Software Engineering Internship at Wabtec

Sahil Dev
Supervisor: Burak Onal
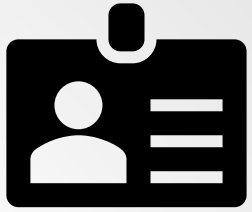Mentors: Kenny Seminuk, Jacob Liu

Summer 2019

Preview

About Me

- Rising Junior at University of Maryland

- Computer Science and Mathematics major

- Gymnast for 13 years, member of Gymkana

- Fan of animals

  - Rabbits, turtles, and foxes

- Afraid of spiders, deep water, and trains*

* this is a joke

Goals

- Gain real world programming experience

- Learn new tools and programming languages

- Make lots of friends! :)
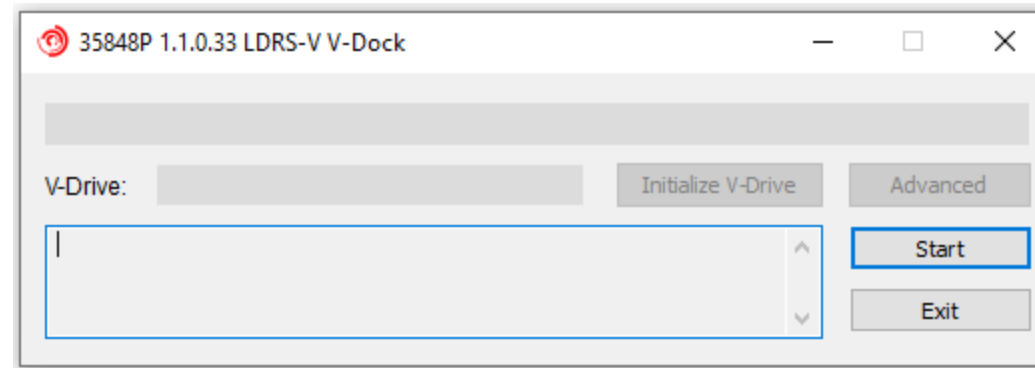
Projects

- V-Dock Application
  - Mentor: Jacob

- LDRS-V Troubleshooting Guide
  - Mentors: Kenny, Jacob

- Wireshark Dissector
  - Mentor: Kenny

V-Dock Application

Situation

- The V-Dock application interacts with the LDRS-V video drive
- Wabtec uses a third party to develop this application
  - Greater expenses, difficulty in communication, slow updates

Solution

- Develop Wabtec software to interface with the drive
  - Mount and unmount the partitions (sections) of the drive to allow for video playback
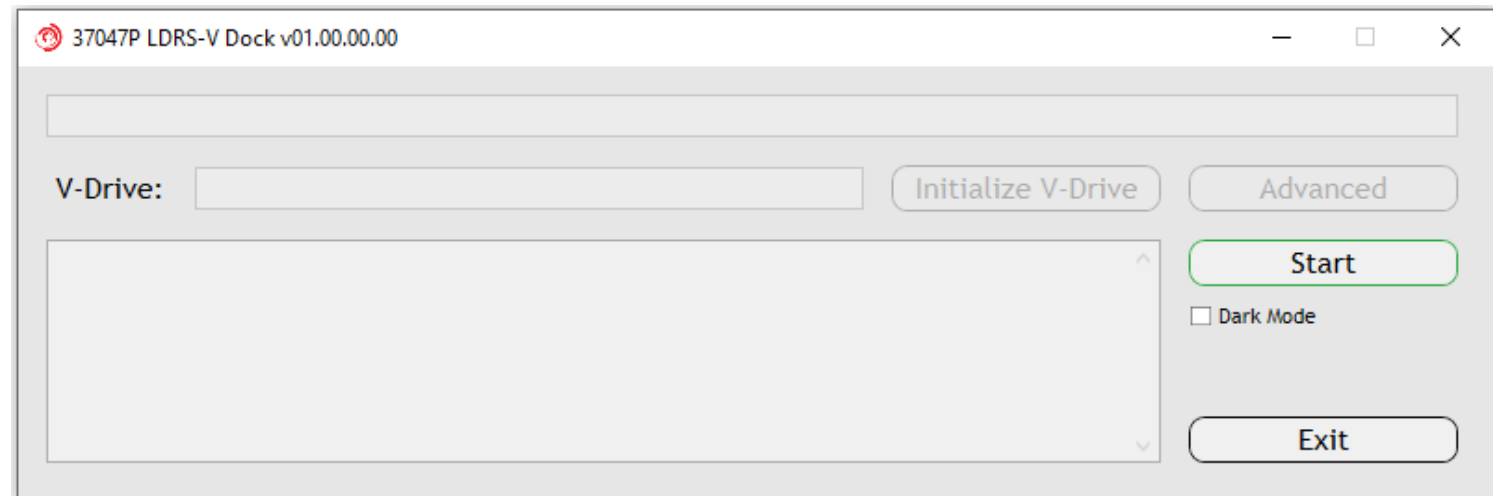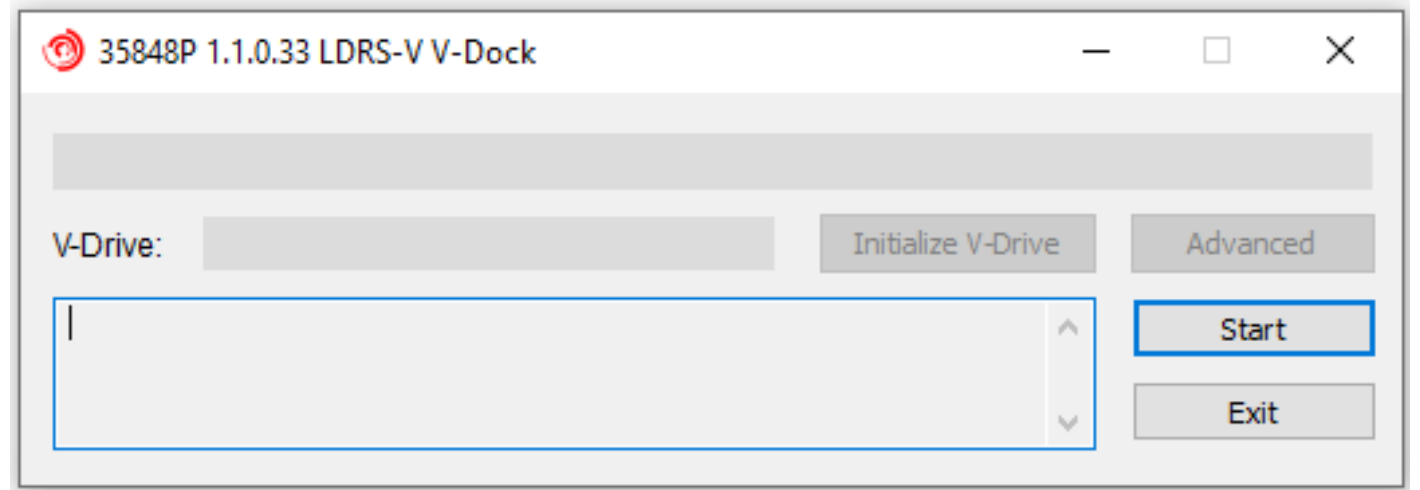 - Initialize the drive for reuse via deleting its contents

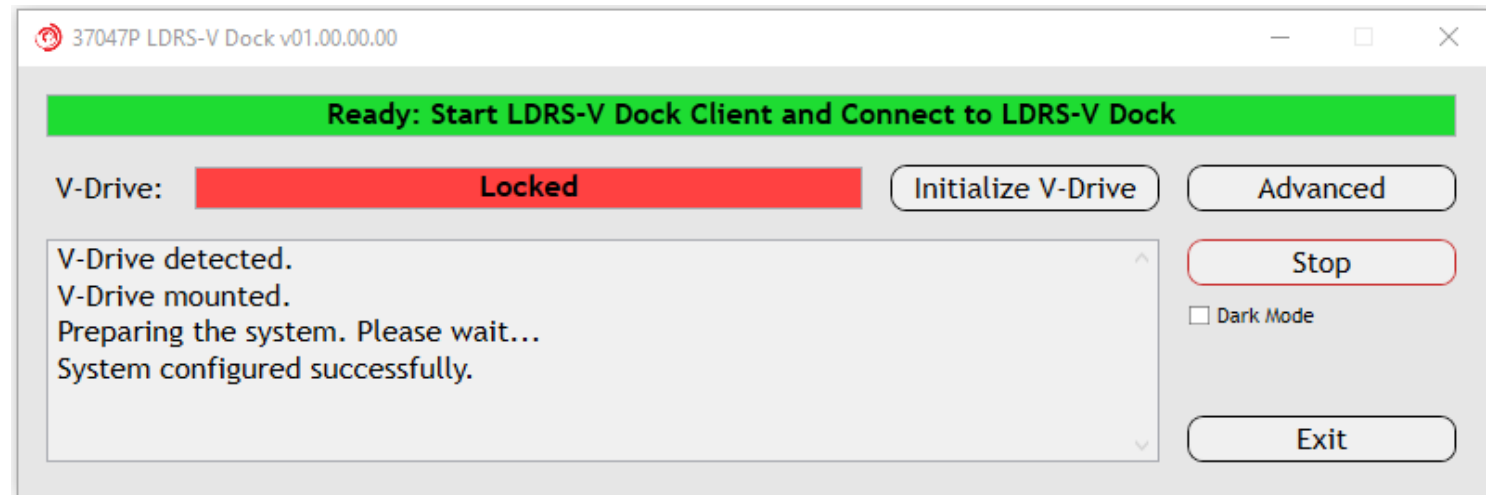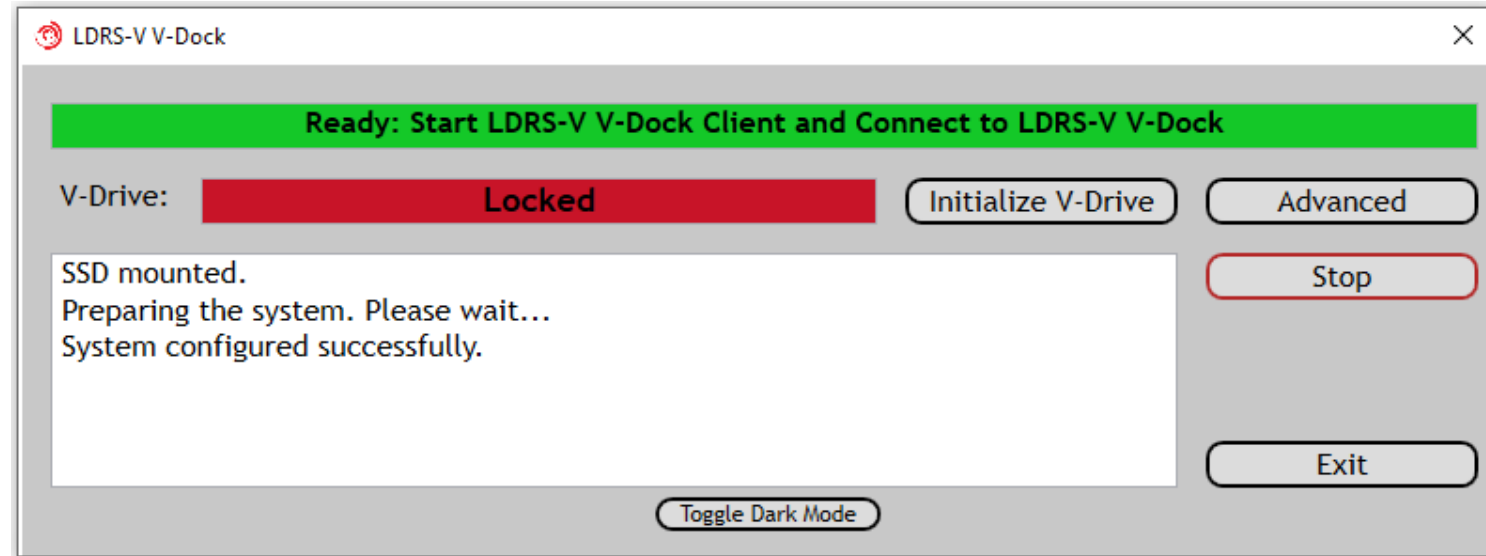Tool: Visual Studio

Languages: C#, XAML

V-Dock Application

Results: Original Version vs. New Version

35848P 1.1.0.33 LDRS-V V-Dock

V-Drive: Initialize V-Drive   Advanced

Start

Exit

37047P LDRS-V Dock v01.00.00.00

V-Drive: Initialize V-Drive   Advanced

Start

☐ Dark Mode

Exit

V-Dock Application

Results: My First Version vs. New Version

LDRS-V V-Dock

Ready: Start LDRS-V V-Dock Client and Connect to LDRS-V V-Dock

V-Drive: Locked | Initialize V-Drive | Advanced

SSD mounted.
Preparing the system. Please wait...
System configured successfully.

Stop

Exit

Toggle Dark Mode

37047P LDRS-V Dock v01.00.00.00

Ready: Start LDRS-V Dock Client and Connect to LDRS-V Dock

V-Drive: Locked | Initialize V-Drive | Advanced

V-Drive detected.
V-Drive mounted.
Preparing the system. Please wait...
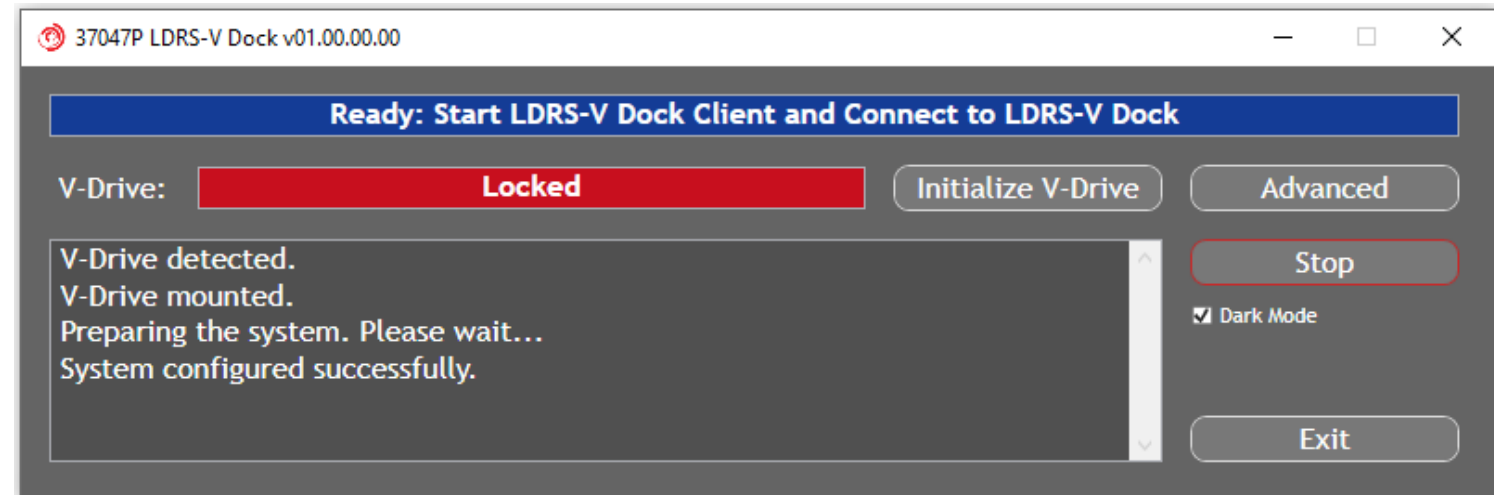System configured successfully.

Stop

☐ Dark Mode

Exit

V-Dock Application
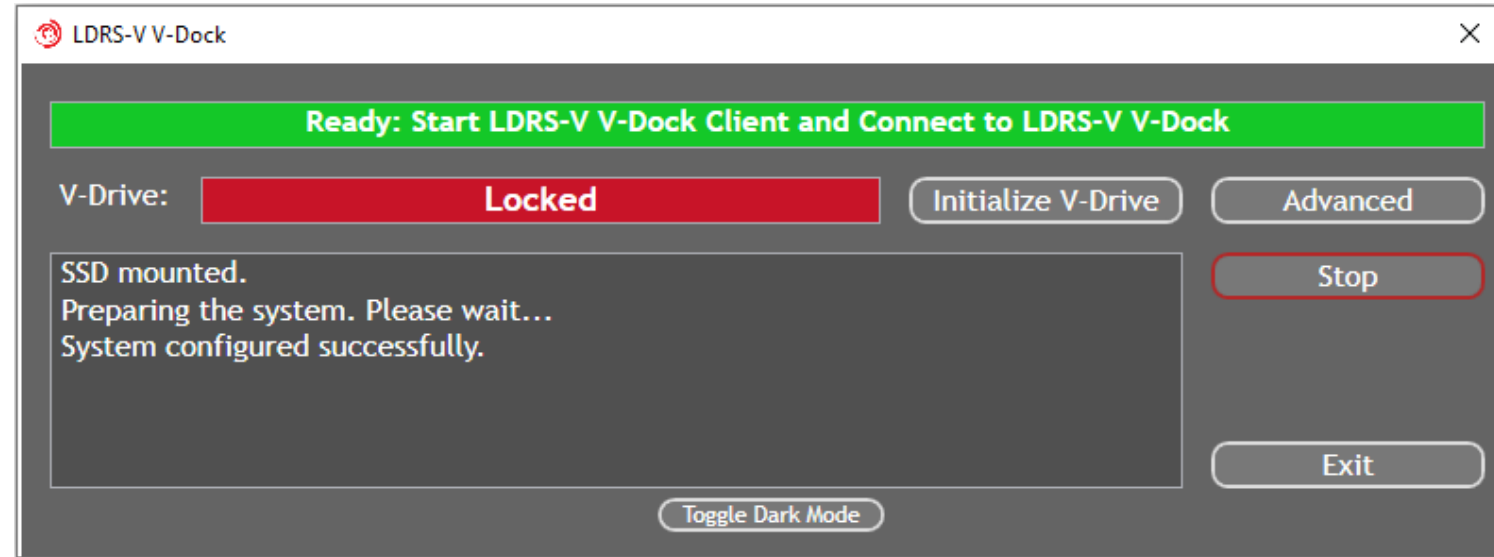
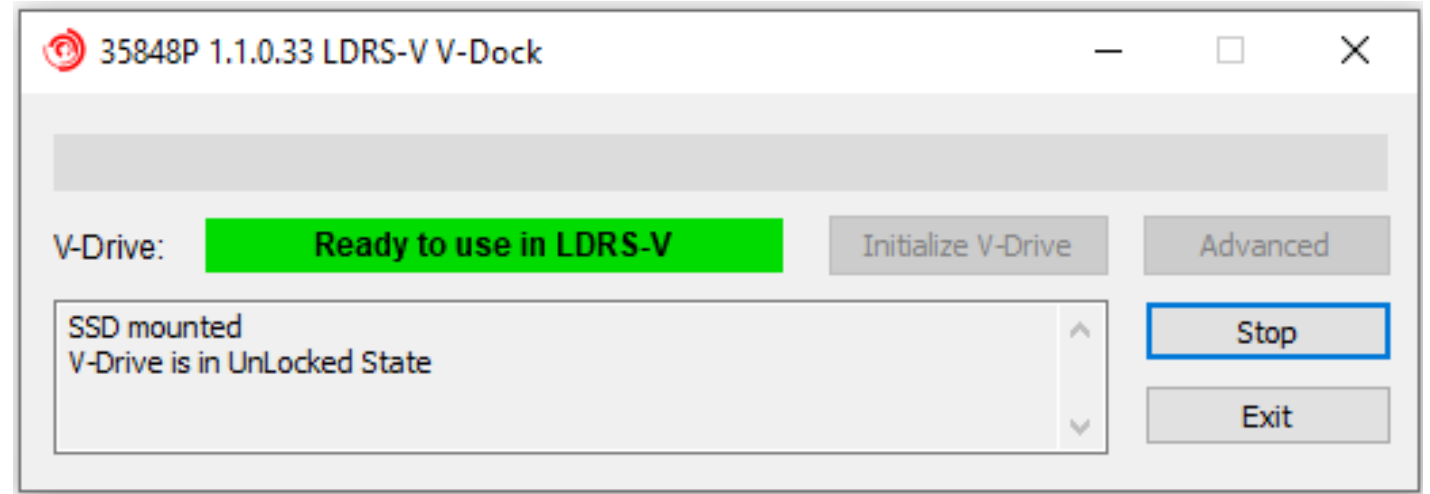Results: My First Version vs. New Version

V-Dock Application

Results: Original Version vs. New Version

35848P 1.1.0.33 LDRS-V V-Dock

V-Drive: **Ready to use in LDRS-V** [Initialize V-Drive] [Advanced]

SSD mounted
V-Drive is in UnLocked State

[Stop] [Exit]

37047P LDRS-V Dock v01.00.00.00

V-Drive: **Ready to use in LDRS-V** [Initialize V-Drive] [Advanced]

V-Drive detected.
V-Drive mounted.
Preparing the system. Please wait…
Drive is in unlocked state.

[Stop] ☐ Dark Mode [Exit]
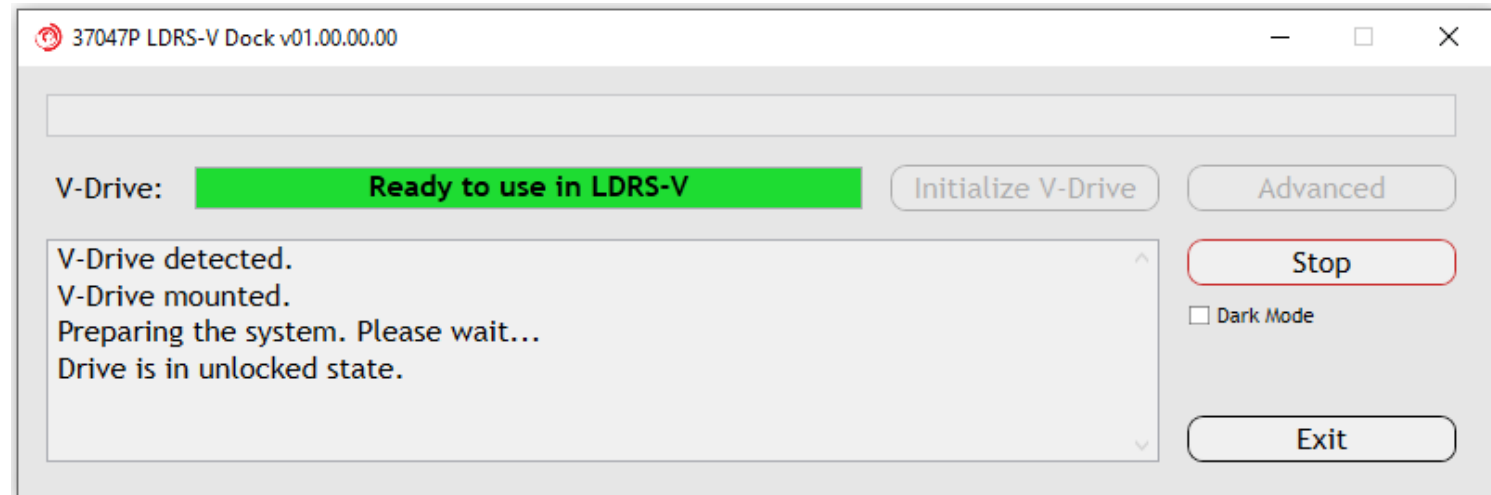
LDRS-V Troubleshooting Guide

Situation

- LDRS-V units are returned to Wabtec when customers encounter problems with the system

- Troubleshooting an LDRS-V unit takes a lot of time away from the software team

Solution

- Write a standard guide on troubleshooting an LDRS-V unit to facilitate the process and allow for people outside the software team to troubleshoot LDRS-V units

Tools: Microsoft Word, TeXworks

Languages: LaTeX, English

Obstacles

- No experience working with LDRS-V

Results: First Version vs. Current Version

Troubleshooting the LDRS-V

Contents

Guide: Troubleshooting the LDRS-V

Wabtec Railway Electronics

July 2019

Contents

Results: First Version vs. Current Version

LDRS-V Troubleshooting Guide

Troubleshooting the LDRS-V

1. Check the power door light

Check the light on the power door.

If the light is solid green, go to step 2.

If flashing green, go to step 2.

If solid red, go to step 2.

If off, plug into power?

2. Check the caddy door light

Check the light on the caddy door.

If the light is solid green, go to step 2.

If flashing green, go to step 2.

If solid red, go to step 2.

If off ?.

3. Check if the drive is mountable

1. Execute the shell command 'mount'
2. Execute 'ls -la /dev/sd' to search for the drive ???
3. Execute 'fdisk'?
4. Execute 'smartctl'?

If the drive is visible, go to step 2.

If the drive is not visible, the drive is not mountable. Category 3 device failure.

4. Check for database corruption

If the database is corrupted, Category 7 device failure.

If the database is not corrupted, go to step 2.

5. Check for power instability

---

4 Troubleshooting the LDRS-V

This is a step-by-step guide on troubleshooting LDRS-V units. Begin at Powering on the LDRS-V and follow the steps to determine the category of failure for the device you are using.

4.1 Powering on the LDRS-V

4.1.1 Instructions

Power on the unit. The power light should remain solid red while the unit is booting. Wait until the color or flashing pattern changes, then proceed to Checking the Power Status LED.

4.1.2 What Next?

Proceed to Checking the Power Status LED.

4.2 Checking the Power Status LED

4.2.1 Instructions

Locate the power light labeled "PWR". Determine the color and flashing pattern of the light.

4.2.2 What Next?

If the light is solid green, go to Attempting to Access the Unit
If the light is flashing green, go to ???
If the light is solid red, the unit is still booting. Wait until the color or flashing pattern changes and then reevaluate.
If the light is flashing red, go to Checking for POST/Keep-Up Circuit Failure
If the light is off, make sure the device is connected to power, then check the light again. If the light is still off, ???

4.3 Checking for POST/Keep-Up Circuit Failure

4.3.1 Instructions

Perform an audit record download, decode the file in DecLDRS, and determine what is failing (health status record).

4.3.2 What Next?

If the CHM is bad, and a download cannot be performed, this is a Category 7: Appears Healthy device failure. Use '/wre/apps/showsharedmem -d 7' to obtain the latest health information, and dump the output into a text file.
If the CHM is not bad, go to Checking for Serial GPS Activity.

Wireshark Dissector

Situation

- The LDRS-V sends packets of data to the Verifier Application via Ethernet

- The data is unusable without being interpreted

Solution

- Write a dissector to parse useful information out of the data

Tools: Wireshark, Notepad++

Language: Lua

Obstacles

- First time using Wireshark and Lua
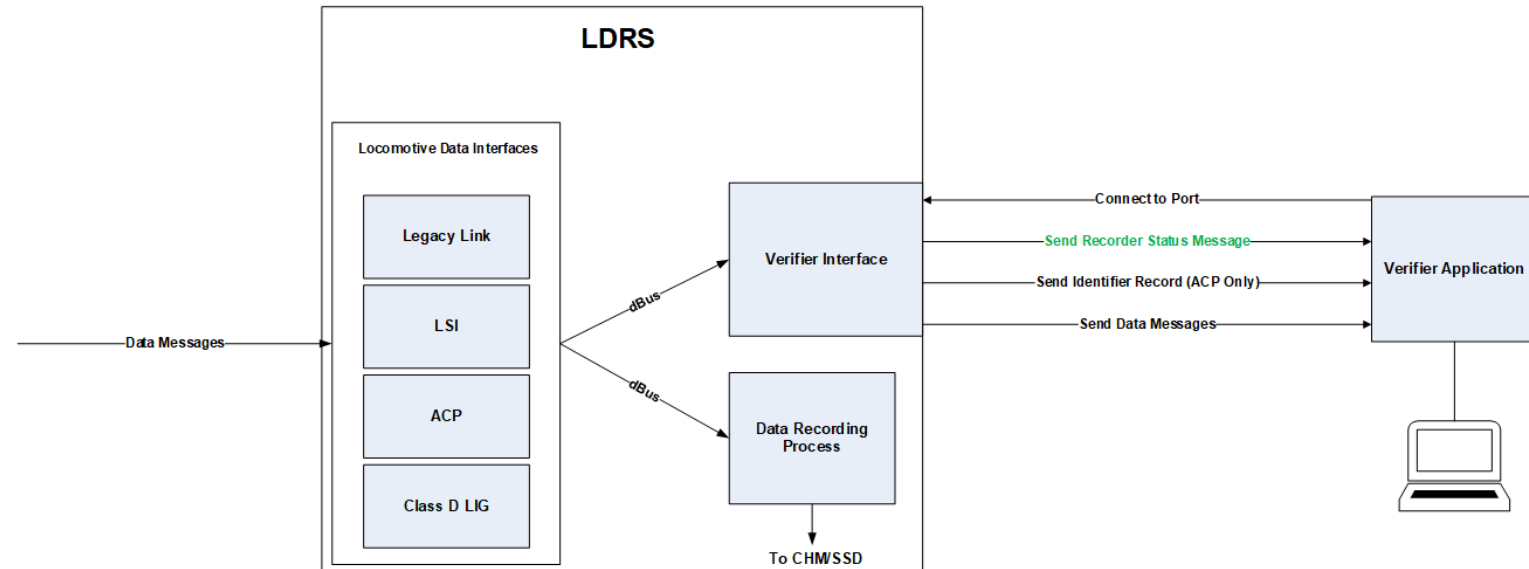
- Data is of unknown length
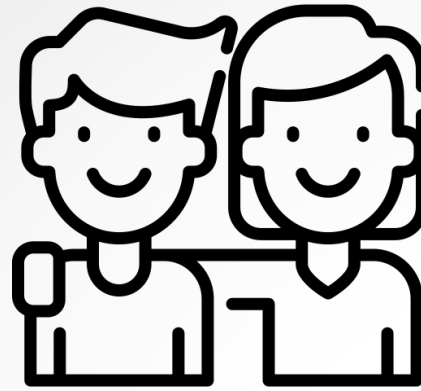
Wireshark Dissector

Results:

Revisiting Goals

- Gain real world programming experience

    - Wrote code for the V-Dock and the Wireshark dissector

- Learn new tools and programming languages

    - Learned Visual Studio, C#, XAML, and Lua

- Make lots of friends! :)

    - Became friends with the other interns and my mentors
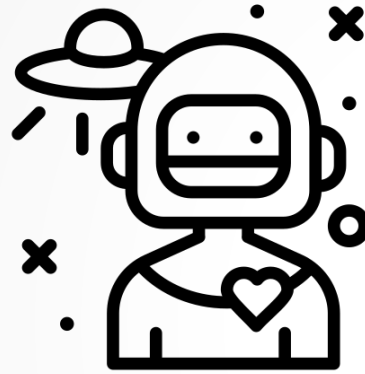
Positives

Friendly Mentors

Rewarding Projects

Inclusion in Meetings

Intern Work Environment

Suggestions

More Space for Interns

Intern Group Project

Review

About Me

Goals

Projects

- V-Dock GUI, LDRS-V Troubleshooting Guide, Wireshark Dissector

Revisiting Goals

- Gained experience, learned new tools, and made friends

Positives

Suggestions

Thank you