



User Guide

Cyclops Ride Assist: Cyclops Ride Assist: Real-Time Monitoring System

Team 9

Aaron Li (lia79)
Amos Cheung (cheuny2)
Amos Yu (yua25)
Brian Le (leb7)
Manny Lemos (lemosm1)

Table Of Contents

- 1. Revision History
- 2. Legal and Copyright Information and Disclaimer
- 3. Introduction
- 4. Hardware Installation
 - 4.1. Hardware Overview
 - 4.2. Main Housing Assembly
 - 4.3. Rear Housing Assembly
 - 4.4. Mounting and Dismounting the CRA
 - 4.4.1. Mounting the Main Housing of the CRA
 - 4.4.2. Mounting the Rear Housing of the CRA
- 5. Instructions on Using the CRA
 - 5.1. Pre-Trip Power On Sequence
 - 5.2. Post-Trip Power Off Sequence
 - 5.3. Logging Data from the CRA
 - 5.4. Interpreting a Capture Sequence Debug
 - 5.5. Retrieving the Video, LiDAR, and Accelerometer Data
- 6. Troubleshooting
- 7. Frequently Asked Questions

List of Tables

- Table 1.1: Revision History
- Table 4.1: All Hardware Components

List of Figures

- Figure 3.1: The Cyclops Ride Assist
- Figure 4.1: Hardware Components of the Cyclops Ride Assist
- Figure 4.2: The Main Housing of the Cyclops Ride Assist (CAD)
- Figure 4.3: The Internals of the Main Housing of the Cyclops Ride Assist
- Figure 4.4: The Rear Housing of the Cyclops Ride Assist (CAD)
- Figure 4.5: The Main Housing of the Cyclops Ride Assist
- Figure 4.6: The Rear Housing of the Cyclops Ride Assist
- Figure 4.7: The Clamp of the Cyclops Ride Assist
- Figure 5.1: The Cyclops Ride Assist on a Bicycle
- Figure 5.2: The On and Off Button of the Cyclops Ride Assist
- Figure 5.3: The Capture Button of the Cyclops Ride Assist
- Figure 5.4: The Special LEDs of the Cyclops Ride Assist
- Figure 5.5: The Sliding Door and USB Access of the Cyclops Ride Assist

1. Revision History

Table 1.1: Revision History

Date	Developer(s)	Change
------	--------------	--------

Date	Developer(s)	Change
April 5, 2023	Aaron Li, Manny Lemos	Document created

2. Legal and Copyright Information and Disclaimer

The Cyclops Ride Assist as well as its accompanying documentation is licensed under the Cyclops Team in the Department of Computing and Software (CAS) at McMaster University. All Hardware and Software is the intellectual property of CAS. CAS reserves the right to nullify any aspect or agreement in the Cyclops Ride Assist as well as in its accompanying documentation with no prior notice.

As the product has been deemed open-source, you may develop or re-create the Product for personal, non-commercial, or commercial use as you deem fit with the proper citations. The Team and CAS will not be held liable in the event of any possible hazards or consequences created from the Product that may or may not be limited to physical, mental, health damages, technical issues, or factors out of the Team's control.

By using this product, you accept and agree to be bound by the Terms and Conditions.

Copyright © 2023 Cyclops, Department of Computing and Software (CAS), McMaster University.

3. Introduction

This document is the User Guide for the Cyclops Ride Assist (CRA). It will cover all required installations, assemblies, mounting and dismounting, and proper usage. Furthermore, some common troubleshooting techniques will be introduced as well as some frequently asked questions. The CRA is an all-in-one, easily mountable, and quick to setup system that adds modern car safety features onto a bicycle or motorcycle. These features include rear vehicle detection, crash detection, and automatic video and data capture with upload. This ensures that the Cyclops Ride Assist can be immediately used out of package. The User Guide will thus outline the best practices on mounting the CRA to their own personal bicycle.



Figure 3.1: The Cyclops Ride Assist

4. Hardware Installation

4.1. Hardware Overview

As the Cyclops Ride Assist is a complete product consisting of both hardware and software, it is imperative to correctly install both to ensure proper use. This section will outline the proper technique required to do so. Both the main and rear housing assembly will be pre-assembled prior to delivery to a user.

Pictured below in Figure 3.1 are the components of the Cyclops Ride Assist. Cables are provided. Batteries are not included.

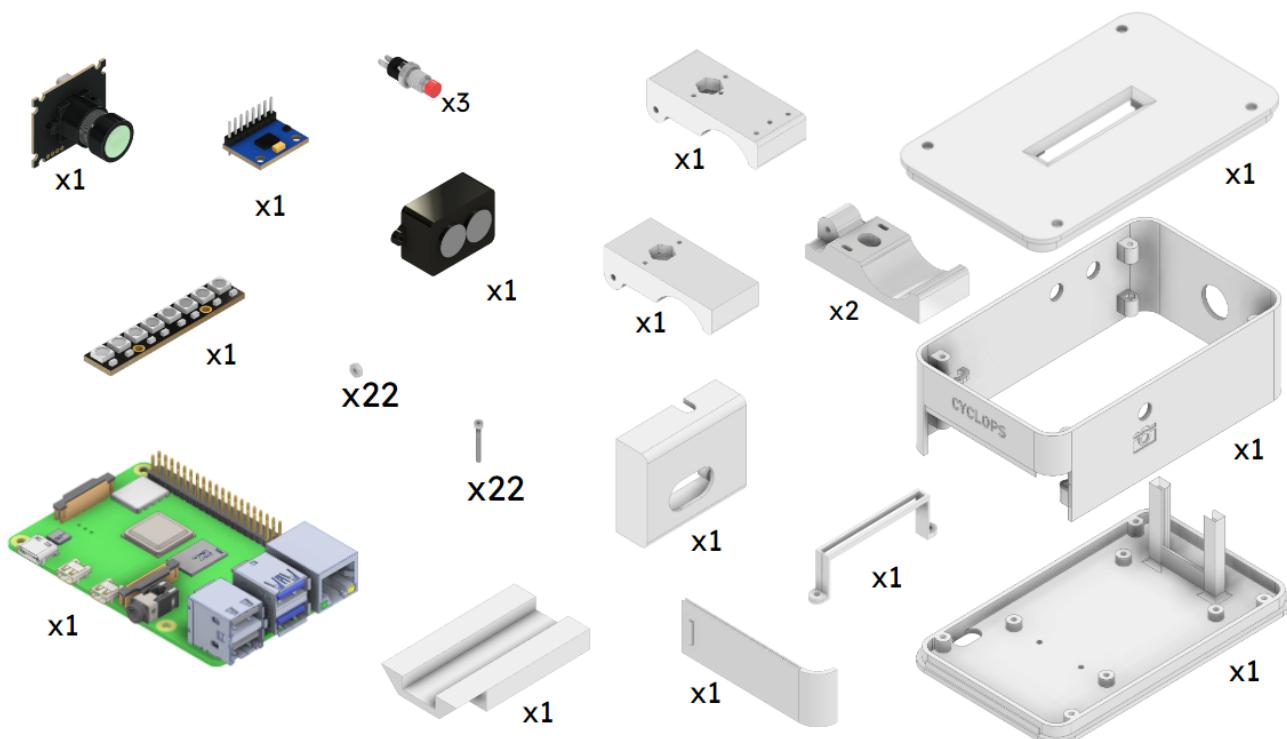


Figure 4.1: All hardware components of the Cyclops Ride Assist.

Hardware Component Name	Assembly Location	Number of Pieces
Raspberry Pi Model B	Main Housing	1
1080p USB Camera	Main Housing	1
Accelerometer ADXL-345	Main Housing	1
Adafruit Neopixel LED Striplight	Main Housing	1
On, Off, Capture Push Button	Main Housing	3
Main Housing (Top)	Main Housing	1
Main Housing (Middle)	Main Housing	1
Main Housing (Bottom)	Main Housing	1
Clamp for Main Housing (Top)	Main Housing	1

Hardware Component Name	Assembly Location	Number of Pieces
Clamp for Main Housing (Bottom)	Main Housing	2
Sliding Door	Main Housing	1
Camera Slot	Main Housing	1
LED Housing Slot	Main Housing	1
TF-Luna LiDAR Sensor	Rear Housing	1
Rear Housing	Main Housing	1
Clamp for Rear Housing (Top)	Rear Housing	1
M2 x 20mm Nuts	Main and Rear Housing	22
M2 Bolts	Main and Rear Housing	22

Table 4.1: All Hardware Components of the Cyclops Ride Assist

4.2. Main Housing Assembly

The Main Housing Assembly will come pre-assembled to the users. All external components can be purchased through approved third party vendors and the 3D printed components will be sourced locally.

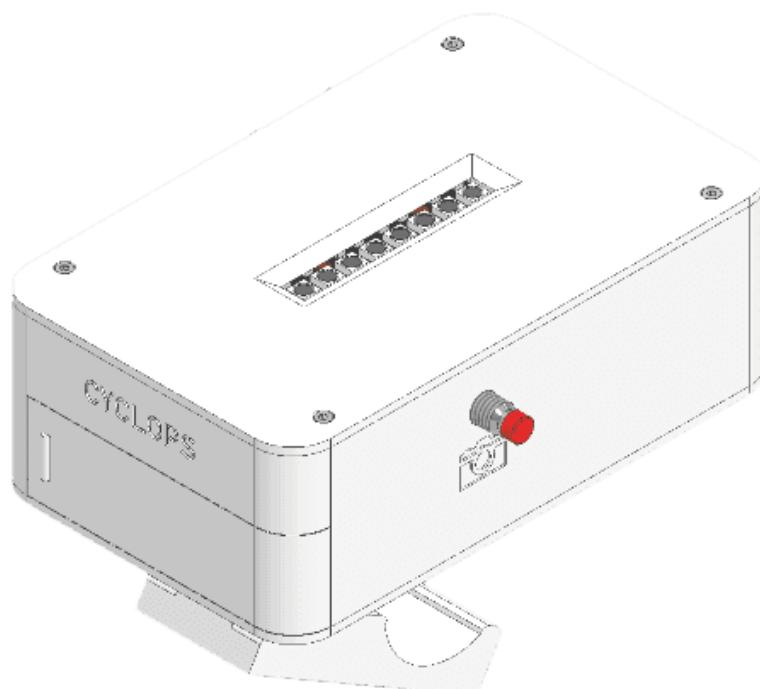


Figure 4.2: The Main Housing of the Cyclops Ride Assist.

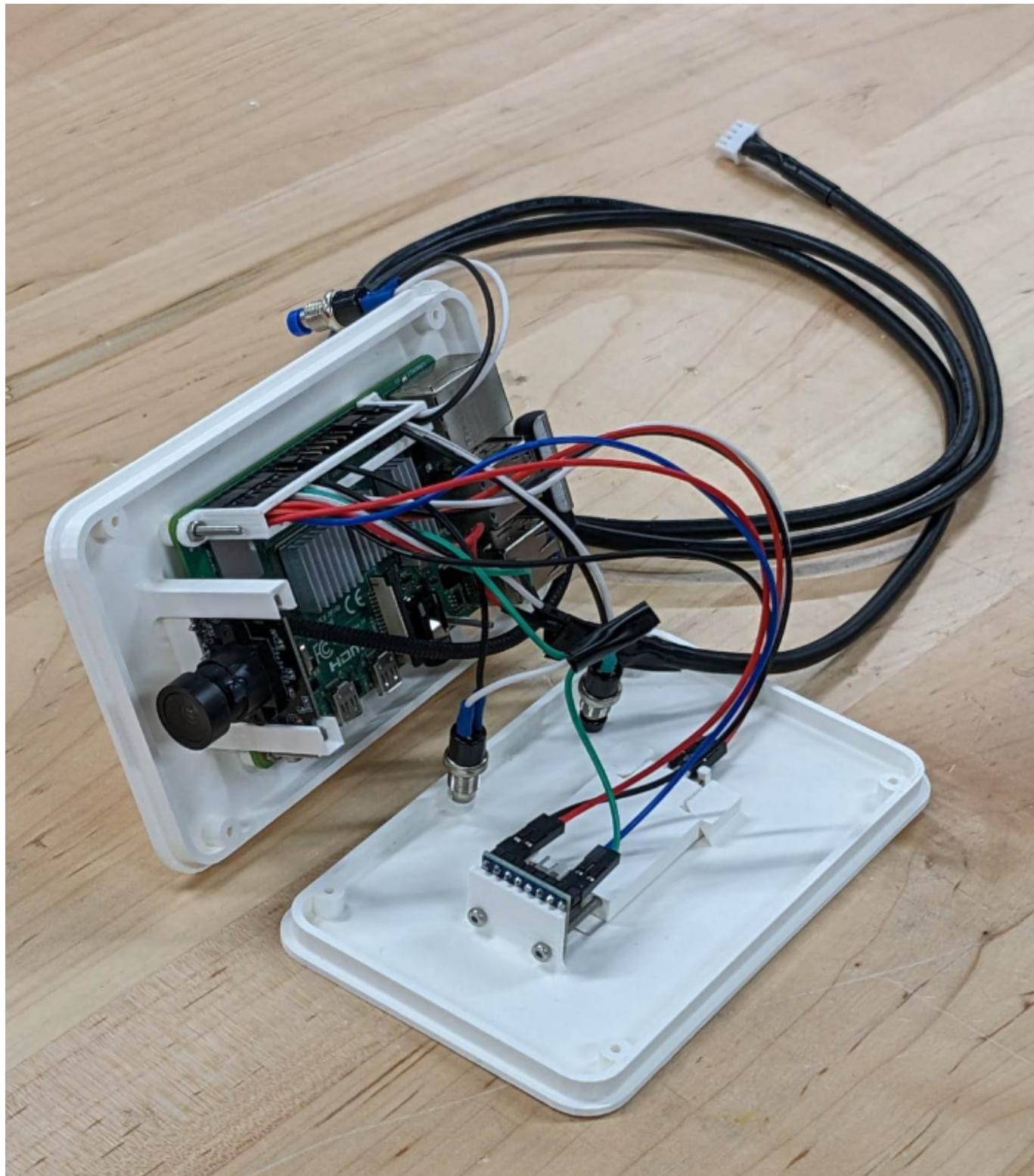


Figure 4.3: The Internals of the Main Housing of the Cyclops Ride Assist.

4.3. Rear Housing Assembly

The Rear Housing Assembly will come pre-assembled to the users. All external components can be purchased through approved third party vendors and the 3D printed components will be sourced locally.

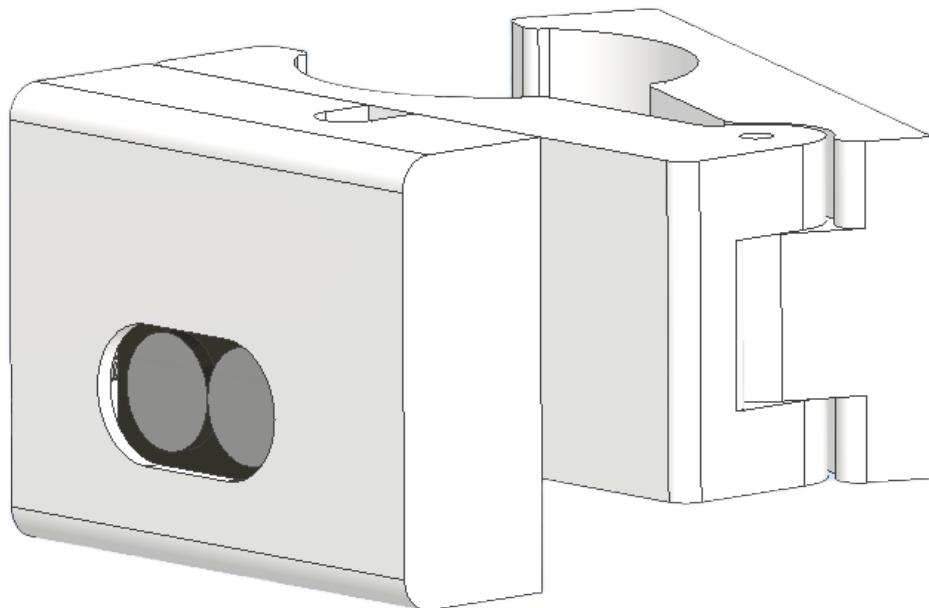


Figure 4.4: The Rear Housing of the Cyclops Ride Assist (CAD).

4.4. Mounting and Dismounting the CRA

4.4.1. Mounting the Main Housing of the CRA

Step Number	Instruction
1	Securely mount the CRA to your bicycle.
2	Place the housing clamp onto the handlebars of your bicycle. Tighten the clamp by spinning the tightener clockwise.
3	Ensure the camera is facing forward.
4	Ensure the LED strip is visible while seated in your riding position.
5	Ensure all cables are securely strapped to the bicycle such that no cable is overhanging.



Figure 4.5: The Main Housing of the Cyclops Ride Assist.

4.4.2. Mounting the Rear Housing of the CRA

Step Number	Instruction
1	Complete Section 4.4.1 .
2	Place the rear clamp onto the seat bar of your bicycle. Tighten the clamp by spinning the tightener clockwise.
2	Ensure the LiDAR sensor is facing away from the bicycle and is level.
3	Ensure all cables are securely strapped to the bicycle such that no cable is overhanging.



Figure 4.6: The Main Housing of the Cyclops Ride Assist (CAD).



Figure 4.7: The Clamp of the Cyclops Ride Assist (CAD).

5. Instructions on Using the CRA

Below are the instruction on how to use the CRA once fully assembled on a bicycle. Please ensure that the previous sections have already been completed.



Figure 5.1: The Cyclops Ride Assist Mounted Properly on a Bicycle.

5.1. Pre-Trip Power On Sequence

In order to setup the CRA prior to a trip, please do the following:

Step Number	Instruction
1	Securely mount the CRA to your bicycle using Section 4.4 above.
2	Locate a portable battery capable of consistently outputting 5V.
2a	Ensure the battery is charged beyond 60%.
3	Securely fasten the battery into the battery carrying pouch.
4	Connect the USB power cable to the battery.
5	Power on the battery.
6	Press the WHITE button labeled '1' located on the left side of the main housing.
7	Wait for the GREEN welcome sequence on the LEDs.
8	Begin your trip.

5.2. Post-Trip Power Off Sequence

In order to turn off the CRA after a trip, please do the following:

Step Number	Instruction
1	Press the black Power Off button labeled '0' located on the left side of the main housing and as seen in Figure 5.2 below.
2	Wait for the RED goodbye sequence on the LEDs.
3	Power off your portable battery.
4	Remove the CRA from your bicycle.



Figure 5.2: The On and Off Button.

5.3. Logging Data from the CRA

In the event of a system recognized collision, data logging will occur automatically 10 seconds after the crash without any user intervention.

Logging can also occur when the user presses the BLUE capture button on the side of the main housing.

Step Number	Instruction
1	Ensure the Pre-Trip Power On Sequence has been followed completely.
2	Press the BLUE capture button labelled with a camera icon located on the right side of the main housing.



Figure 5.3: The Capture Button.

5.4. Interpreting a Capture Sequence Debug

Following a system detected collision or capture button press, the CRA will do the following actions automatically:

Action	Instruction
1	Following a system detected crash or capture button press, the CRA will log 60 seconds of accelerometer, camera, and LiDAR data.
2	Following the logging, the user is notified separately of the success or failure of each of these 3 logging events.
3	Wait between 0 to 10 seconds after a system detected crash or capture button press for all footage and data to log.
4	Note the blinking color of the 3 LEDs closest to the user. Blue would indicate a SUCCESS and red would indicate a FAILURE. Please refer to Section 6: Troubleshooting for further help.
4a	The LEDs correspond to: Accelerometer (closest LED to user) Camera (2nd closest LED to user) LiDAR (3rd closest LED to user)



Figure 5.4: The Special LED Buttons.

5.5. Retrieving the Video, LiDAR, and Accelerometer Data

In order to view the video footage, LiDAR files, or accelerometer data files, a personal computer must be used. The following steps will outline how to do so.

Step	Instruction
------	-------------

Step	Instruction
1	Open the sliding door on the rear of the main housing to expose the USB stick.
2	Pull the USB stick out of the USB port.
3	Plug the USB stick into your device (personal computer, laptop, etc.)
4	Copy any videos or files you would like to save onto your device. All files are located inside "Capture" folders.
5	(OPTIONAL) Reformat the USB stick as FAT32 to wipe all data.

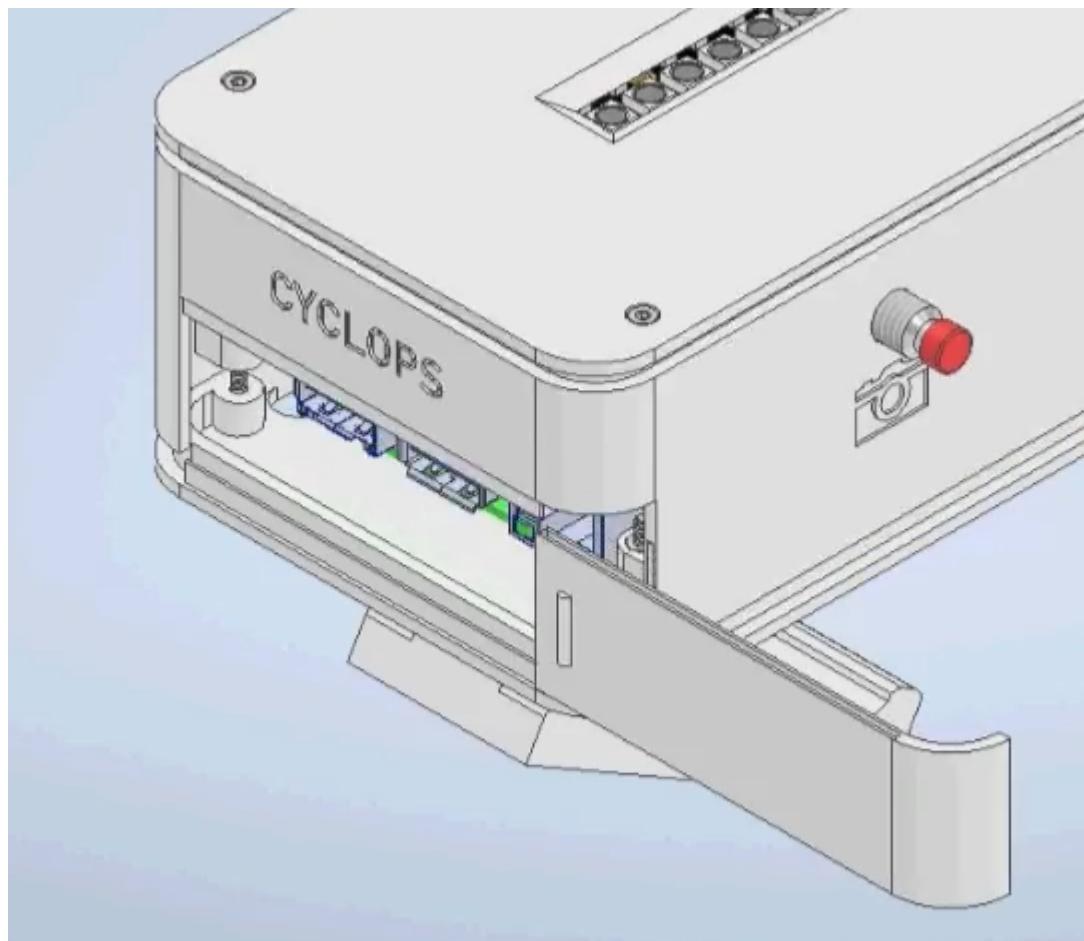


Figure 5.5: The Sliding Door for USB Access.

6. Troubleshooting

In the event of an error, please do the following:

Action	Instruction
1	Determine the cause of the issue (accelerometer, camear, LiDAR) based on the LED lights as outlined in Step 3 and 4 of Section 5.4
1a	If the accelerometer is the issue, open the CRA Main Housing. Check to see if the accelerometer cables are properly connected to the microcontroller.

Action	Instruction
1b	If the camera is the issue, open the CRA Main Housing. Check to see if the camera cables are properly connected to the microcontroller.
1c	If the LiDAR is the issue, ensure that the wires are connected properly at the CRA Rear Housing.
2	If the above actions do not work, please power off the CRA using the BLACK button under the '0', wait 30s, and then power it on using the WHITE button under the '1' button.
3	If the above actions do not work, please power off the CRA through the battery, wait 30s, re-power on the battery, and then power the CRA on using the WHITE button under the '1' button.

7. Frequently Asked Questions

Q: Will the CRA system work with my bicycle?

A: CRA is intended to work with all modern bicycles. Its universal clamp can grip posts from 1" up to 3.5" in diameter.

Q: Where can I ask further questions about the Cyclops Ride Assist? Where can I submit a ticket for an issue?

A: An issue or question can be created on our repository, available [here](#) on Github.

Q: How can I contribute to the Cyclops Ride Assist software/hardware?

A: All of our software and hardware drawings are open-source and available [here](#) on Github.