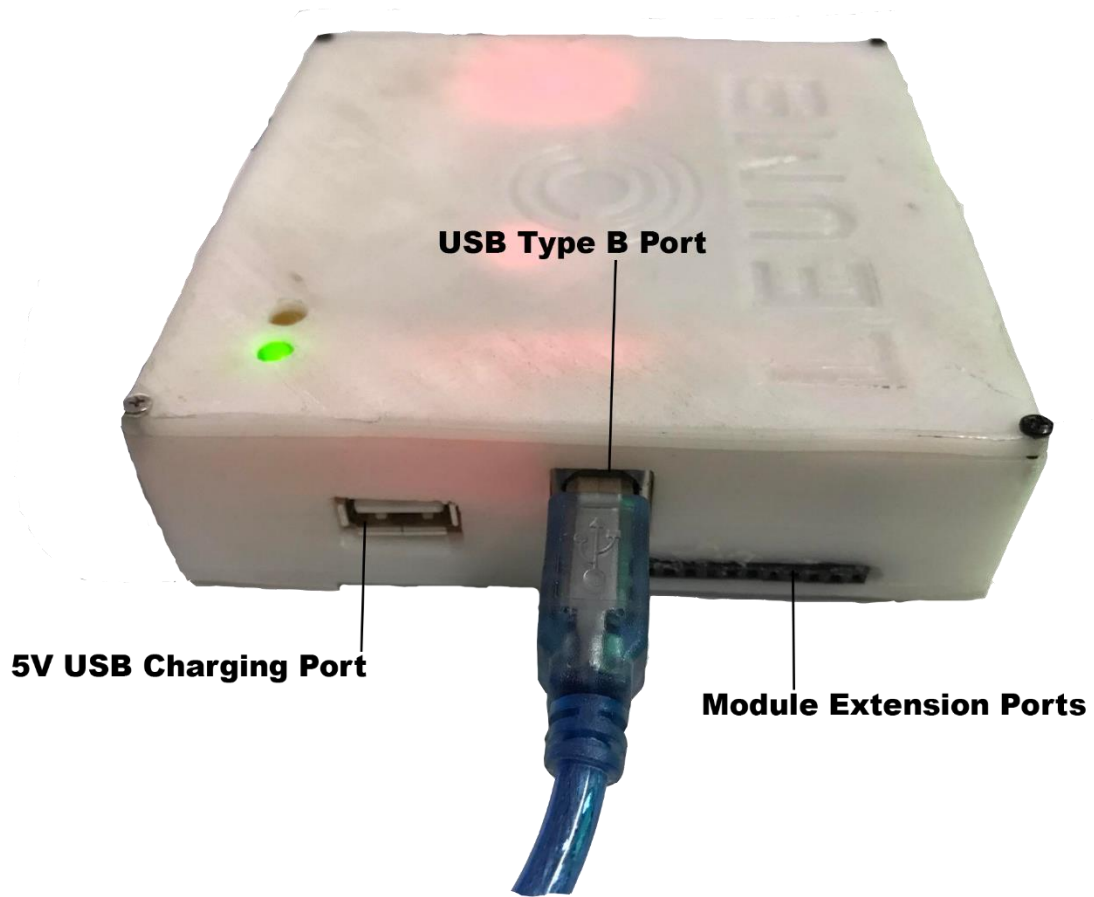
- 1 x LEUMS Custodian Hardware
- 1 x LEUMS Application Software (Windows)
- 3 x LEUMS Laboratory Equipment Hardware
- 3 x Power Cable
- 1 x Micro USB Cable
- 1 x USB Type B Cable
- 1 x User Manual

Product Overview

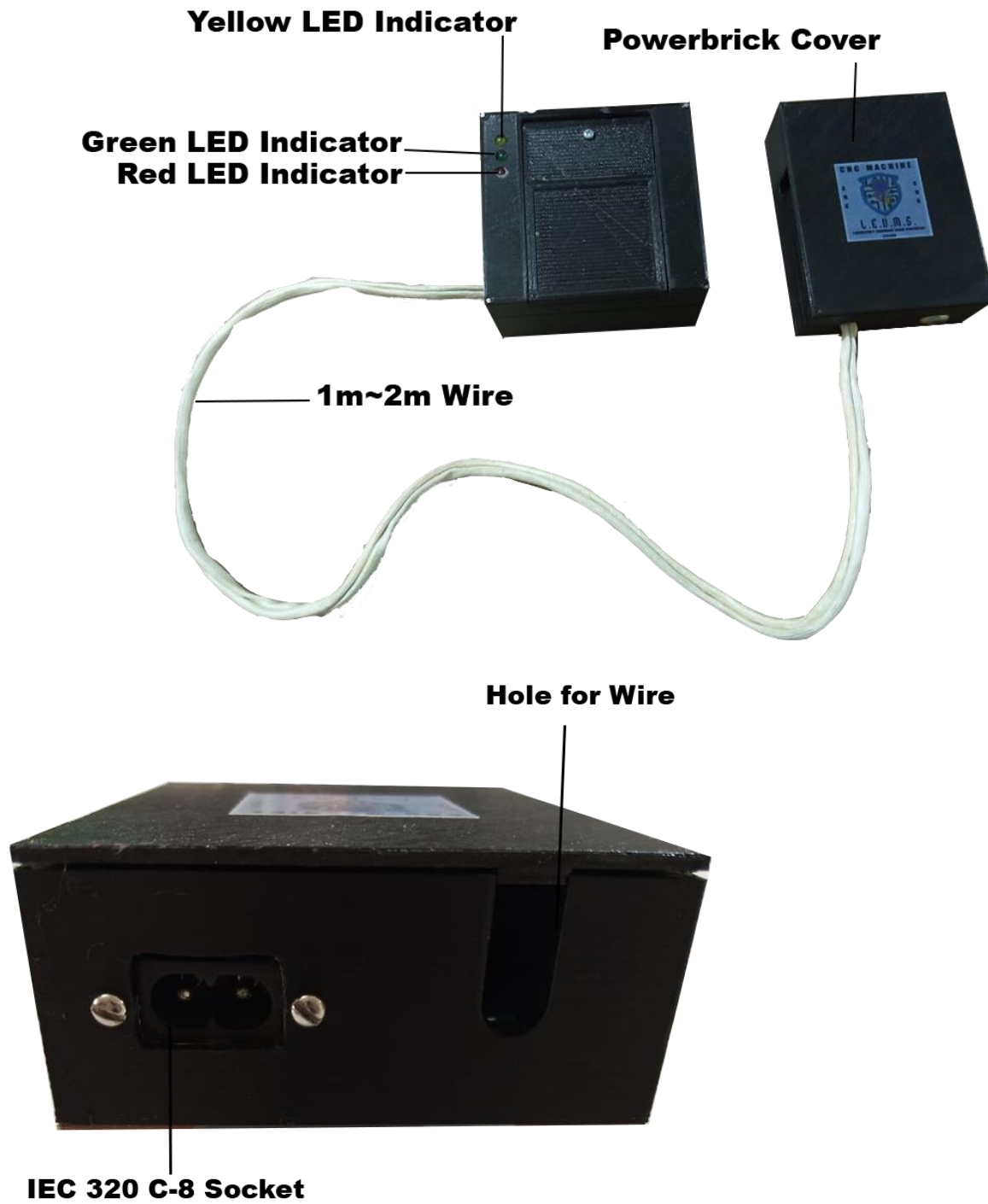
Top-Front Custodian Hardware:



Top-Side Custodian Hardware:



Top-Side Laboratory Equipment Hardware:







Card Reader Slot



IP40 Key Switch

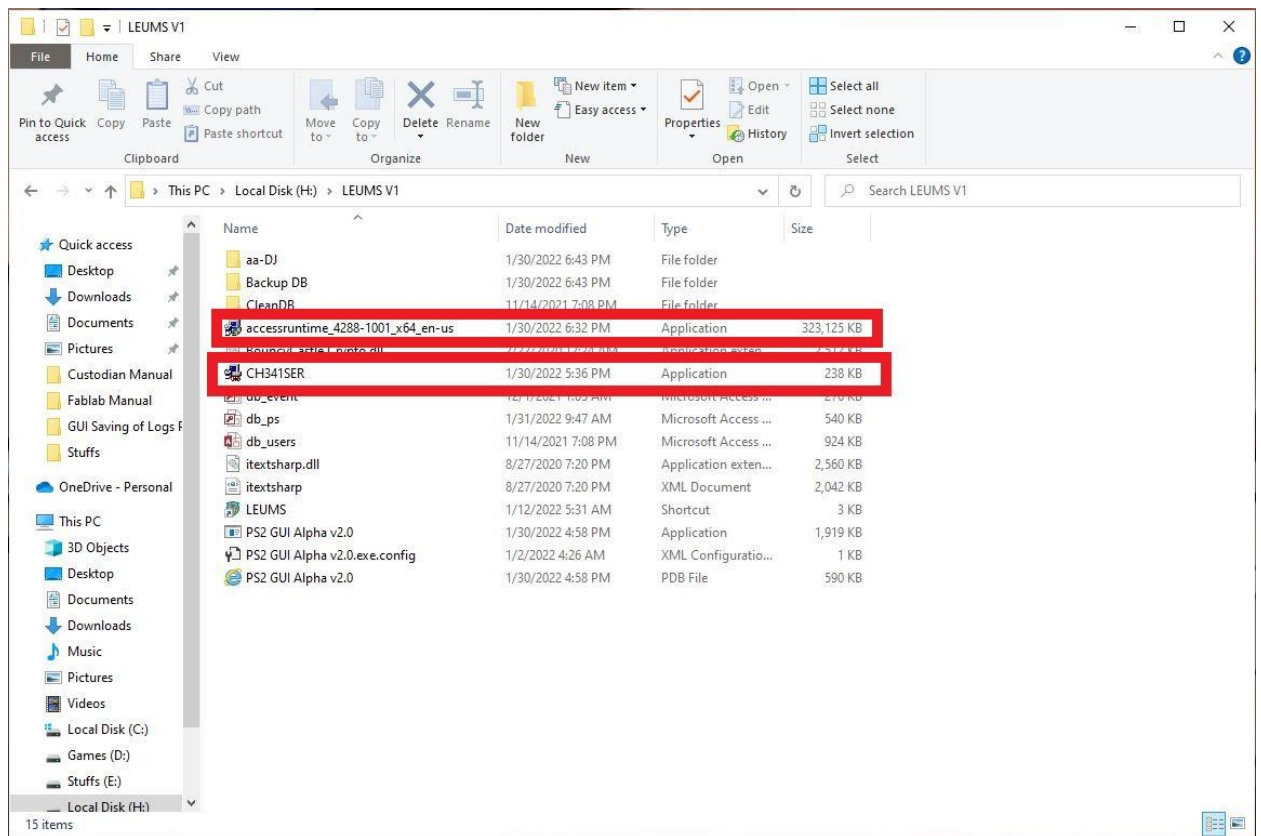
Specifications

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.



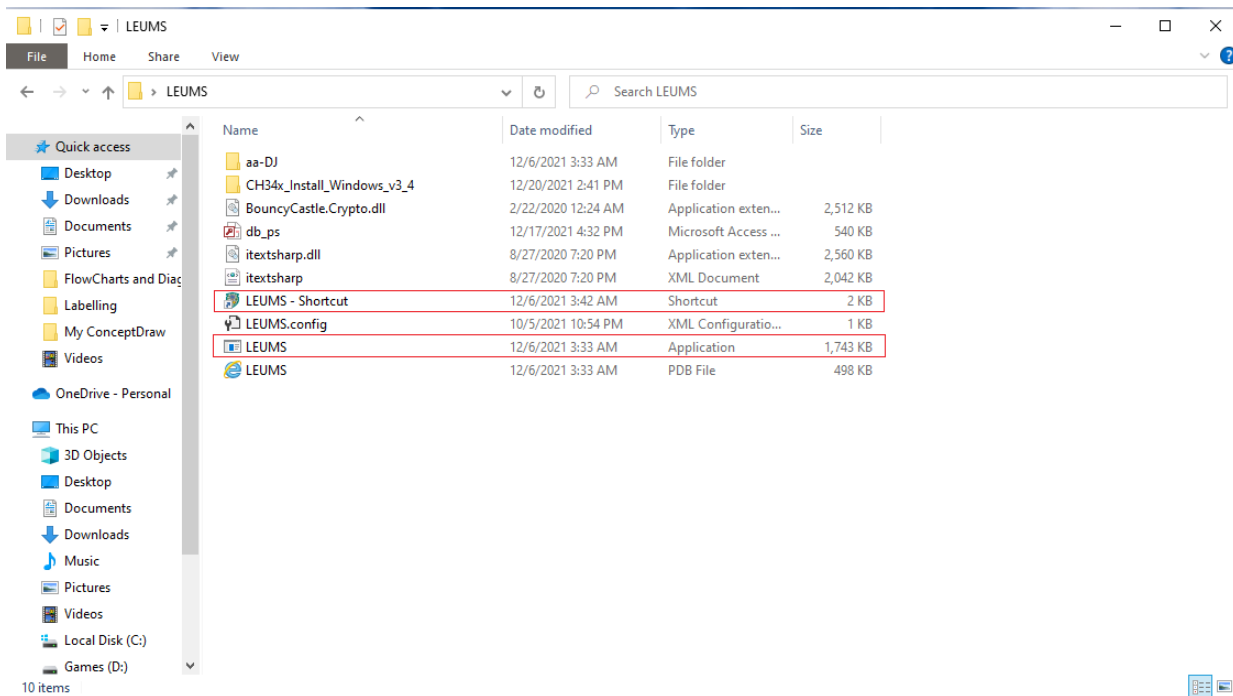
2. Locate the USB type B on the Left Side of the LEUMS Hardware.



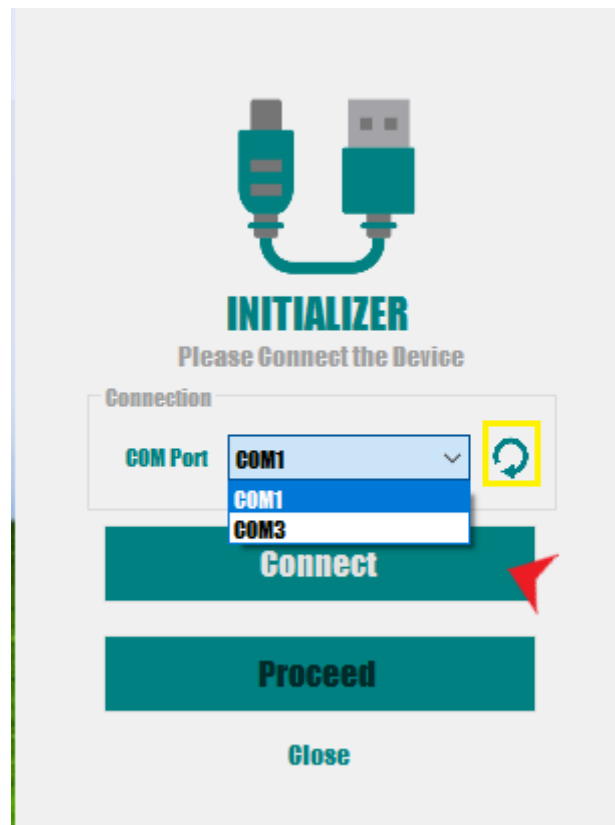
Connect the LEUMS Hardware to your PC with the USB type B connector. The Power Indicator LED (Green LED) should light up to indicate the connection was successful

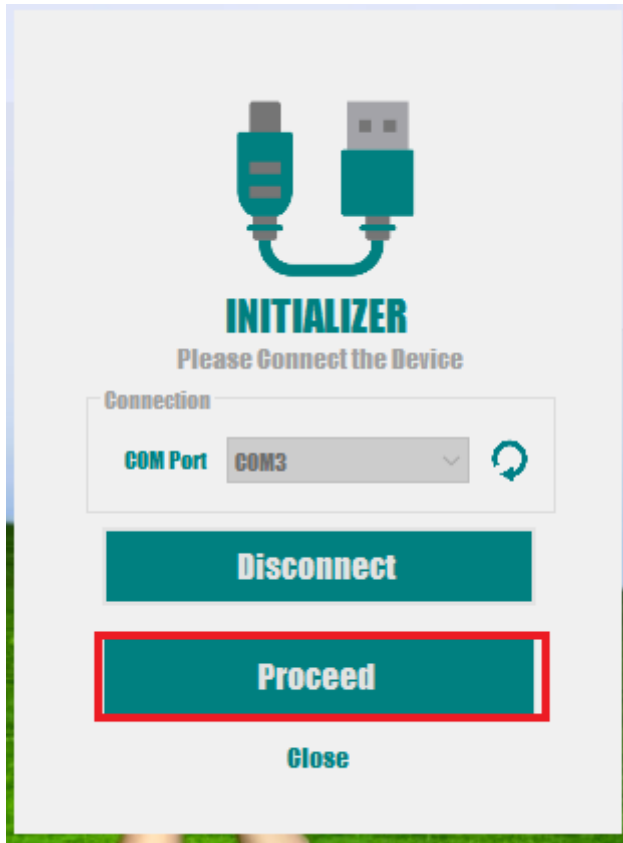


3. Navigate to the LEUMS folder and Run the LEUMS Application.
(Note: The Shortcut may be placed on the desktop for easier access)



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.



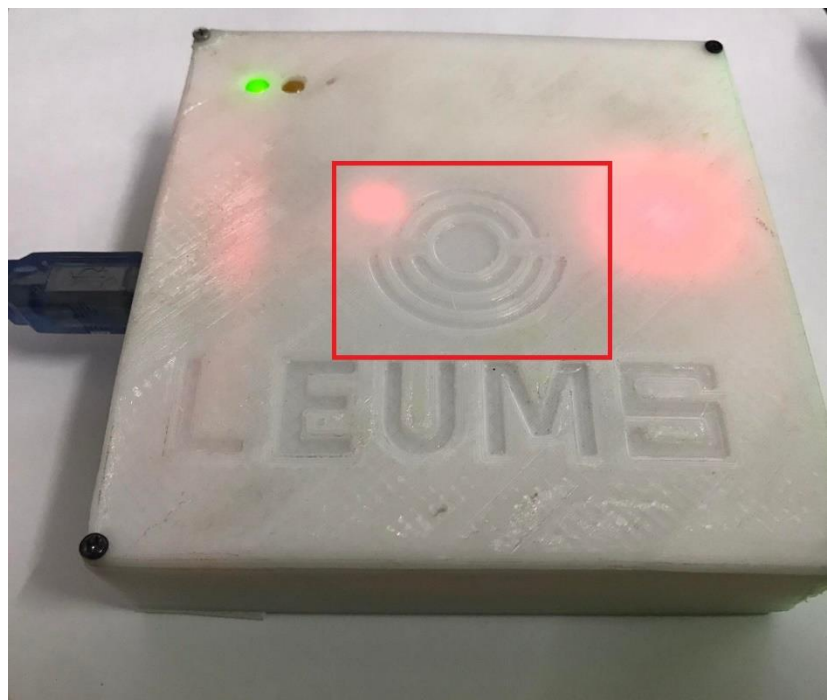


5. Once Connected, a Disconnect button is will be present in case of further changes to the communication port. If the correct communication port is already selected. Click on proceed and the connection from the LEUMS Hardware and the PC is now established and will now be directed to the Login Page.

How to Scan RFID using the LEUMS Custodian Hardware

Tap the Card

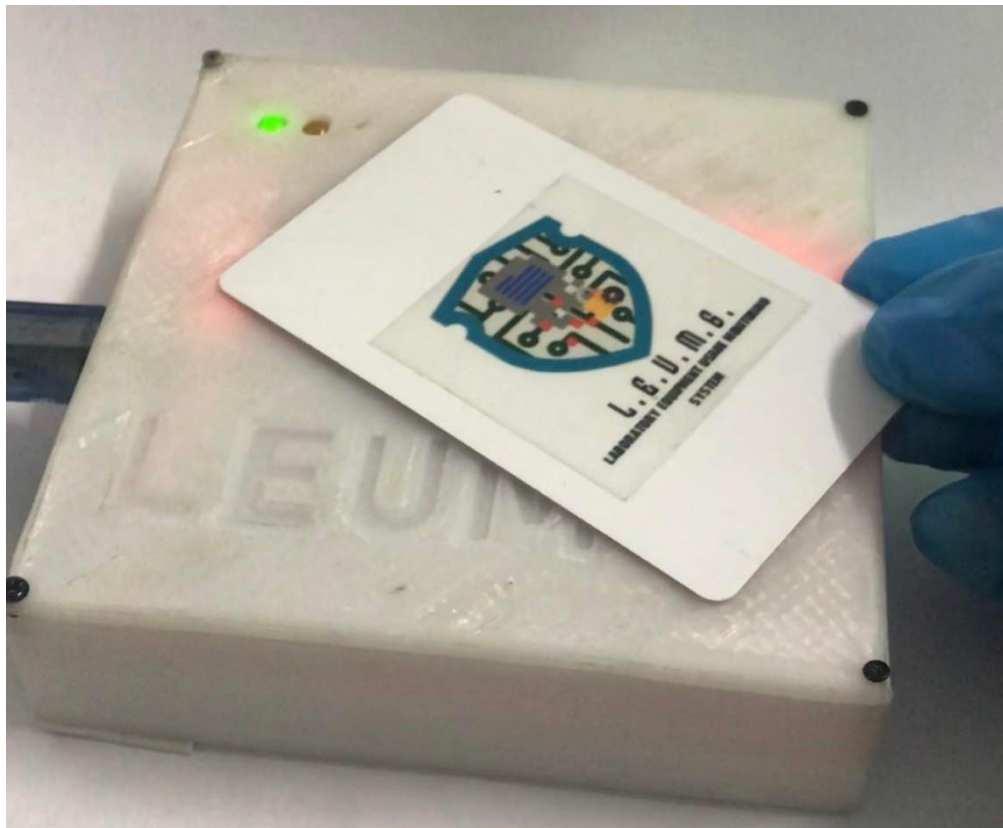
1. The location of the RFID scanner is directly under the embossed signal logo above the LEUMS embossed text. Which is where the user is designated to tap the card for a reliable scan.



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)



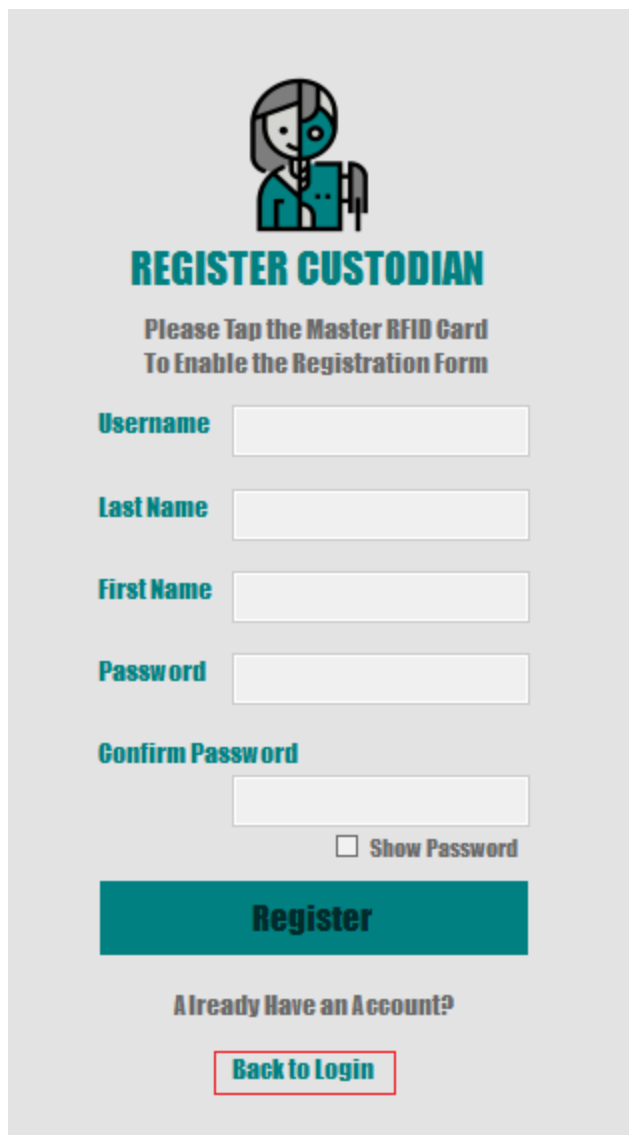
3. After an approximately 0.5s of tapping, the Power Indicator LED (Green LED) will turn back on and turns off the Read Indicator LED (Yellow LED) and will now be ready for another tap.

(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)

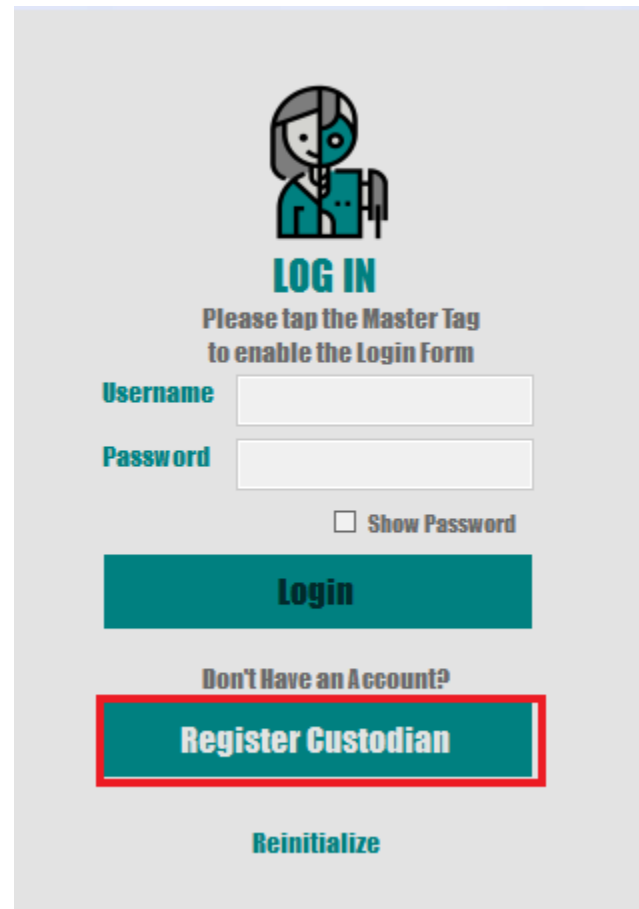
How to Register as a Custodian on the LEUMS Application Software

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.



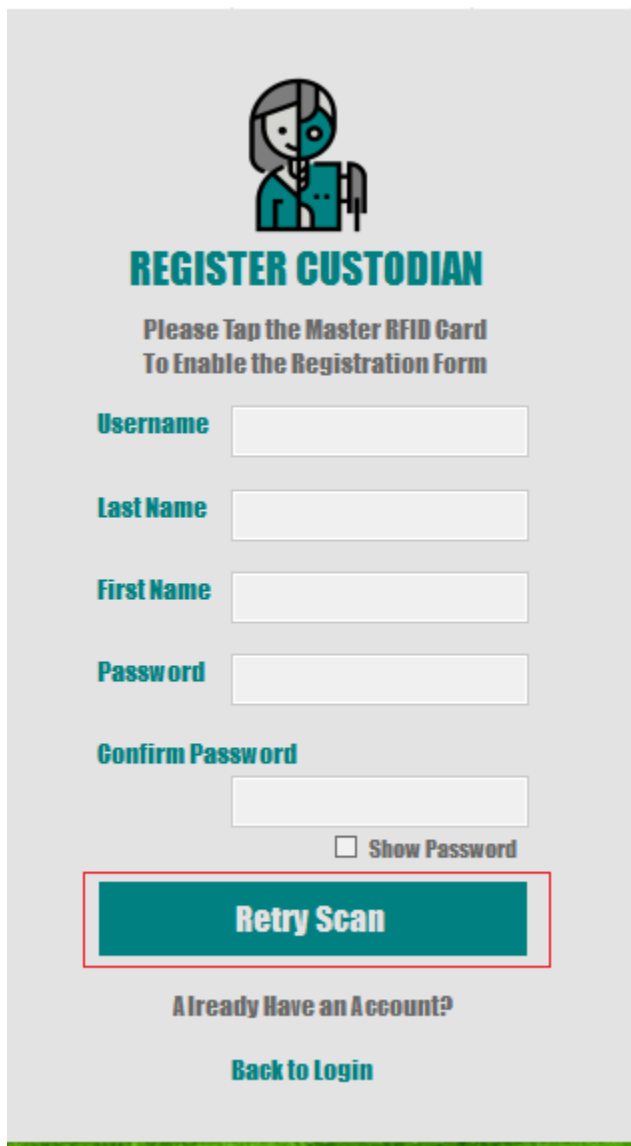
The Register Custodian screen features a stylized icon of a person with a blue face and a black body, holding a black tag. Below the icon, the text "REGISTER CUSTODIAN" is displayed in bold blue letters. Underneath, a message reads "Please Tap the Master RFID Card To Enable the Registration Form". The form includes input fields for "Username", "Last Name", "First Name", "Password", and "Confirm Password". A "Show Password" checkbox is located below the "Confirm Password" field. A large blue "Register" button is positioned below the form. At the bottom, the text "Already Have an Account?" is followed by a red-bordered button labeled "Back to Login".



The Login screen features a stylized icon of a person with a blue face and a black body, holding a black tag. Below the icon, the text "LOG IN" is displayed in bold blue letters. Underneath, a message reads "Please tap the Master Tag to enable the Login Form". The form includes input fields for "Username" and "Password". A "Show Password" checkbox is located below the "Password" field. A large blue "Login" button is positioned below the form. Below the "Login" button, the text "Don't Have an Account?" is followed by a red-bordered button labeled "Register Custodian". At the bottom, a blue "Reinitialize" button is visible.

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.



The image shows a registration form titled "REGISTER CUSTODIAN". At the top is a logo of a person with a blue face and a key. Below the logo is the text "Please Tap the Master RFID Card To Enable the Registration Form". The form contains five input fields: "Username", "Last Name", "First Name", "Password", and "Confirm Password". There is a "Show Password" checkbox below the "Confirm Password" field. A red rectangle highlights a teal "Retry Scan" button at the bottom of the form. Below the button is the text "Already Have an Account?" and a link "Back to Login".

REGISTER CUSTODIAN

Please Tap the Master RFID Card
To Enable the Registration Form

Username

Last Name

First Name

Password

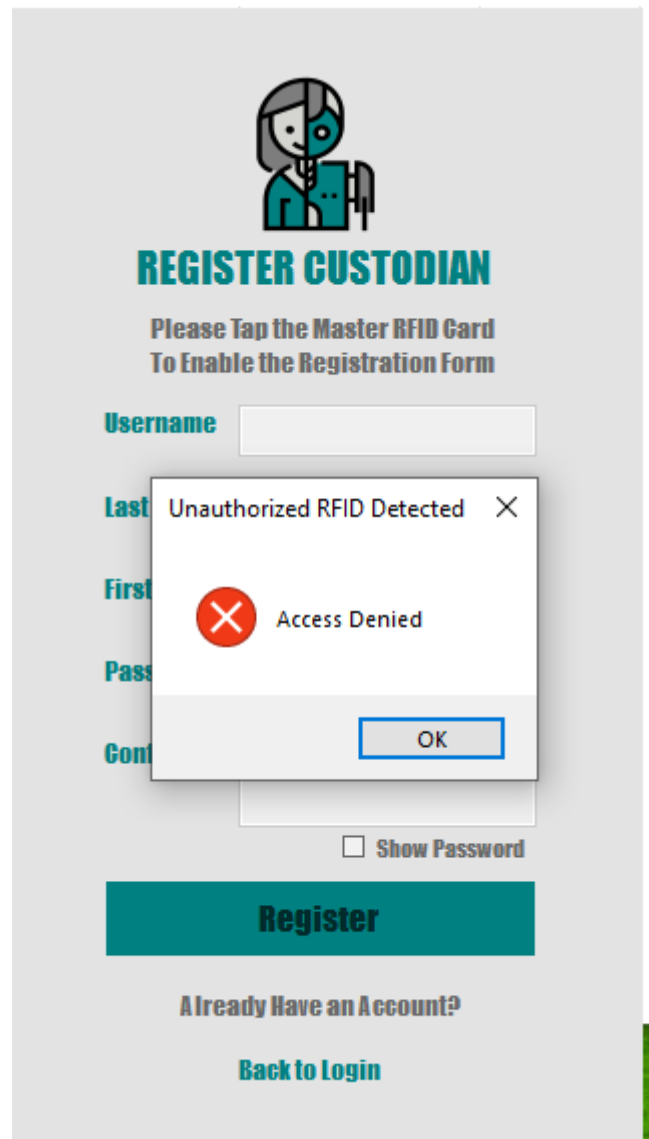
Confirm Password

☐ Show Password

Retry Scan

Already Have an Account?

[Back to Login](#)



The image shows the same registration form as the previous one, but with an error dialog box overlaid. The dialog box is titled "Unauthorized RFID Detected" and contains a red circle with a white 'X' and the text "Access Denied". There is an "OK" button at the bottom of the dialog. The background form is partially obscured by the dialog box.

REGISTER CUSTODIAN

Please Tap the Master RFID Card
To Enable the Registration Form

Username

Last Name

First Name

Password

Confirm Password

☐ Show Password

Register

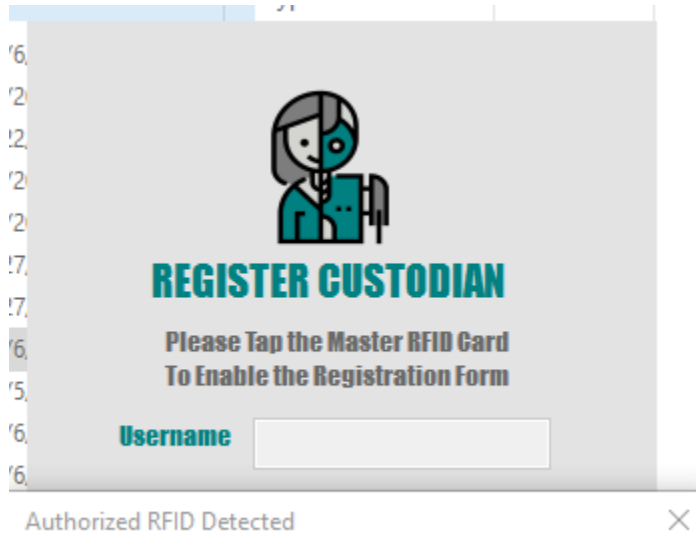
Already Have an Account?

[Back to Login](#)

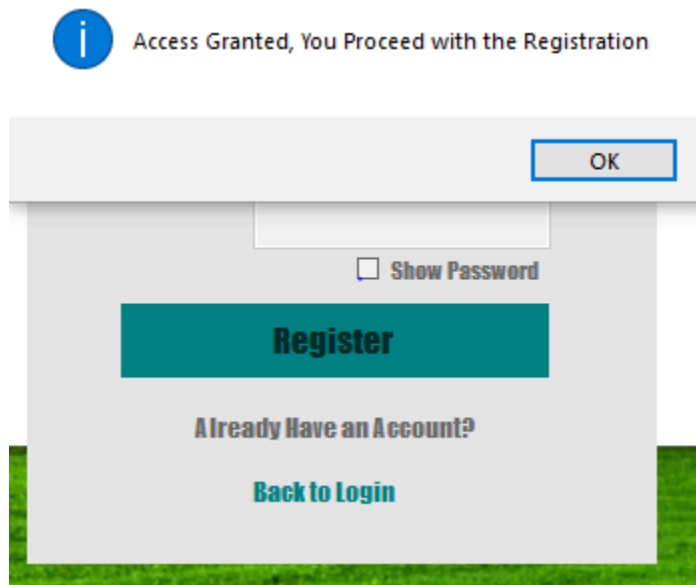
Unauthorized RFID Detected X

Access Denied

OK

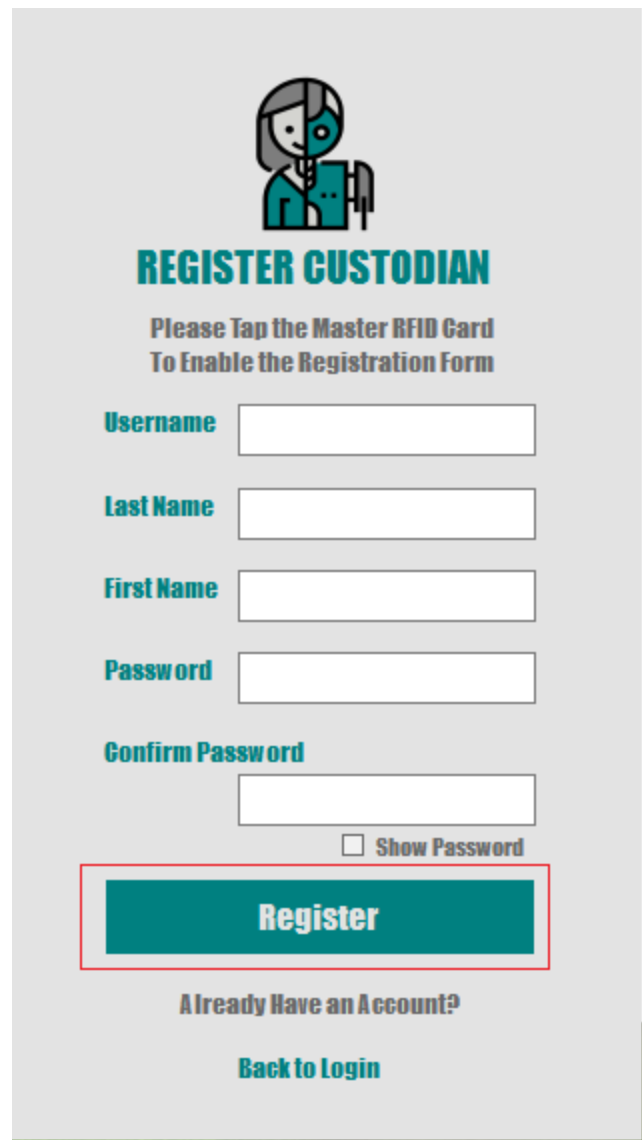


4. If the RFID card the user tapped on the scanner is the Custodian Card/Master RFID/Master Tag the GUI will detect it and will allow the user to register as a custodian.



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.

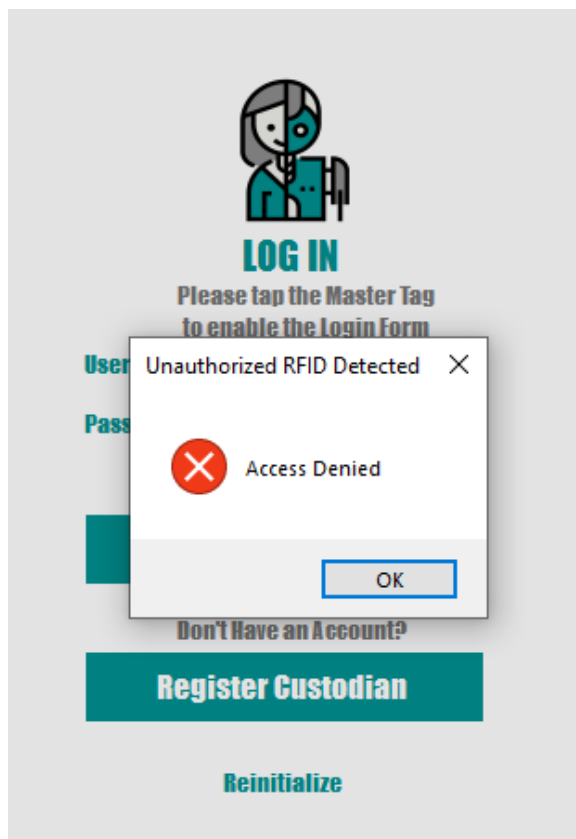
(Note: The GUI will inform the user if the chosen username is already in use.)



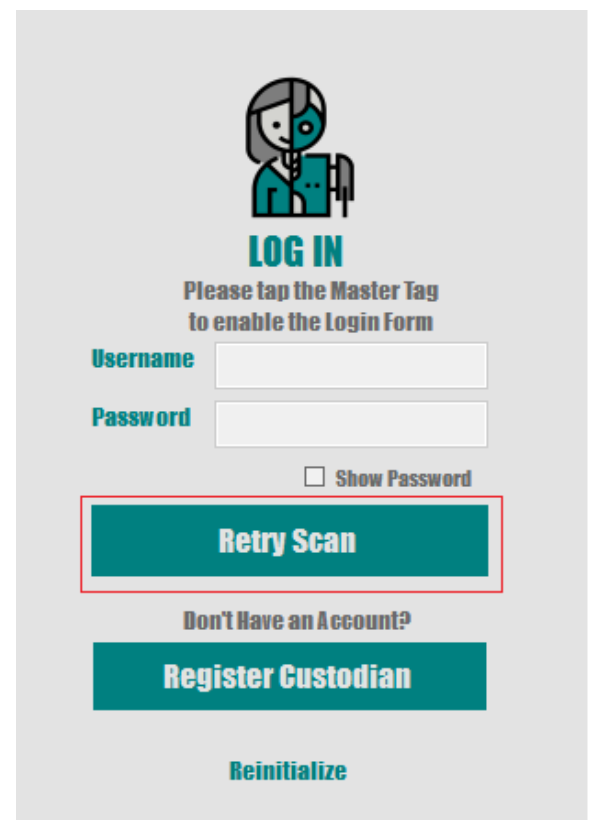
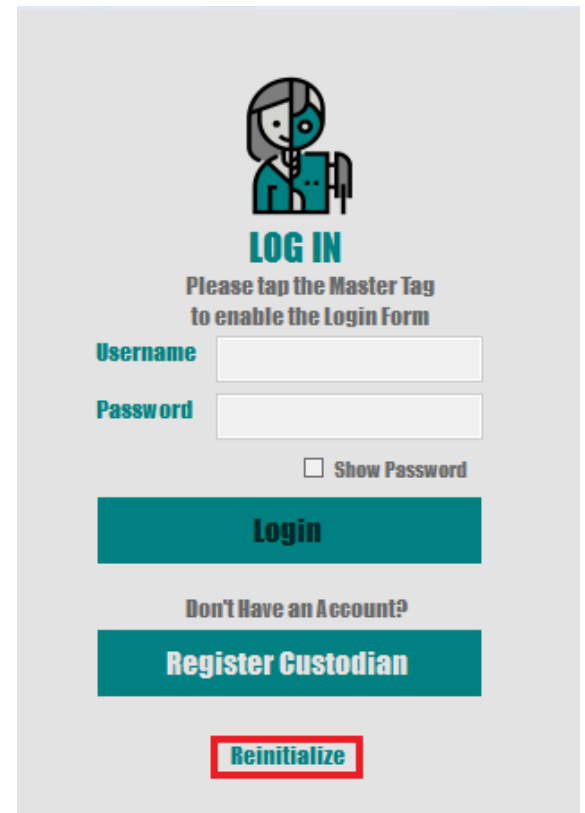
How to Log in on the LEUMS Application Software

Login

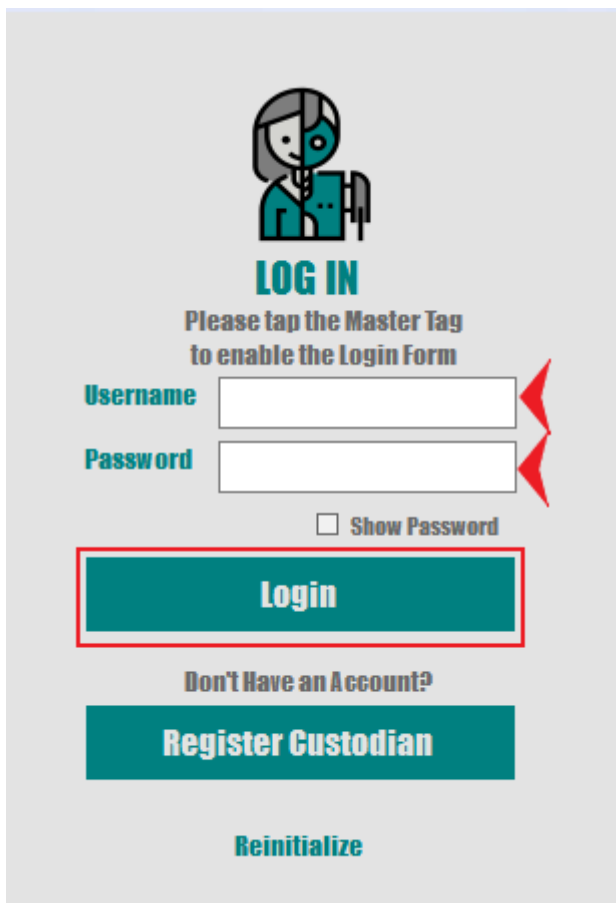
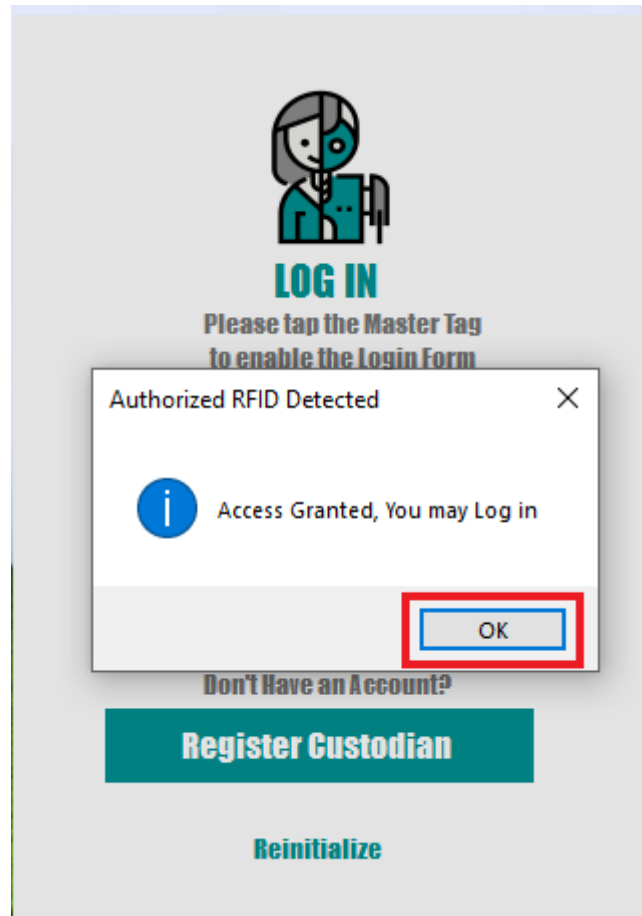
1. After loading the registration page. The user will be required to tap the Custodian RFID or also known as the Master RFID or Master Tag that is hard coded on the application.
2. If after tapping any card and the GUI does not detect any information about the card. It's advised to reinitialize and make 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

LEUMS V1.1

Dashboard 12/20/2021 03:18 PM

NoCOM#

End Session

[View Event Logs](#)

Notifications

- User fAFA Logged in at 12/6/2021 3:42:40 AM
- User Fafa Logged in at 12/17/2021 4:32:24 PM
- User Fafa Logged in at 12/20/2021 3:17:48 PM

Status

	Machine_RFID	MachineName	StudentLastName	StudentFirstName	StudentIDNumber	Time&Da
<						>

	Machine_RFID	MachineName	ProductType	MachineCondition
▶	D7 2D 68 7B	test	test	Available

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**.

LEUMS V1.1

Dashboard 12/20/2021 03:18 PM

NoCOM#

End Session

[View Event Logs](#)

Notifications

- User fAFA Logged in at 12/6/2021 3:42:40 AM
- User Fafa Logged in at 12/17/2021 4:32:24 PM
- User Fafa Logged in at 12/20/2021 3:17:48 PM

Status

	Machine_RFID	MachineName	StudentLastName	StudentFirstName	StudentIDNumber	Time&Da
<						>

	Machine_RFID	MachineName	ProductType	MachineCondition
▶	D7 2D 68 7B	test	test	Available

LEUMS V1.1

Fafa

Dashboard

History

New Session

Machine Registry

Maintenance

Users

Logout

Dashboard

12/20/202103:18 PM

NoCOM#

End Session

[View Event Logs](#)

Notifications

User fAFA Logged in at 12/6/2021 3:42:40 AM

User Fafa Logged in at 12/17/2021 4:32:24 PM

User Fafa Logged in at 12/20/2021 3:17:48 PM

Status

	Machine_RFID	MachineName	StudentLastName	StudentFirstName	StudentIDNumber	Time&Da
<						>
	D7 2D 68 7B	test	test			Available

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".

LEUMS V1.1

Fafa

Dashboard

History

New Session

Machine Registry

Maintenance

Users

Logout

Dashboard

12/20/202103:18 PM

NoCOM#

End Session

[View Event Logs](#)

Notifications

User fAFA Logged in at 12/6/2021 3:42:40 AM

User Fafa Logged in at 12/17/2021 4:32:24 PM

User Fafa Logged in at 12/20/2021 3:17:48 PM

Status

	Machine_RFID	MachineName	StudentLastName	StudentFirstName	StudentIDNumber	Time&Da
<						>
	D7 2D 68 7B	test	test			Available

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.

LEUMS V1.1

Fafa

Dashboard

History

New Session

Machine Registry

Maintenance

Users

Logout

Dashboard

NoCOM#

End Session

[View Event Logs](#)

Notifications

User fAFA Logged in at 12/6/2021 3:42:40 AM

User Fafa Logged in at 12/17/2021 4:32:24 PM

User Fafa Logged in at 12/20/2021 3:17:48 PM

Status

	Machine_RFID	MachineName	StudentLastName	StudentFirstName	StudentIDNumber	Time&Da
<						>
	Machine_RFID	MachineName	ProductType		MachineCondition	
▶	D7 2D 68 7B	test	test		Available	

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.

LEUMS V1.1

New Session

Last Name Test

First Name test

ID Number test

Machine test

Project Number test

Project Description test

Terms and Conditions

By agreeing, The student/ borrower's own ID must be shown to the custodian, otherwise the custodian will not let you use the RFID cards. If the RFID card has been lent to you, you must take care of it and it must not be tampered, wet or damaged in order to use the machines in the fablab property. If you lost the RFID card the borrower's id will not be returned unless you replace, pay or have come to an arrangement with the custodian for the lost RFID card. The borrowers are also responsible in case the machines in the fablab are damaged. Tampering or copying the RFID and trying to hack the machine will be fined and/or banned.

☒ Agree to Terms and Conditions

Start New Session

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.

LEUMS V1.1

New Session

Last Name Test

First Name test

ID Number test

Machine test

Project Number test

Project Description test

Terms and Conditions

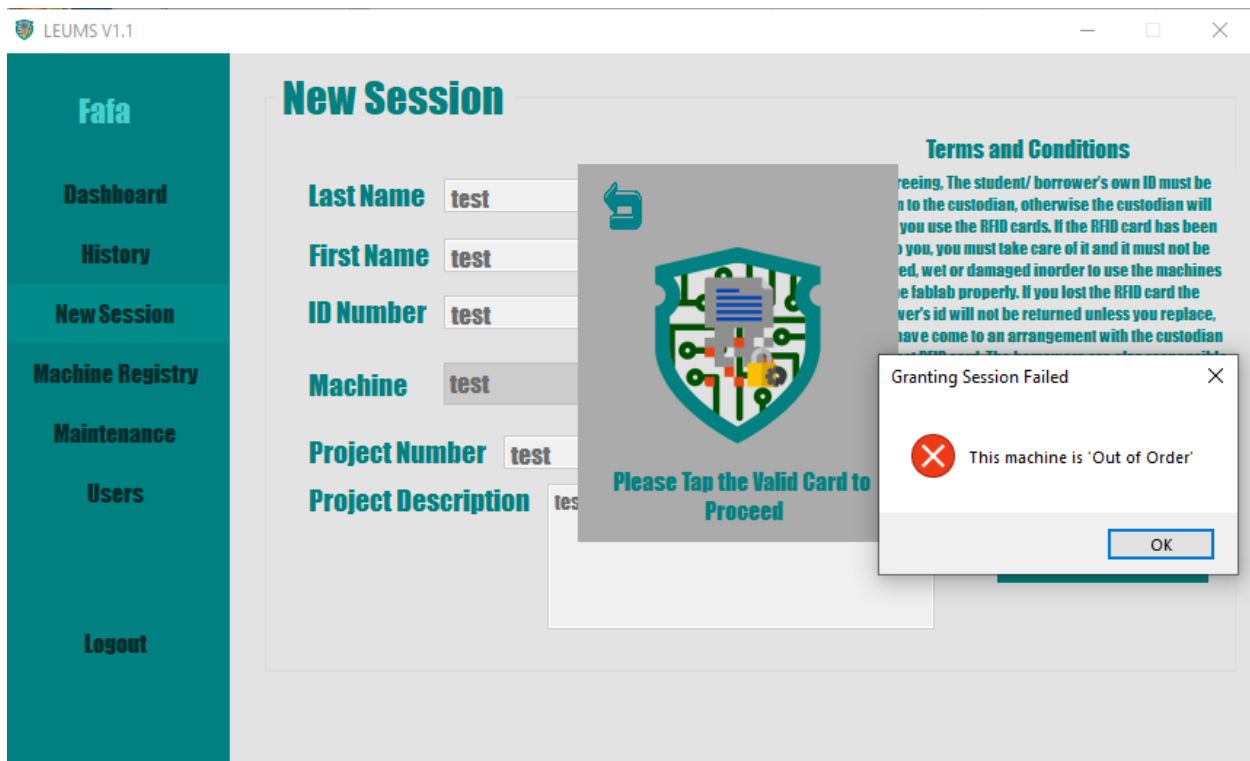
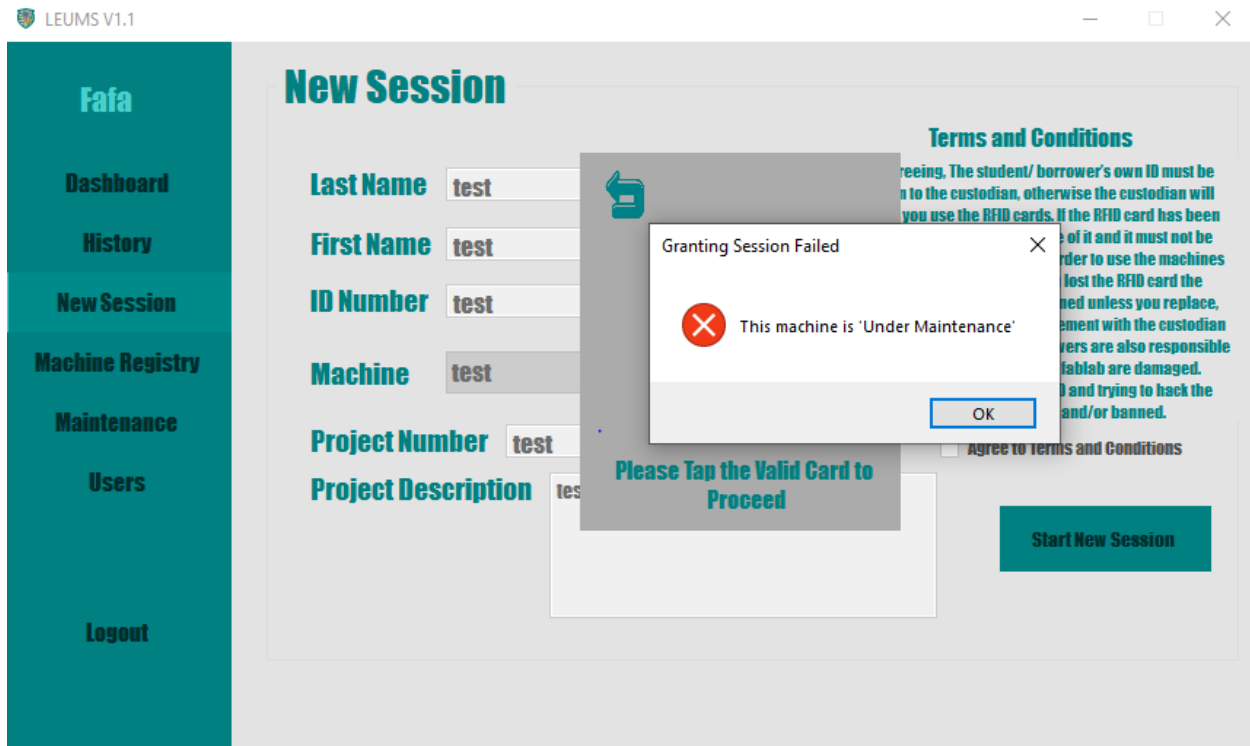
By agreeing, The student/ borrower's own ID must be shown to the custodian, otherwise the custodian will not let you use the RFID cards. If the RFID card has been lent to you, you must take care of it and it must not be tampered, wet or damaged in order to use the machines in the fablab property. If you lost the RFID card the borrower's id will not be returned unless you replace, pay or have come to an arrangement with the custodian for the lost RFID card. The borrowers are also responsible in case the machines in the fablab are damaged. Tampering or copying the RFID and trying to hack the machine will be fined and/or banned.

☐ Agree to Terms and Conditions

Start New Session

Please Tap the Valid Card to Proceed

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”.

LEUMS V1.1

Fafa

Dashboard

History

New Session

Machine Registry

Maintenance

Users

Logout

New Session

Last Name

Test

First Name

test

ID Number

test

Machine

test

Project Number

test

Project Description

test

Please Tap the Valid Card to Proceed

Terms and Conditions

Freeing. The student/ borrower's own ID must be given to the custodian, otherwise the custodian will not allow you to use the RFID cards. If the RFID card has been lost, you must take care of it and it must not be used, wet or damaged in order to use the machines in the fablab property. If you lost the RFID card the borrower's id will not be returned unless you replace it. If you have come to an arrangement with the custodian to use the lost RFID card. The borrowers are also responsible for the use of the machines in the fablab are damaged, lost, or copying the RFID and trying to hack the machine will be fined and/or banned.

☐ Agree to Terms and Conditions

Start New Session

Session Granted

i

Machine is now ready for use

OK

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.

LEUMS V1.1

Fafa

Dashboard

History

New Session

Machine Registry

Maintenance

Users

Logout

Dashboard

12/20/2021 04:00 PM

NoCOM#

End Session

[View Event Logs](#)

Notifications

User Fafa Logged in at 12/1/2021 2:42:43 AM

Machine test is registered at 12/1/2021 2:43:13 AM

User Fafa Logged in at 12/6/2021 3:23:08 AM

Machine test is in session at 12/6/2021 3:23:41 AM

Machine test Ended its session at 12/6/2021 3:23:53 AM

Status

	Machine_RFID	MachineName	StudentLastName	StudentFirstName	StudentIDNumber	Time&Date
▶	D7 2D 68 7B	test	Test	test	test	12/20/2021

	Machine_RFID	MachineName	ProductType	MachineCondition
▶	D7 2D 68 7B	test	test	In Use



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.

LEUMS V1.1

Fafa
Dashboard
History
New Session
Machine Registry
Maintenance
Users
Logout

New Session

Last Name
First Name
ID Number
Machine
Project Number
Project Description



Please Tap the Valid Card to Proceed


Terms and Conditions

...reeing. The student/ borrower's own ID must be ...n to the custodian, otherwise the custodian will ...you use the RFID cards. If the RFID card has been ...you, you must take care of it and it must not be ...ed, wet or damaged inorder to use the machines ...e fablab properly. If you lost the RFID card the ...ver's id will not be returned unless you replace, ...ave come to an arrangement with the custodian ...ost RFID card. The borrowers are also responsible ...se the machines in the fablab are damaged. ...ering or copying the RFID and trying to hack the ...machine will be fined and/or banned.

☐ Agree to Terms and Conditions

Start New Session

Custodian's Card Detected

 Are you sure you want to use this card?

Yes No

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.

Status

	Machine_RFID	MachineName	StudentLastName	StudentFirstName	StudentIDNumber	Time&Da
▶	Custodian Card	test	test	test	test	12/20/202
<div>< ></div>						

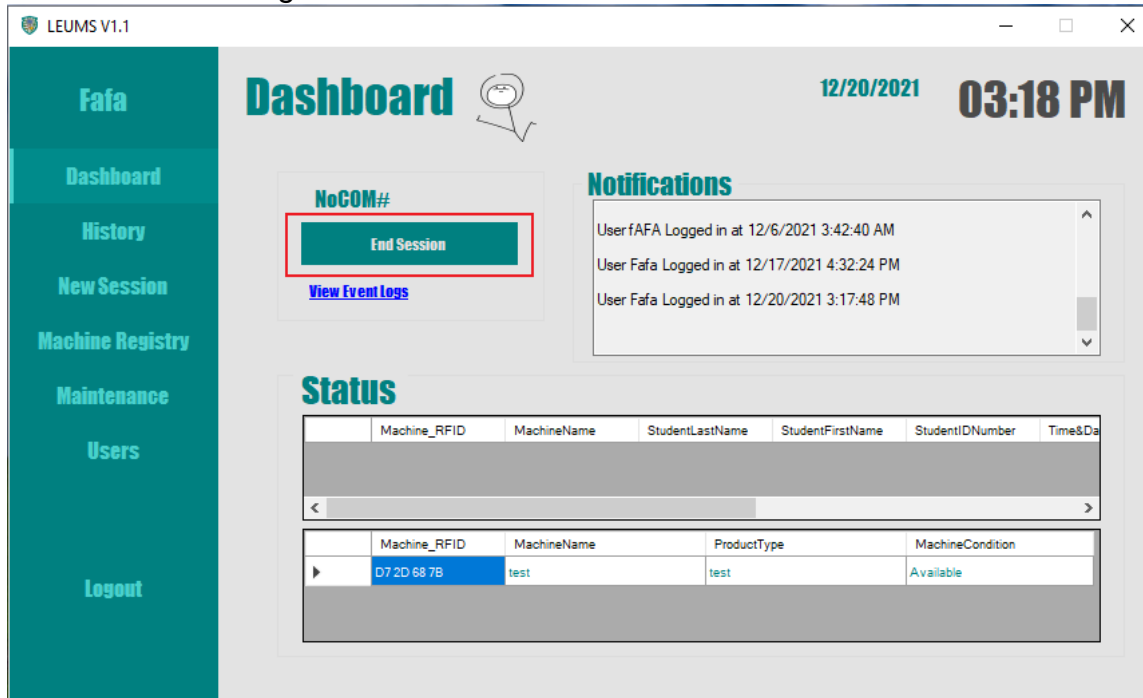
	Machine_RFID	MachineName	ProductType	MachineCondition
▶	D7 2D 68 7B	test	test	In Use

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

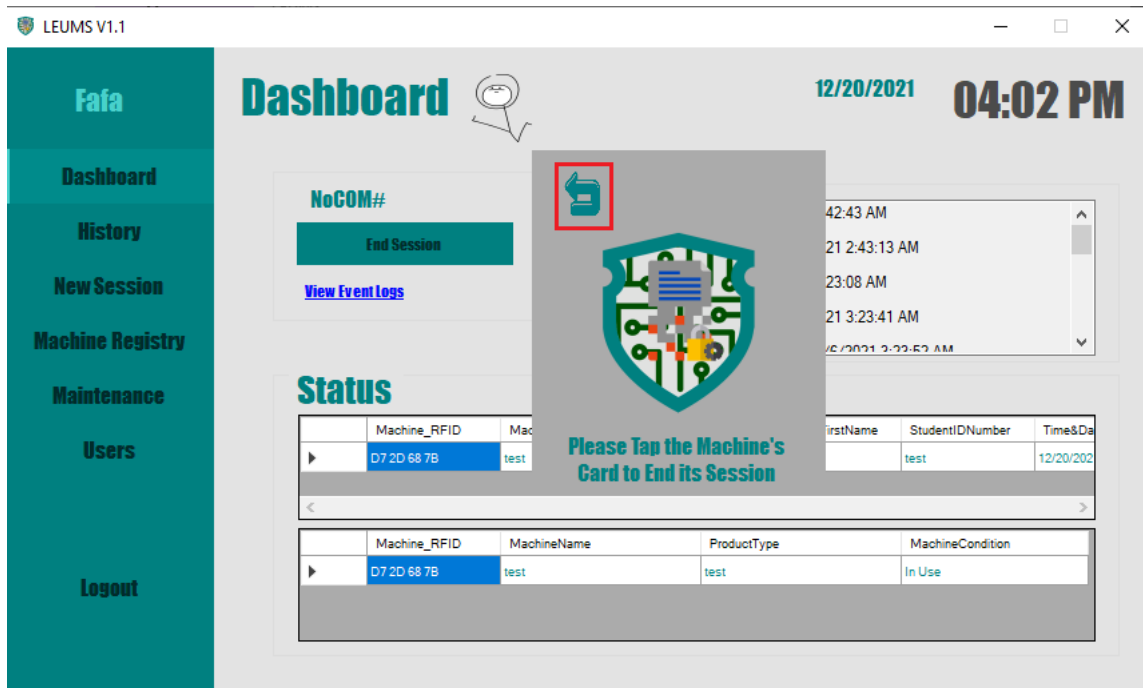
How to End a Session

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.

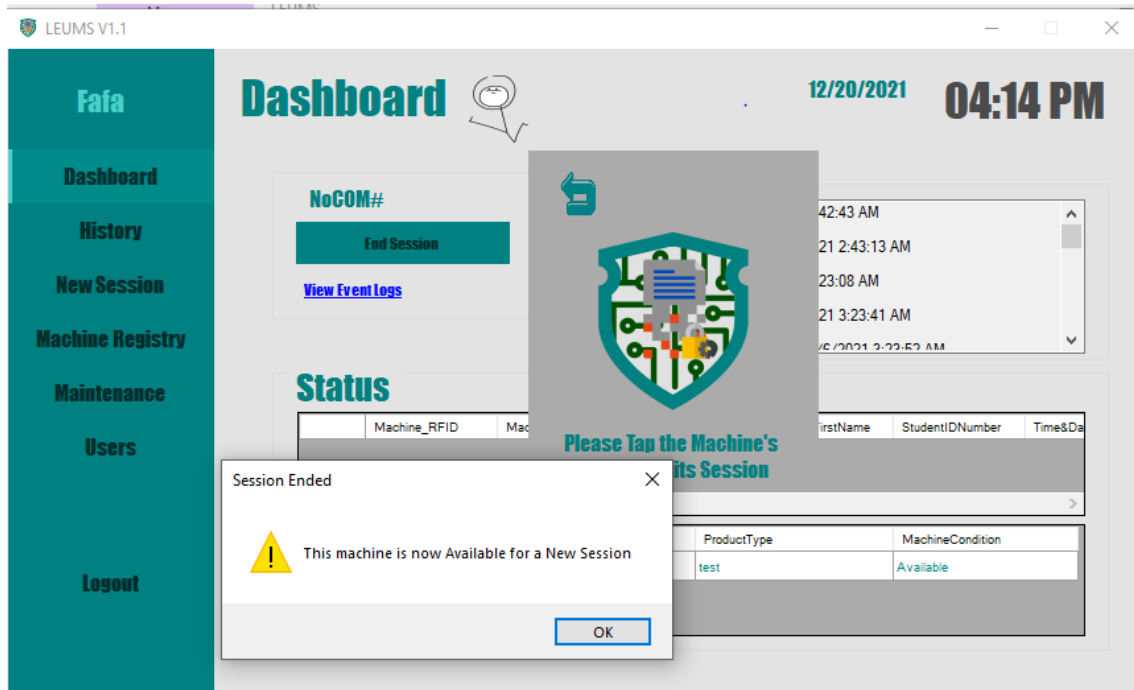


Clicking the “End Session” button which is located at the dashboard tab pops out the End Session Panel which requires the custodian to tap the returned Machine Card or Custodian Card to end the session. Can be canceled by clicking the back button.

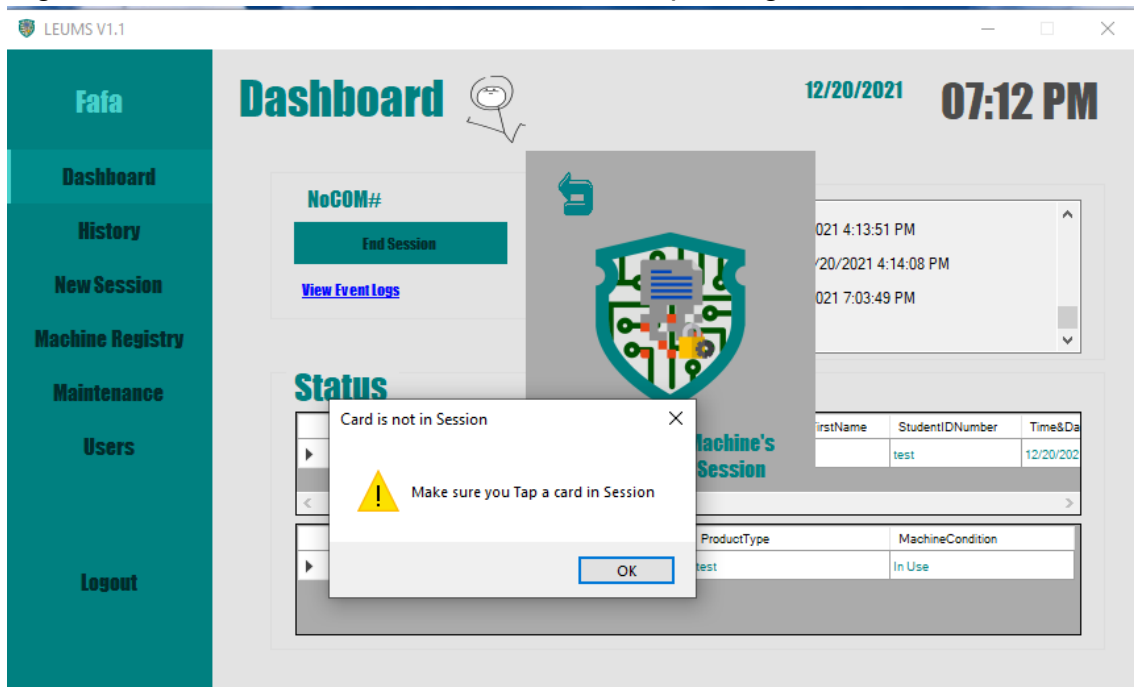


2 Ways to End a Session

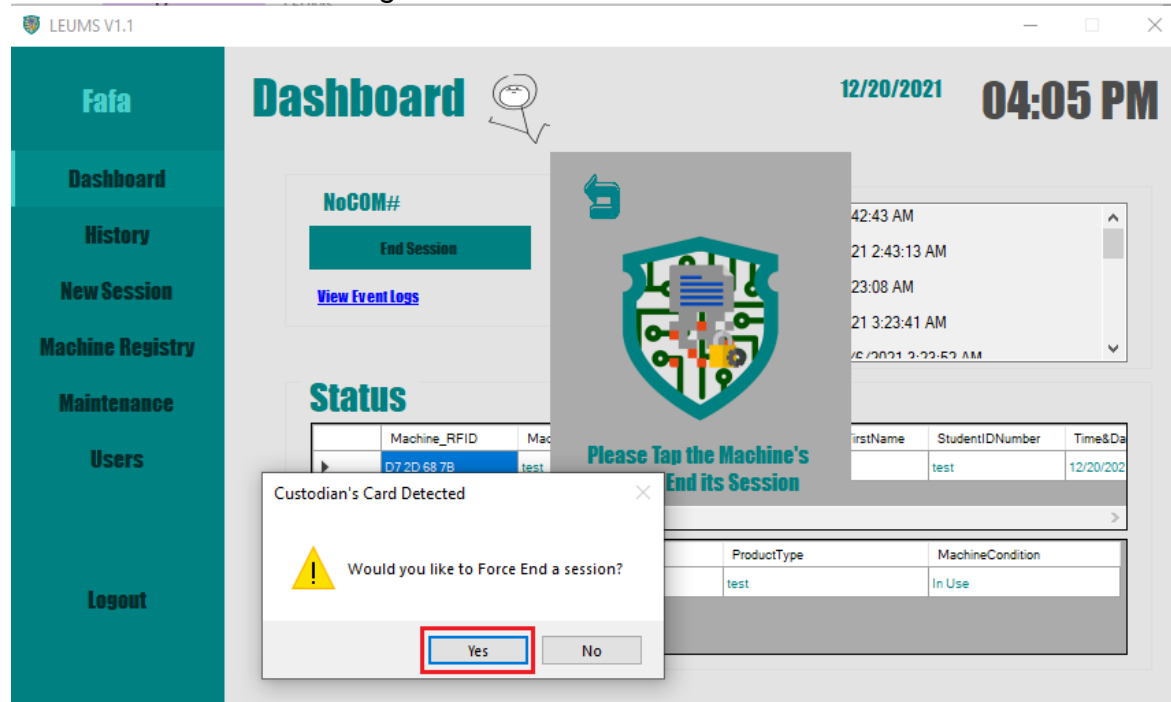
Using the Registered Machine Card - If the custodian taps the registered card, it will automatically end the session of the machine that is linked to the tapped card and updates the machine status to "Available".



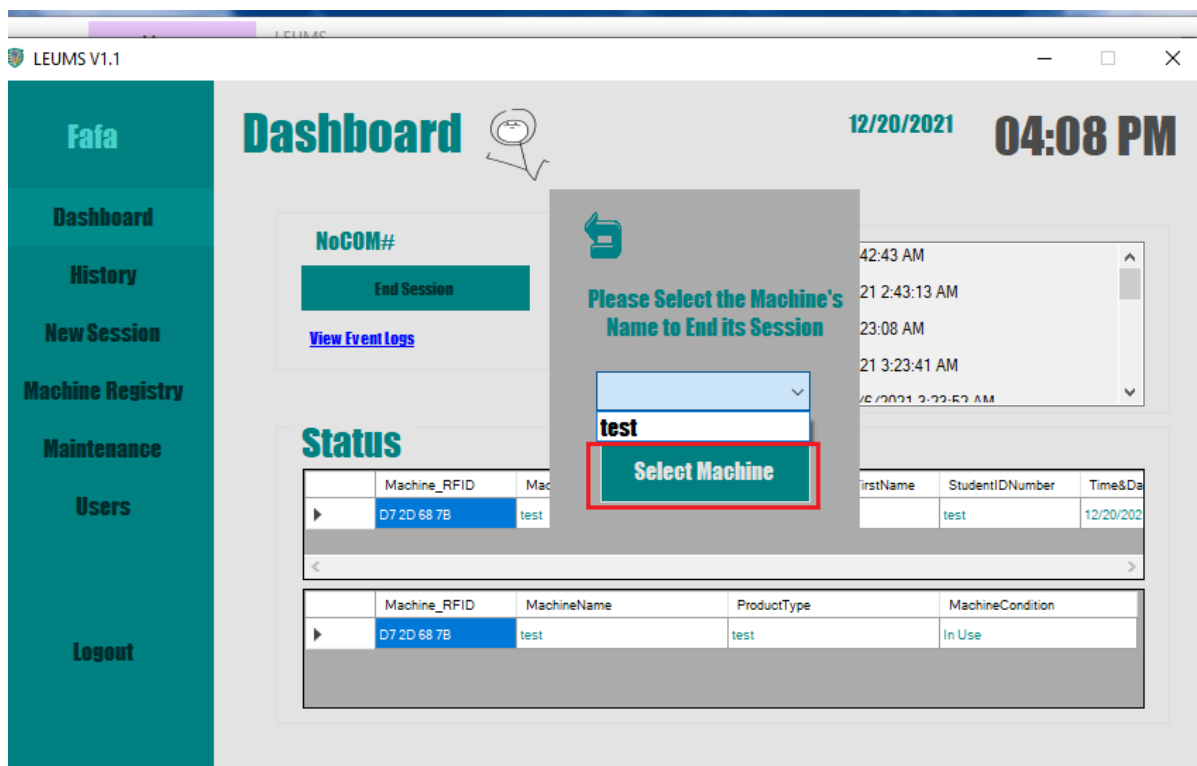
If the linked machine to the tapped card is not in session the GUI will prompt the user that the tapped card is not in session. This also shows up if the linked machine to the tapped card's session was granted using a custodian's card. Indicating that the registered card cannot override a custodian's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



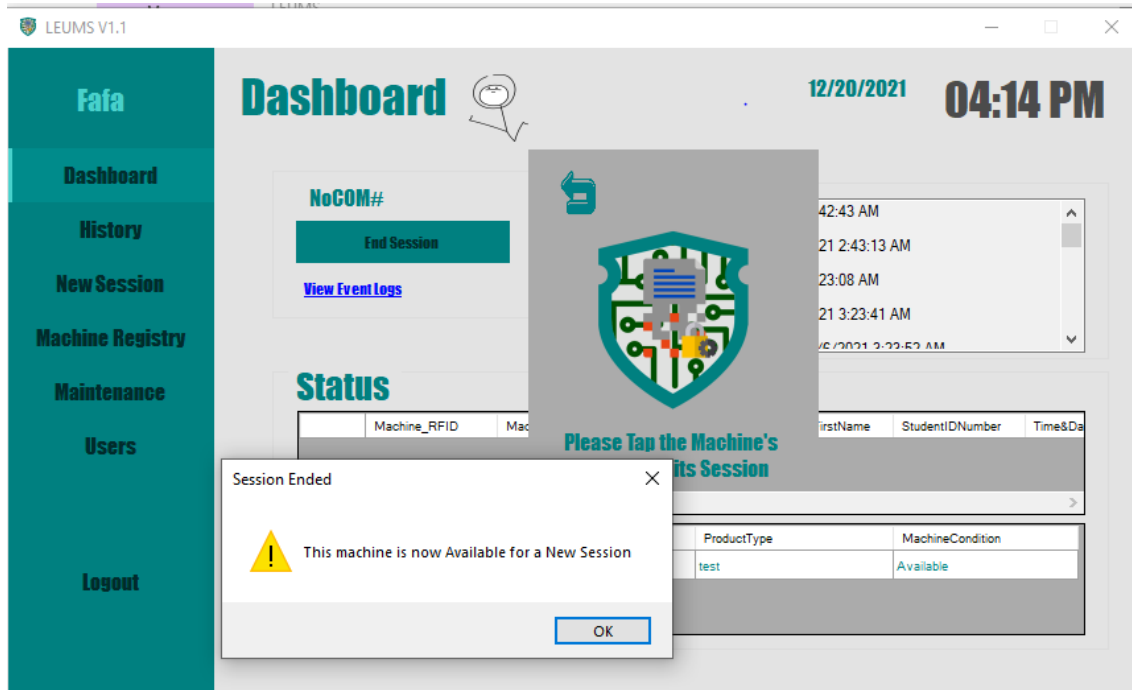
Using the Custodian's Card - If the custodian taps the custodian's card which can be used on all existing machines registered within the application. It will prompt a "Force End" and pops out the Force End Menu which can end any on-going session regardless how those sessions were granted.



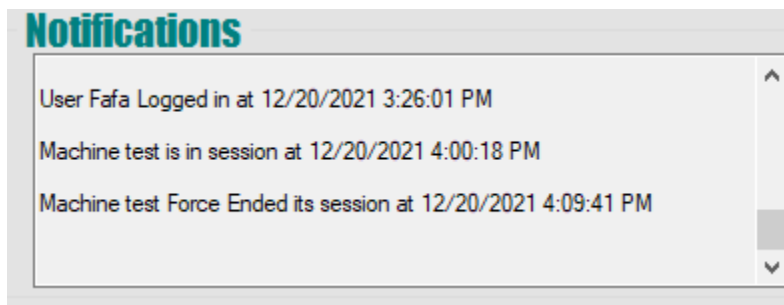
On the Force End Menu the user may select a currently active session and click "Select Machine" to force end the selected machine being used on the selected session.



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.

LEUMS V1.1

Machine Registry

Machine Name test

Product test (ex. 3D Printer)

Brand test

Model/Model No. test

Serial Number test

Date Acquired Monday, December 20, 2021

Initial Condition of Machine

test

Terms and Conditions

The custodian agrees that this machine that will be added in the registry is in optimal condition for student/borrower's use. The custodian also agrees to always be strict in checking if the RFID cards have been properly returned and make sure they are undamaged, if the RFID cards are damaged or lost the custodian will conduct an investigation immediately and provide an alternative for the RFID card. The custodian also agrees that only the custodian can input the Machine's information and make sure they are accurate and reliable information. The custodian agrees to make a report on a frequent basis for regular maintenance planning and updates of the machine.

☒ Agree to Terms and Conditions

☒ The Custodian ensures that this machine is in optimal condition for student use.

Register Machine

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.

LEUMS V1.1

Machine Registry

Machine Name test

Product test

Brand test

Model/Model No. test

Serial Number test

Date Acquired Mon

Initial Condition of Machine

test

Terms and Conditions

The custodian agrees that this machine that will be added in the registry is in optimal condition for student/borrower's use. The custodian also agrees to always be strict in checking if the RFID cards have been properly returned and make sure they are undamaged, if the RFID cards are damaged or lost the custodian will conduct an investigation immediately and provide an alternative for the RFID card. The custodian also agrees that only the custodian can input the Machine's information and make sure they are accurate and reliable information. The custodian agrees to make a report on a frequent basis for regular maintenance planning and updates of the machine.

☒ Agree to Terms and Conditions

☒ The Custodian ensures that this machine is in optimal condition for student use.

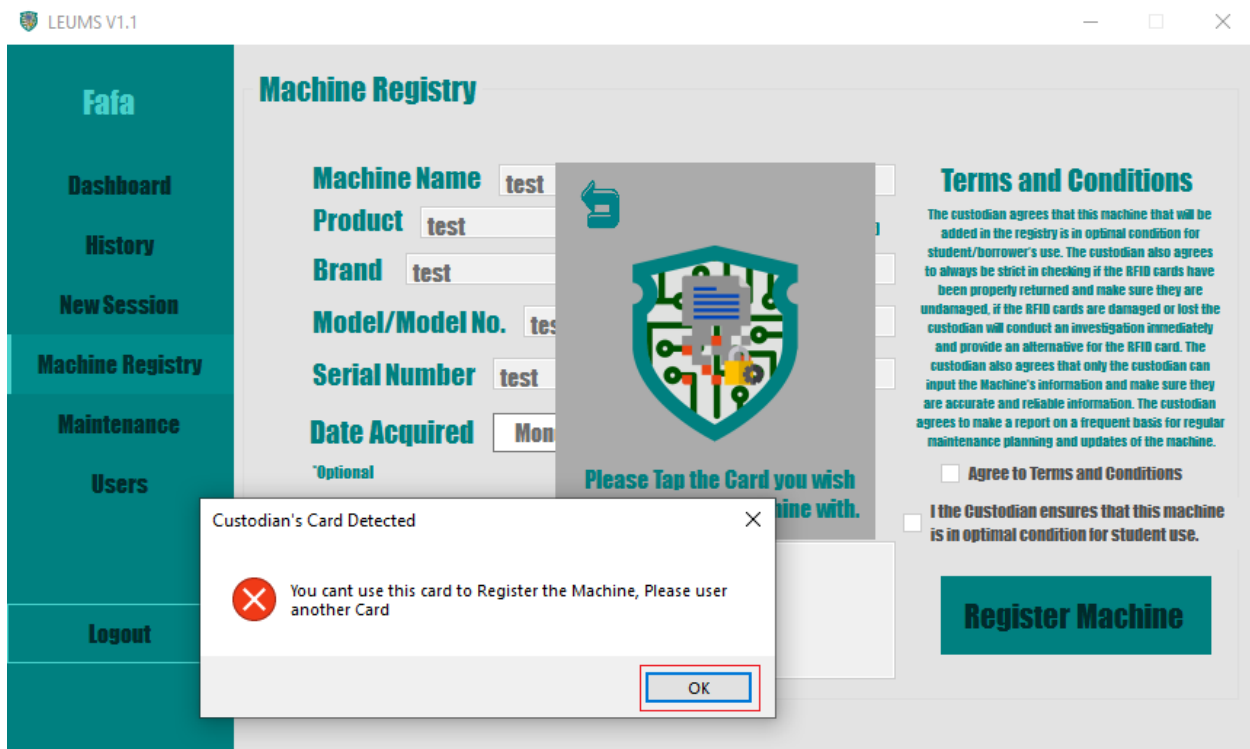
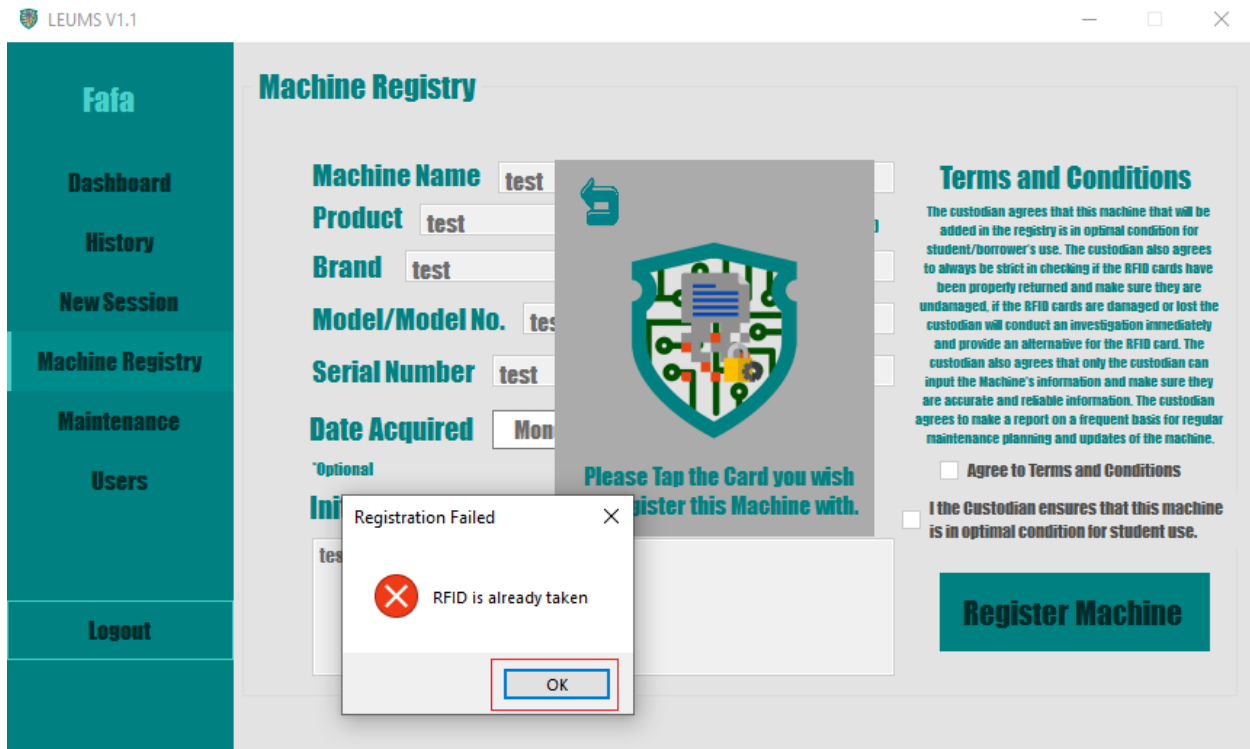
Register Machine

You used an Unregistered Card

Are you sure you want to use this card for this machine? Note (You can't use this card to register other Machines)

Yes **No**

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.

LEUMS V1.1

Machine Registry

Machine Name test2

Product test2

Brand test2

Model/Model No. test2

Serial Number test2

Date Acquired Mon

*Optional

Initial Condition of Machine test2

Please Tap the Card you wish to Register this Machine with.

Terms and Conditions

The custodian agrees that this machine that will be added in the registry is in optimal condition for student/borrower's use. The custodian also agrees to always be strict in checking if the RFID cards have been properly returned and make sure they are undamaged, if the RFID cards are damaged or lost the custodian will conduct an investigation immediately and provide an alternative for the RFID card. The custodian also agrees that only the custodian can input the Machine's information and make sure they are accurate and reliable information. The custodian agrees to make a report on a frequent basis for regular maintenance planning and updates of the machine.

☐ Agree to Terms and Conditions

☐ I the Custodian ensures that this machine is in optimal condition for student use.

Register Machine

Machine Registered

i This machine is now linked to this RFID card

OK

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

Status

	Machine_RFID	MachineName	StudentLastName	StudentFirstName	StudentIDNumber	Time&Date
< >						
	Machine_RFID	MachineName	ProductType	MachineCondition		
▶	D7 2D 68 7B	test2	test2	Available		

(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.

LEUMS V1.1

Maintenance Schedule

Date Time of Maintenance: 12 / 20 / 2021 12:00 AM

Machine to be Maintained: test

Frequency of Maintenance: Once

Set Maintenance

Remove Maintenance

[View Maintenance Logs](#)

MachineName	Date	Time	MaintenanceFrequency	ScheduledBy
-------------	------	------	----------------------	-------------

Maintenance Report

Machine Maintained: []

Machine Condition: Available

Submit Report

View Machines

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.

LEUMS V1.1

Maintenance Schedule

Date Time of Maintenance: 12 / 20 / 2021 12:00 AM

Machine to be Maintained: test

Frequency of Maintenance: Weekly

Set Maintenance

Remove Maintenance

[View Maintenance Logs](#)

MachineName	Date	Time	MaintenanceFrequency	ScheduledBy
-------------	------	------	----------------------	-------------

Maintenance Report

Machine Maintained: []

Machine Condition: Available

Submit Report

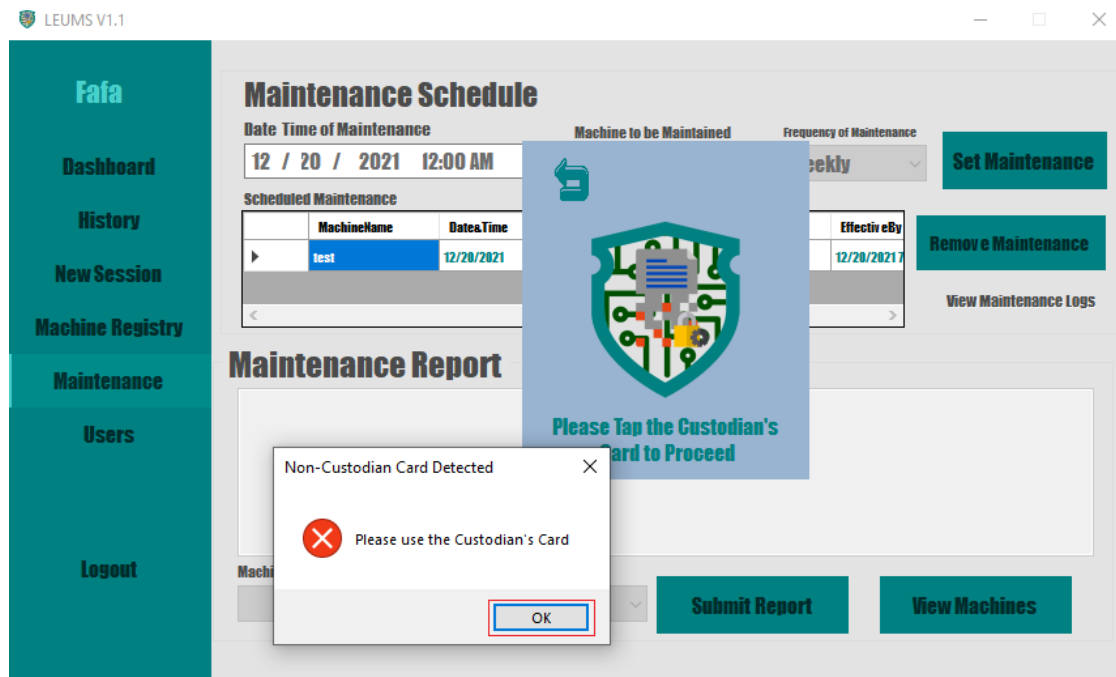
View Machines

Maintenance Schedule Set

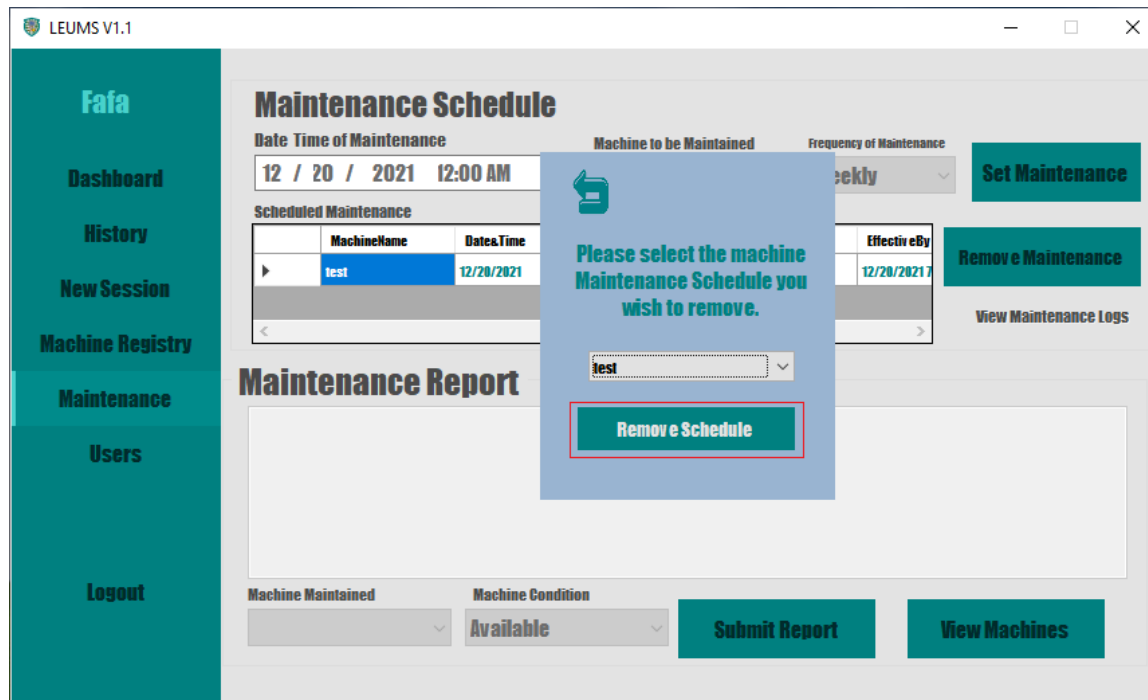
You have successfully Registered a Maintenance Schedule for this Machine 12/20/2021

OK

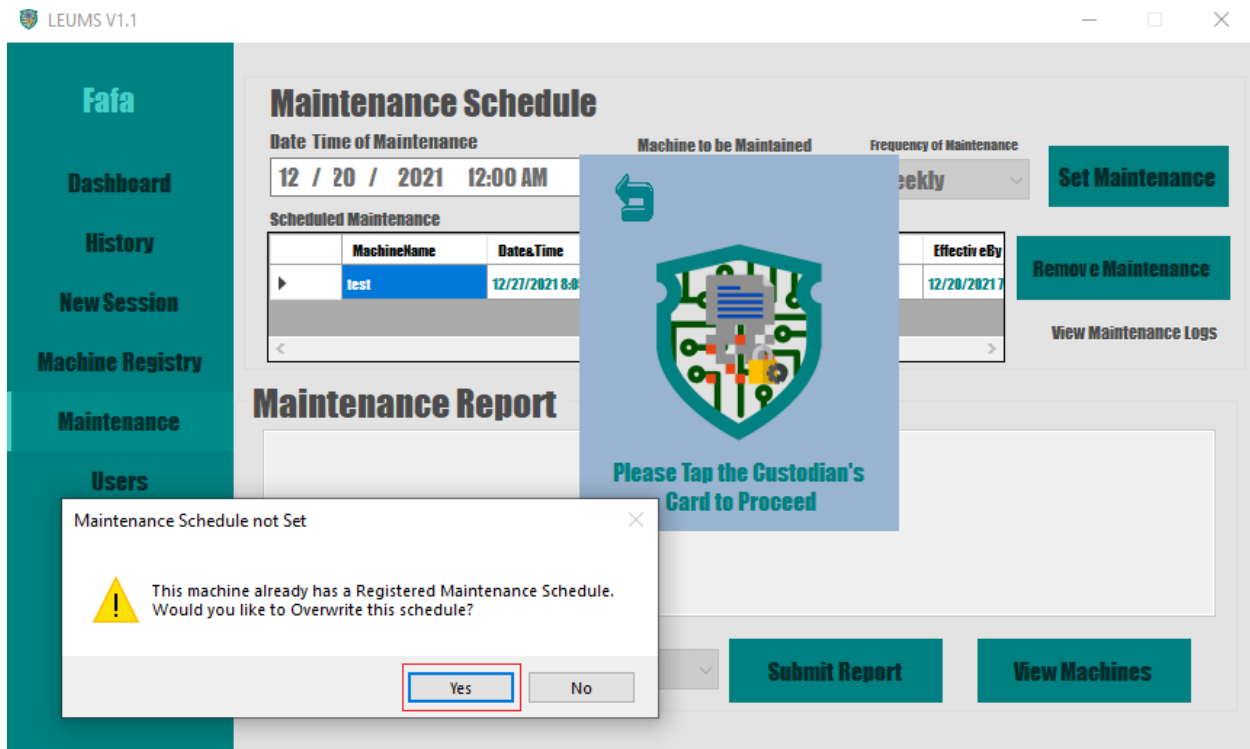
If the user taps a non-custodian's card for the Security Panel, It will deny any action that will require a custodian's card such as viewing of machines, view maintenance logs, setting or removing maintenance schedules and most save to PDF functions.



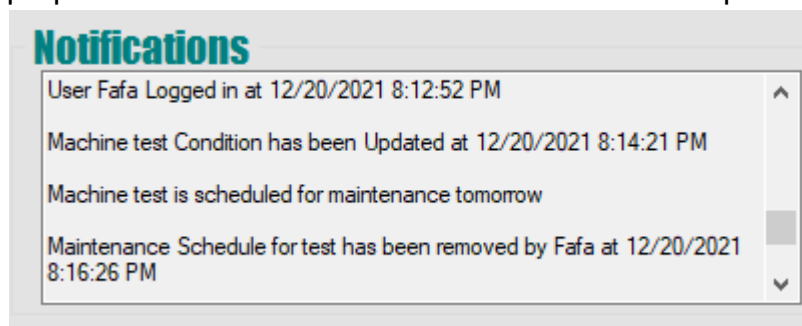
In case there is a need to remove a recurring maintenance schedule clicking the remove button and tapping the custodian's card will unlock the remove machine schedule options. Just choose which machine you would like to remove its maintenance schedule and click "Remove Schedule".



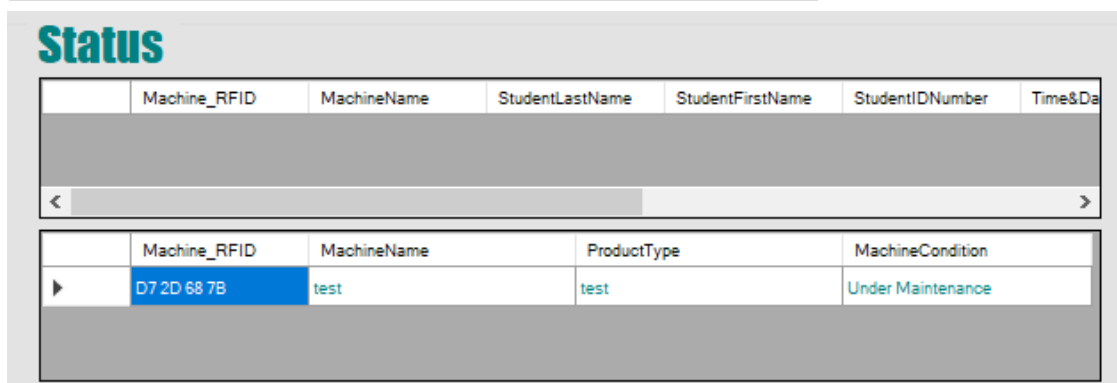
In case there's a need for overriding an already existing or a recurring maintenance schedule. By filling out the required fields and click "Set Maintenance" and tap the custodian's card. And this will replace the existing maintenance schedule.



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.

LEUMS V1.1

Fafa

Dashboard
History
New Session
Machine Registry
Maintenance
Users
Logout

Maintenance Schedule

Date Time of Maintenance: 12 / 20 / 2021 12:00 AM

Machine to be Maintained: test

Frequency of Maintenance: Weekly

Scheduled Maintenance

MachineName	Datea.Time
test	12/20/2021

EffectiveBy

EffectiveBy
12/20/2021

Buttons: Set Maintenance, Remove Maintenance, View Maintenance Logs

Maintenance Report

Buttons: Submit Report, View Machines

Remove Schedule

Please select the machine Maintenance Schedule you wish to remove.

test

Error Message: Maintenance Schedule cannot be removed

Cannot remove Schedule while the machine is Under Maintenance. Please submit the Maintenance Report before removing schedule.

Buttons: OK

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

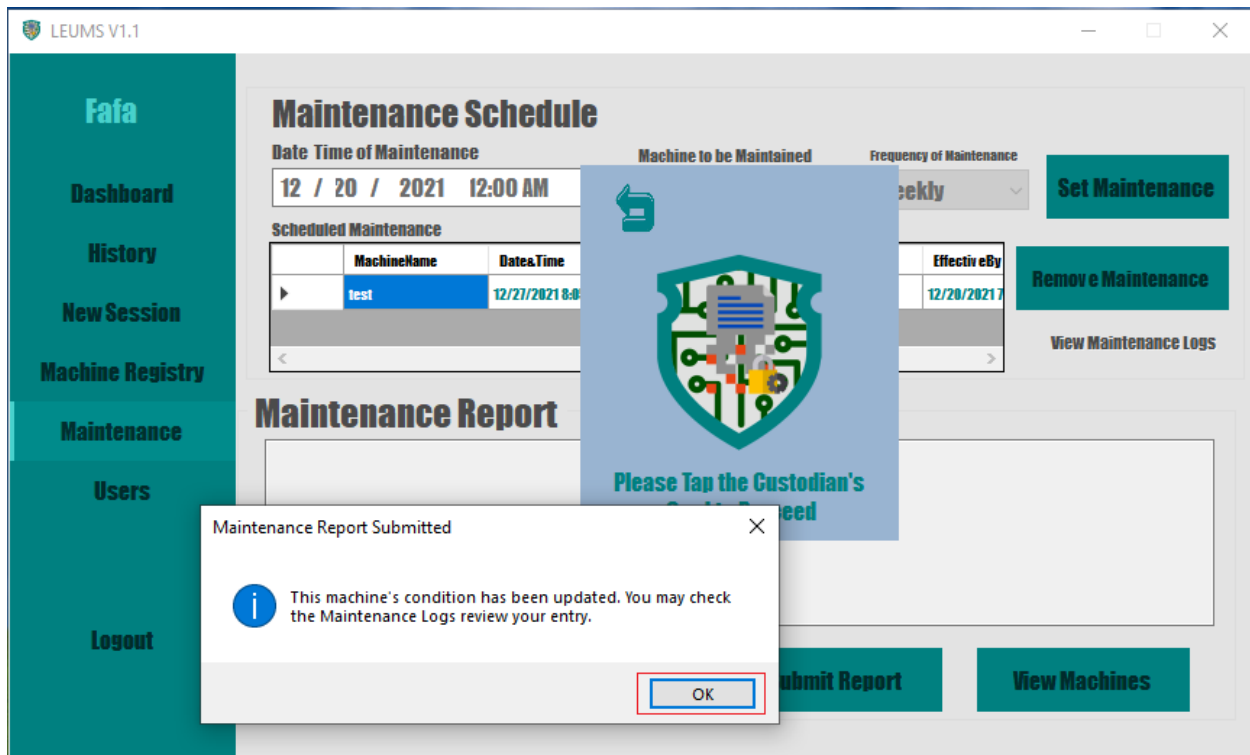
The screenshot shows the LEUMS V1.1 web application interface. On the left is a teal sidebar with navigation links: Fafa, Dashboard, History, New Session, Machine Registry, Maintenance (highlighted), Users, and Logout. The main content area is divided into two sections. The top section, titled 'Maintenance Schedule', contains input fields for 'Date Time of Maintenance' (12 / 20 / 2021 12:00 AM), 'Machine to be Maintained' (test), and 'Frequency of Maintenance' (Weekly). It includes buttons for 'Set Maintenance' and 'Remove Maintenance', and a link for 'View Maintenance Logs'. Below these is a table for 'Scheduled Maintenance' with columns: MachineName, Date, Time, Maintenance Frequency, Scheduled By, and Effective By. The table contains one entry for 'test' machine, scheduled for 12/20/2021 at 12:00 AM, with a weekly frequency, scheduled by 'Fafa', and effective by 12/20/2021. The bottom section, titled 'Maintenance Report', features a large empty text box for the report. Below the text box are dropdown menus for 'Machine Maintained' (test) and 'Machine Condition' (Available). The 'Machine Condition' dropdown is open, showing options: Available, Available, Out of Order, and Decommissioned. To the right of the dropdowns are buttons for 'Submit Report' and 'View Machines'.

MachineName	Date	Time	Maintenance Frequency	Scheduled By	Effective By
test	12/20/2021	12:00 AM	Weekly	Fafa	12/20/2021

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.

Scheduled Maintenance					
	MachineName	Dates.Time	MaintenanceFrequency	ScheduledBy	EffectiveBy
▶	test	12/27/2021 8:05 PM	Weekly	Fafa	12/20/2021 7
< >					

(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.)

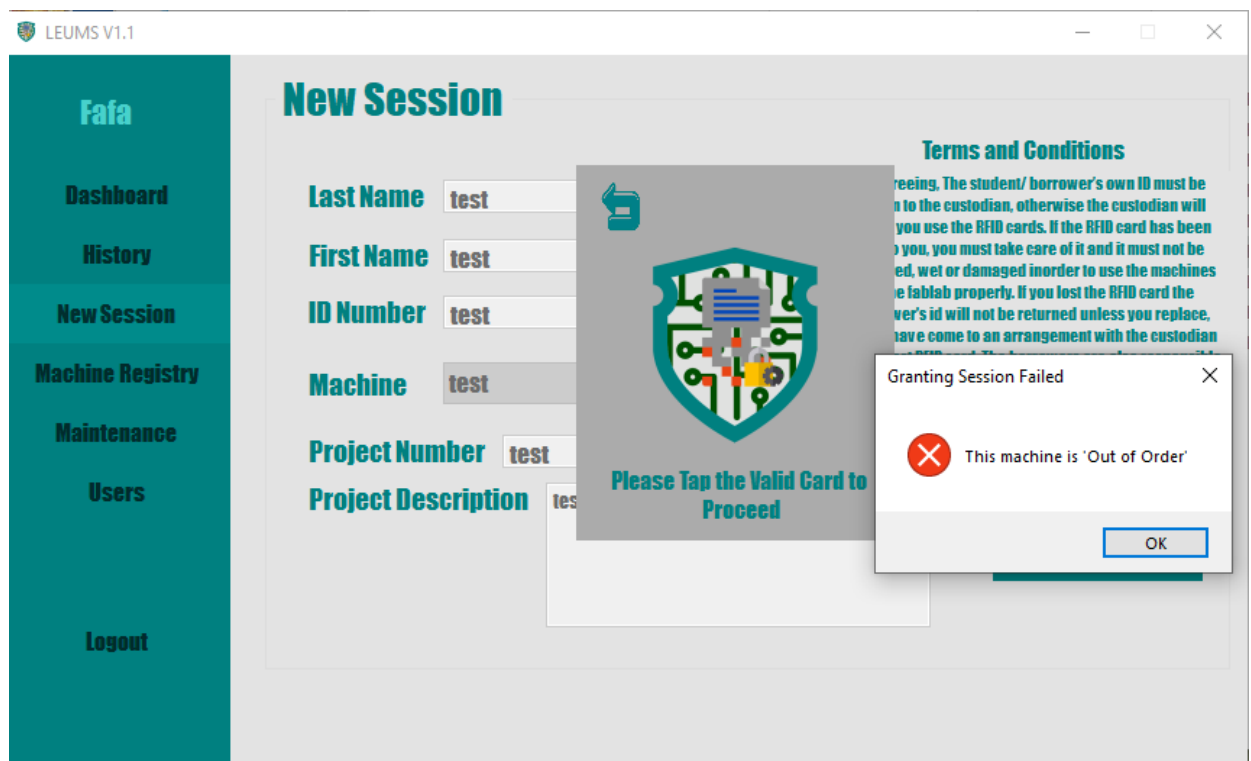
3 Machine Conditions

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

Status

	Machine_RFID	MachineName	StudentLastName	StudentFirstName	StudentIDNumber	Time&Date
</						

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

Status

	Machine_RFID	MachineName	StudentLastName	StudentFirstName	StudentIDNumber	Time&Da

	Machine_RFID	MachineName	ProductType	MachineCondition

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

LEUMS V1.1

Fafa

Dashboard

History

New Session

Machine Registry

Maintenance

Users

Logout

Maintenance Schedule

Date Time of Maintenance: 12 / 20 / 2021 12:00 AM

Machine to be Maintained:

Frequency of Maintenance: Weekly

Set Maintenance

Scheduled Maintenance

	MachineName	Datea.Time	Maintenancefrequenc	ScheduledBy	Effectiv eBy

Remove Maintenance

[View Maintenance Logs](#)

Maintenance Report

Machine Maintained:

Machine Condition: Available

Submit Report

View Machines

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.

Machine Registry

	Machine_RFID	MachineName	ProductType	Brand	Model/Model_Number	SerialNumber	DateAcquired	InitialCondition
▶	D7 2D 68 7B	test2	test2	test2	test2	test2	12/20/2021	test2

[Save PDF](#) [Decommissioned Machines](#)

Decommissioned Machines

	Machine_RFID	MachineName	ProductType	Brand	Model/Model_Number	SerialNumber	DateAcquired	InitialConditionofMachin
▶	D7 2D 68 7B	test	test	test	test	test	12/1/2021	test

[Save PDF](#) [Decommissioned Machines](#)

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:

MaintenanceLogs					
	Machine_Name	Maintained_By	Machine_Condition	Maintenance_Report	Time&DateSubmitted
▶	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 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:

LEUMS V1.1

History

From: 12/20/2021 To: 12/21/2021 Filter Search Save PDF

Machine_RFID	MachineName	StudentLastName	StudentFirstName	StudentIDNumber	Times
D7 2D 68 7B	test	Eclarino	Thomas	2166532	12/6/2
Custodian Card	test	Eclarino	Thomas	2166532	12/6/2

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.

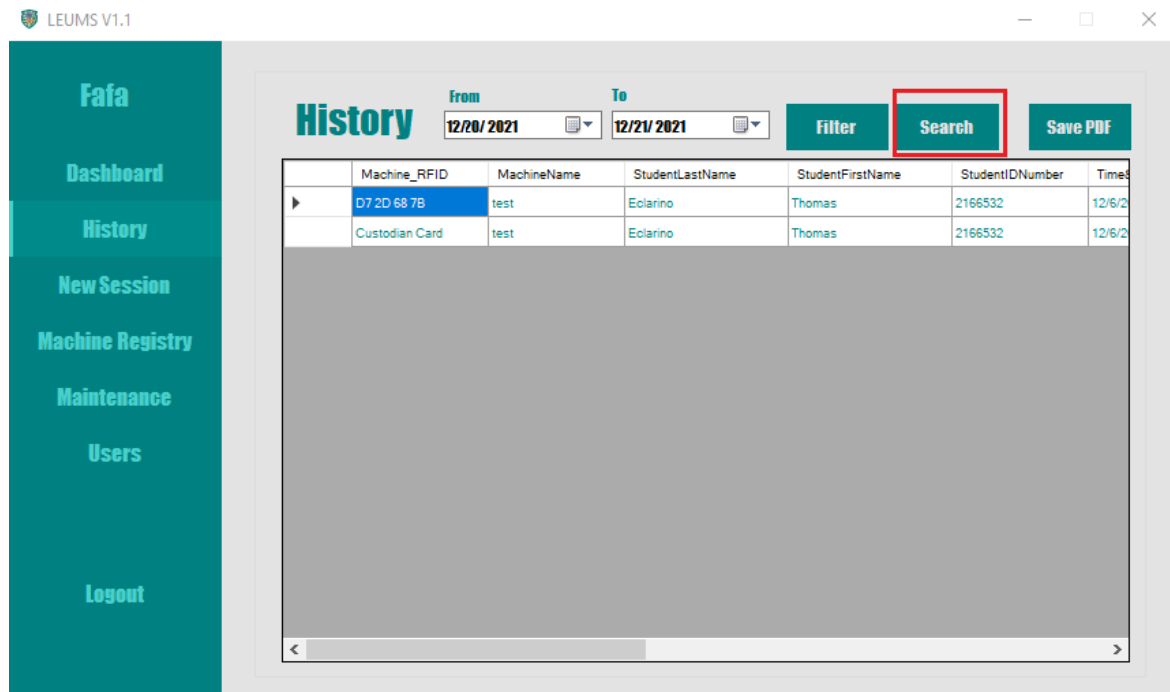
LEUMS V1.1

History

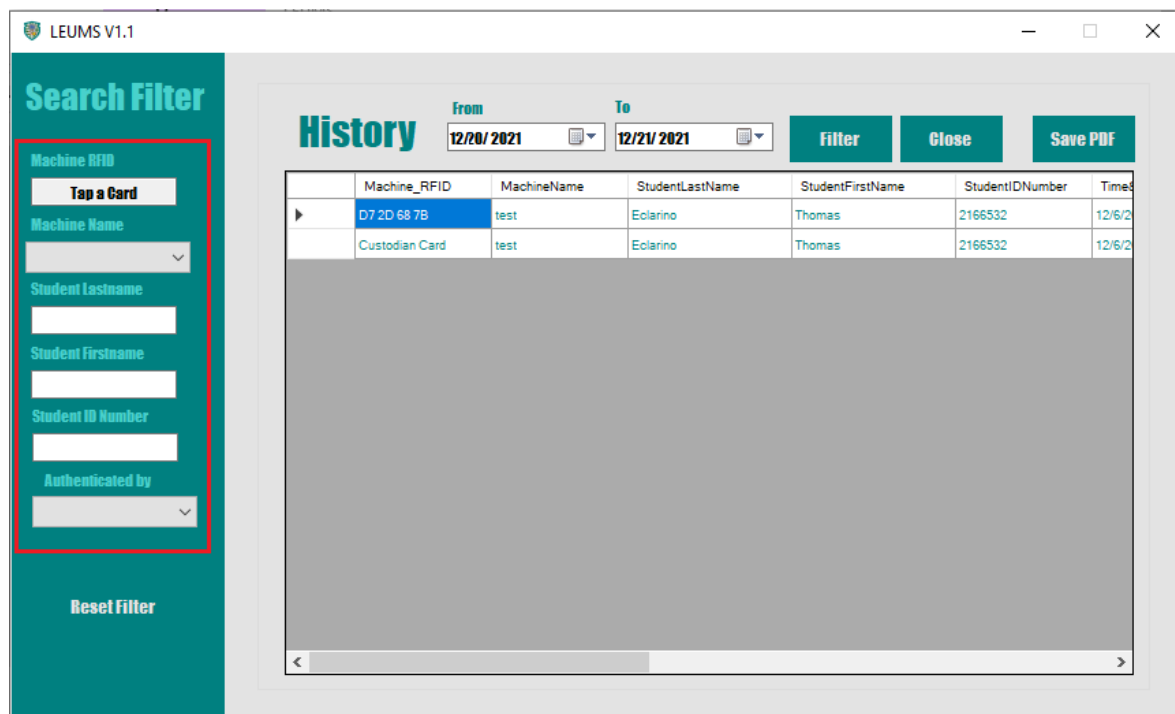
From: 12/20/2021 To: 12/21/2021 Filter Search Save PDF

Machine_RFID	MachineName	StudentLastName	StudentFirstName	StudentIDNumber	Times
D7 2D 68 7B	test	Eclarino	Thomas	2166532	12/6/2
Custodian Card	test	Eclarino	Thomas	2166532	12/6/2

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



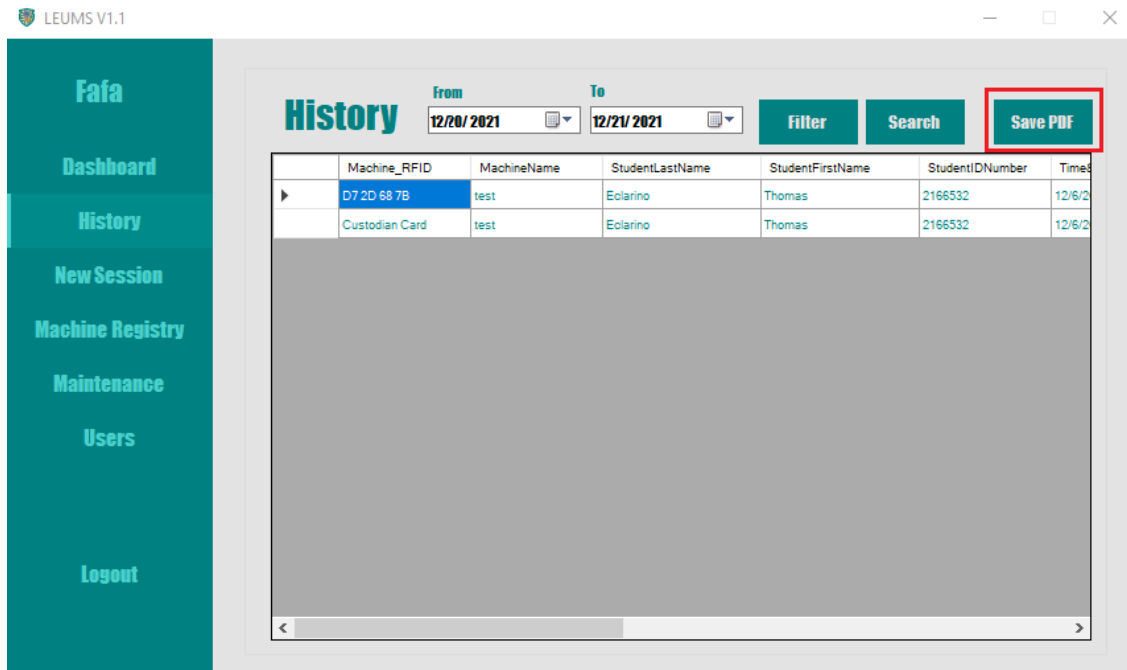
With this search filter panel the user can now filter the displayed data that satisfies all the search parameters for a more accurate result. Changing the search filter parameters will automatically search similarities in its database. But clicking the “filter button” will combine all the parameters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



How to Save Data Table to PDF

Save to PDF

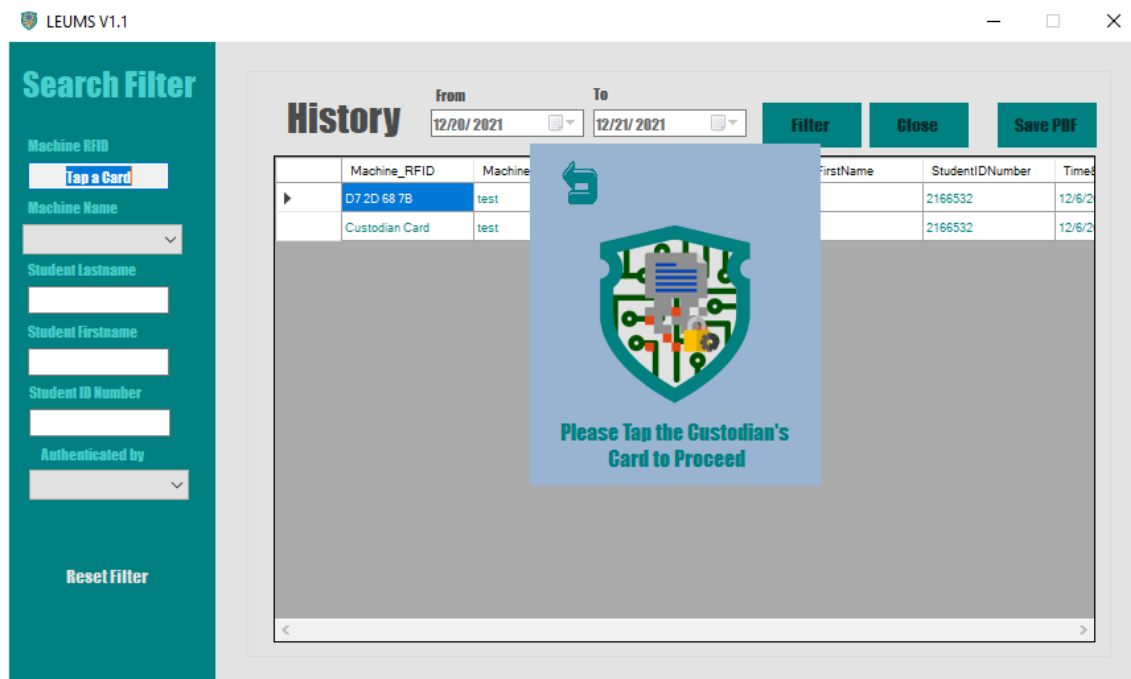
Click the Save PDF button. And whatever the displayed data on the data table will be saved in pdf form and is already format for easy printing at A4 size.



The screenshot shows the LEUMS V1.1 interface. On the left is a teal sidebar with navigation links: Fafa, Dashboard, History (selected), New Session, Machine Registry, Maintenance, Users, and Logout. The main content area is titled 'History' and features a table with columns: Machine_RFID, MachineName, StudentLastName, StudentFirstName, StudentIDNumber, and Time. The table contains two rows: one for 'D7:2D 68 7B' and another for 'Custodian Card', both with 'test' as the MachineName and 'Eclarino Thomas' as the student name. Above the table are date filters for 'From' (12/20/2021) and 'To' (12/21/2021), along with 'Filter', 'Search', and 'Save PDF' buttons. The 'Save PDF' button is highlighted with a red rectangle.

Machine_RFID	MachineName	StudentLastName	StudentFirstName	StudentIDNumber	Time
D7:2D 68 7B	test	Eclarino	Thomas	2166532	12/6/2
Custodian Card	test	Eclarino	Thomas	2166532	12/6/2

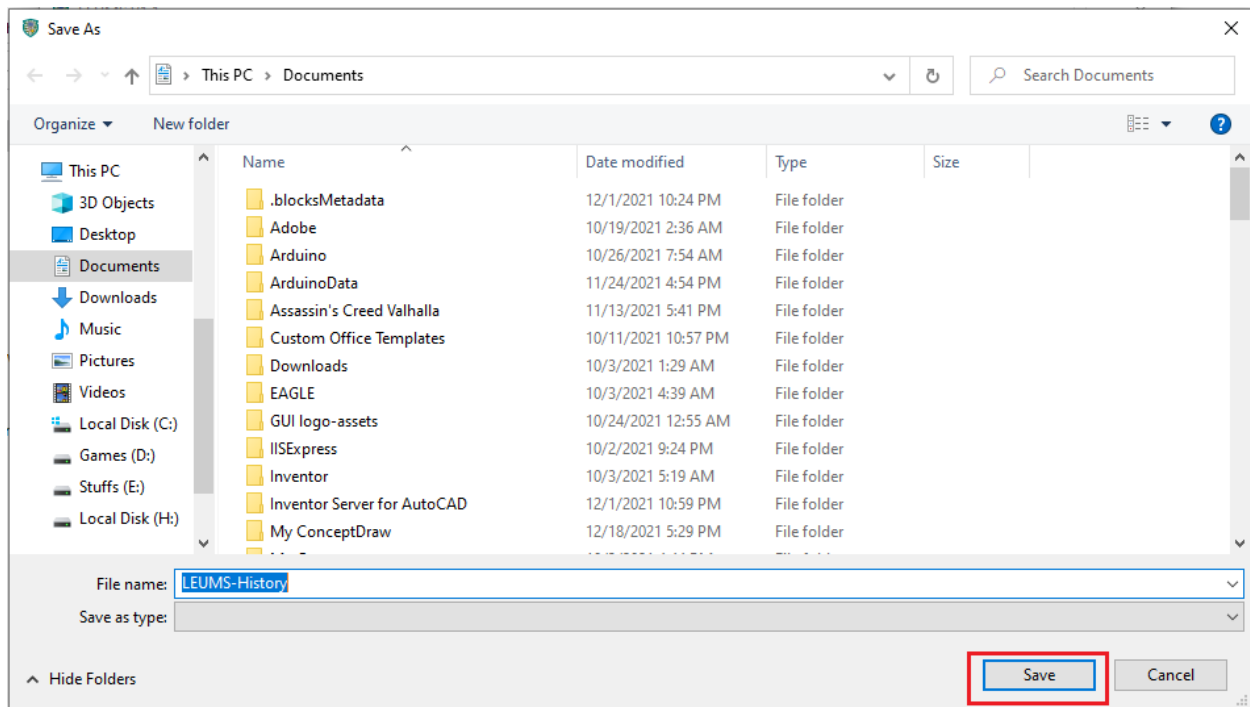
Tap the custodian's card to access the feature.



This screenshot shows the same LEUMS V1.1 interface, but with a modal overlay. The modal is a blue rectangle with a shield icon containing a circuit board and the text 'Please Tap the Custodian's Card to Proceed'. The background is dimmed, showing the 'History' table and the 'Search Filter' sidebar. The 'Search Filter' sidebar on the left includes fields for Machine RFID (with a 'Tap a Card' button), Machine Name, Student Lastname, Student Firstname, Student ID Number, and Authenticated by, along with a 'Reset Filter' button. The 'History' table and filters are visible behind the modal.

Machine_RFID	MachineName	StudentLastName	StudentFirstName	StudentIDNumber	Time
D7:2D 68 7B	test	Eclarino	Thomas	2166532	12/6/2
Custodian Card	test	Eclarino	Thomas	2166532	12/6/2

Click on Save. Automatically saved in PDF file.



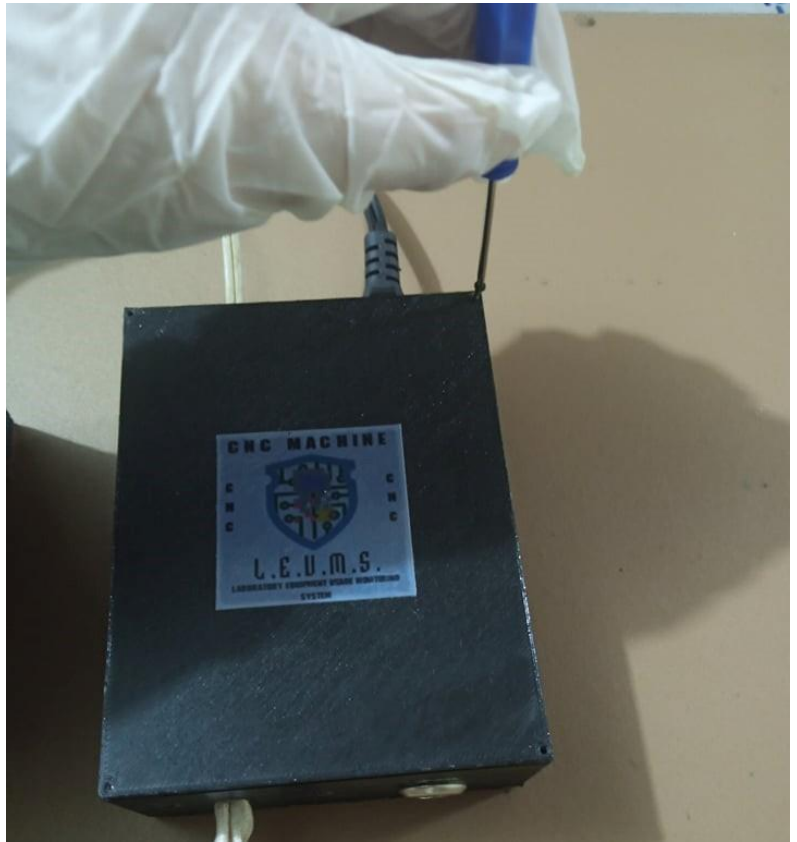
And will be saved as

Machine_RF ID	MachineName	StudentLast Name	StudentFirst Name	StudentIDNumber	Time&DateIn	Time&DateOut	AuthenticateBy	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

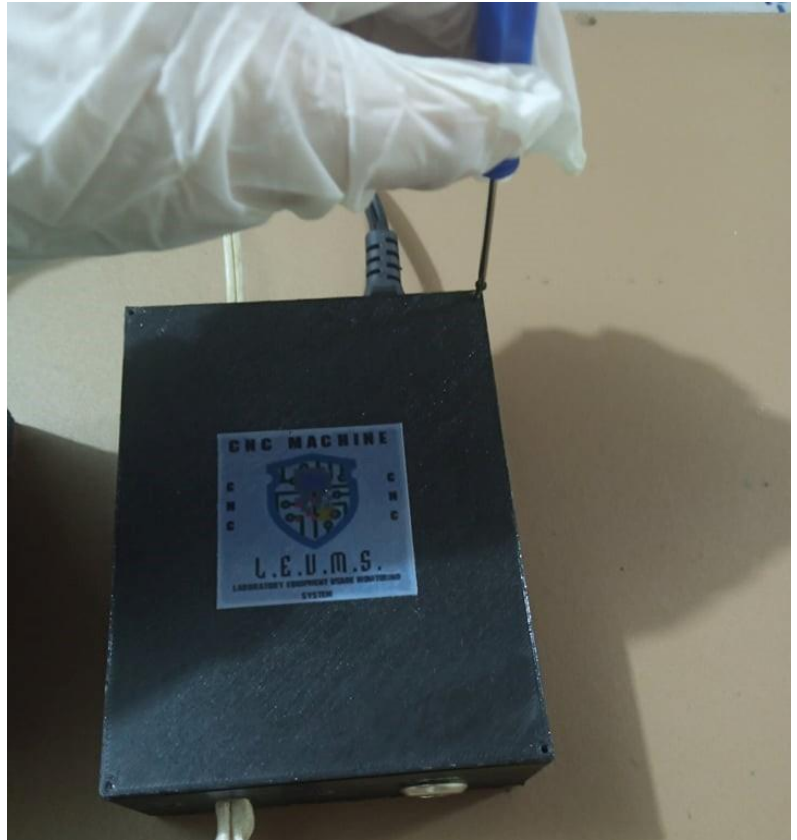
Setup

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.

