RFID AREA INFORMATION NETWORK (RAIN)

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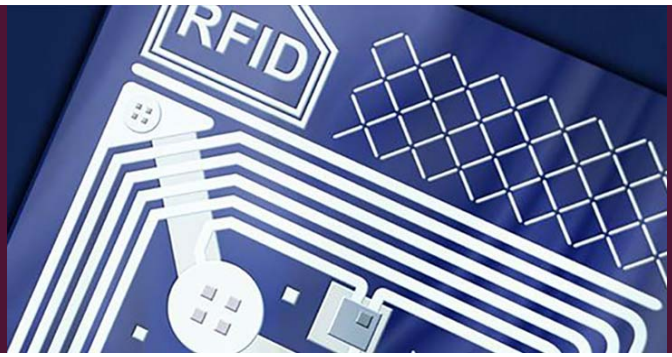


OVERVIEW

- Executive Summary
- Problem Statement and Solution
- RAIN Technical Overview
- RAIN Website Overview
- System Components
- Problems
- Lessons Learned
- Conclusion

EXECUTIVE SUMMARY

- RFID Area Information Network (RAIN) is a RFID scanner, processor, webserver and database, website and application.
- The desired objectives for RAIN are as follows:
  - Provide a scannable area of two meters or greater, this is to provide safety for the transportation personnel and the system.
  - Display the car IDs on a user- friendly interface
  - Store the data for undetermined amount of time

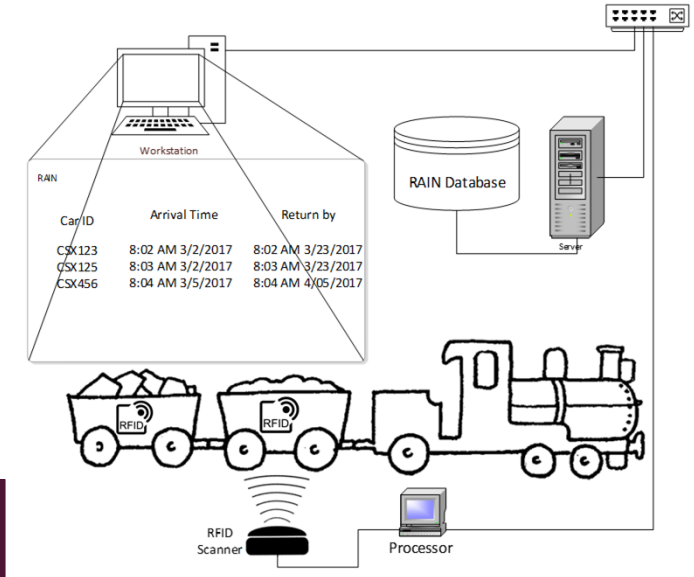
PROBLEM STATEMENT

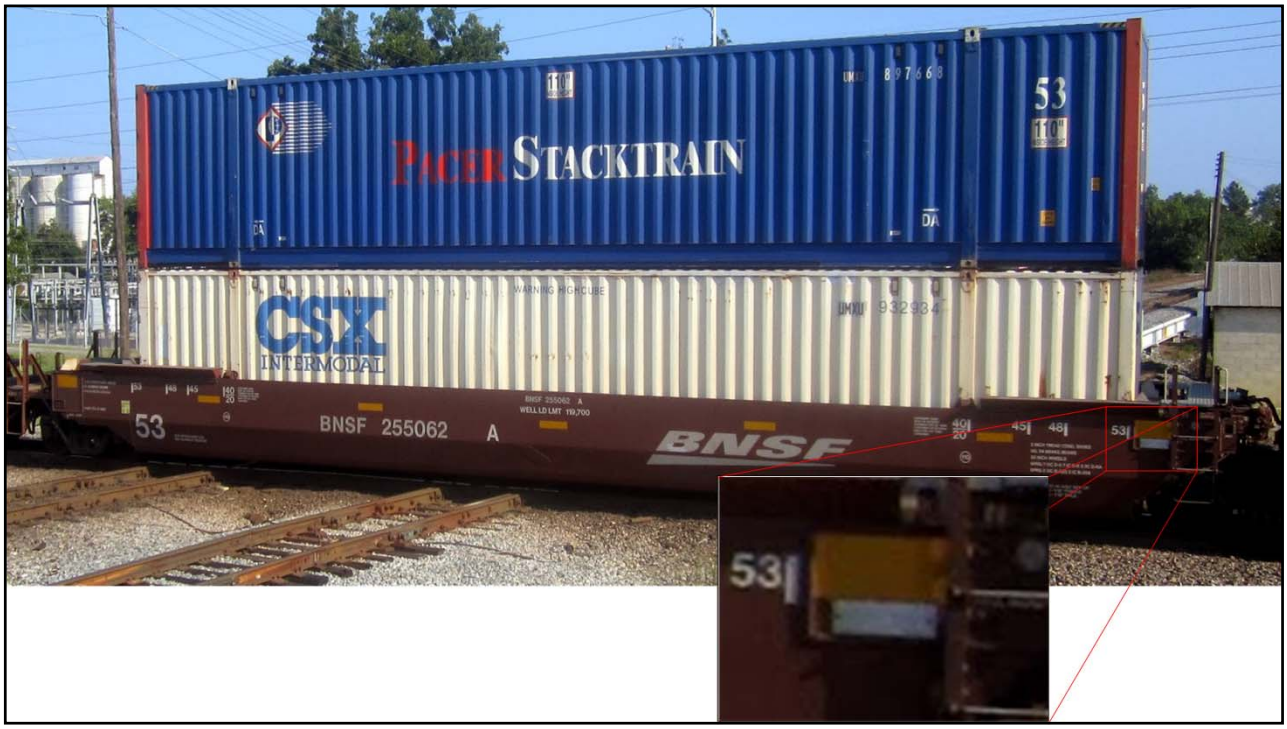
- Insufficient tracking of rail cars on a large industrial campus can lead to rail cars being held for periods past their rental agreements, resulting in fees which grow exponentially, quickly. Without a tracking system in place, companies such as Steel Dynamics, Inc. pay $1,500 each month in demurrage, or late fees.

SOLUTION STATEMENT

- This project consists of five components working together—an RFID antenna and reader all-in-one unit, a processor, an application, a webserver and database, and a website.
- A scanner will retrieve the railcar serial number, and pass the information to a processor, which transmits it to a database. A website queries the database to retrieve the data and the time and location a car was scanned.

RAIN





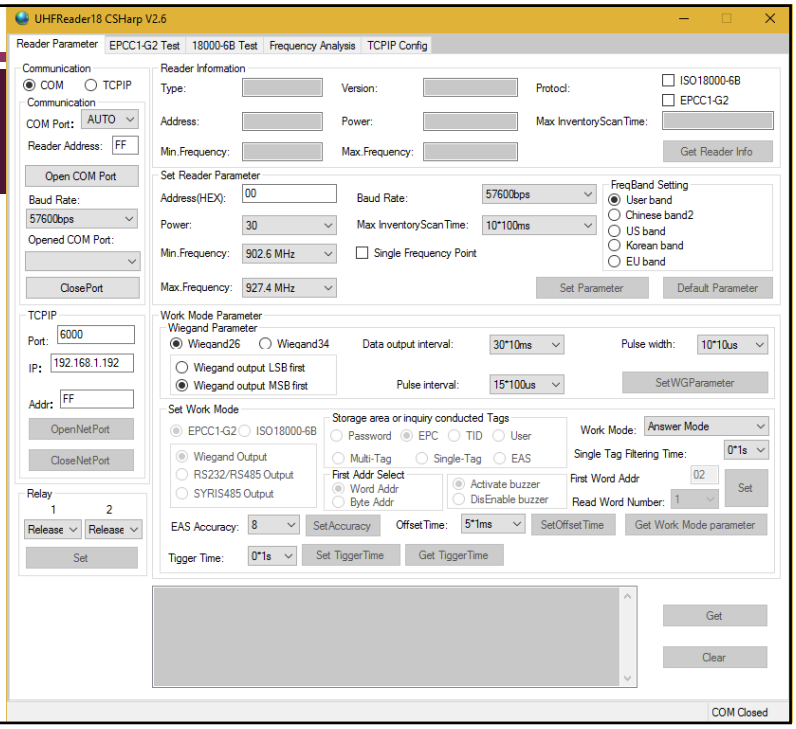
RAIN

- ChaFon Antenna and RFID reader
- GearMo USB to Serial Adapter

RAIN

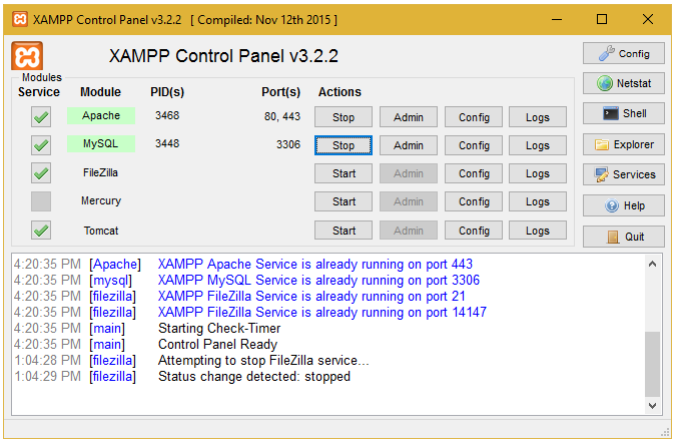
RAIN

- Chafon Demonstration Application
- Able to adjust multiple setting on the antenna and reader



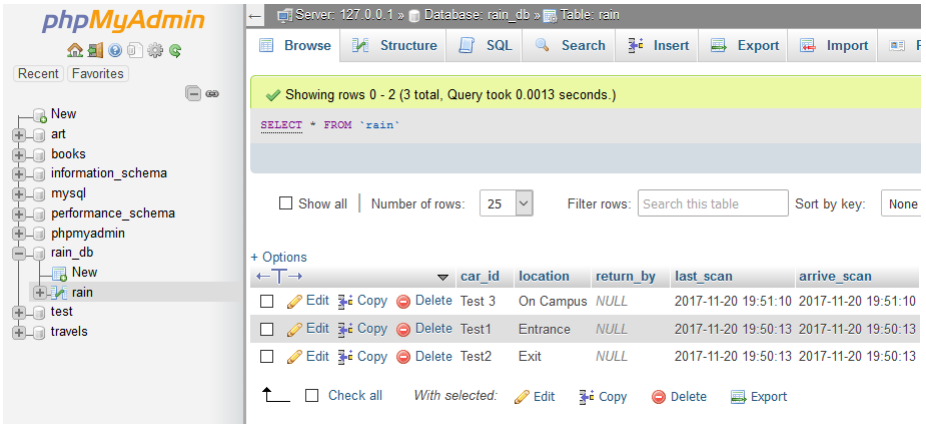
RAIN

- XAMPP Control Panel
- Installs Apache and MySQL



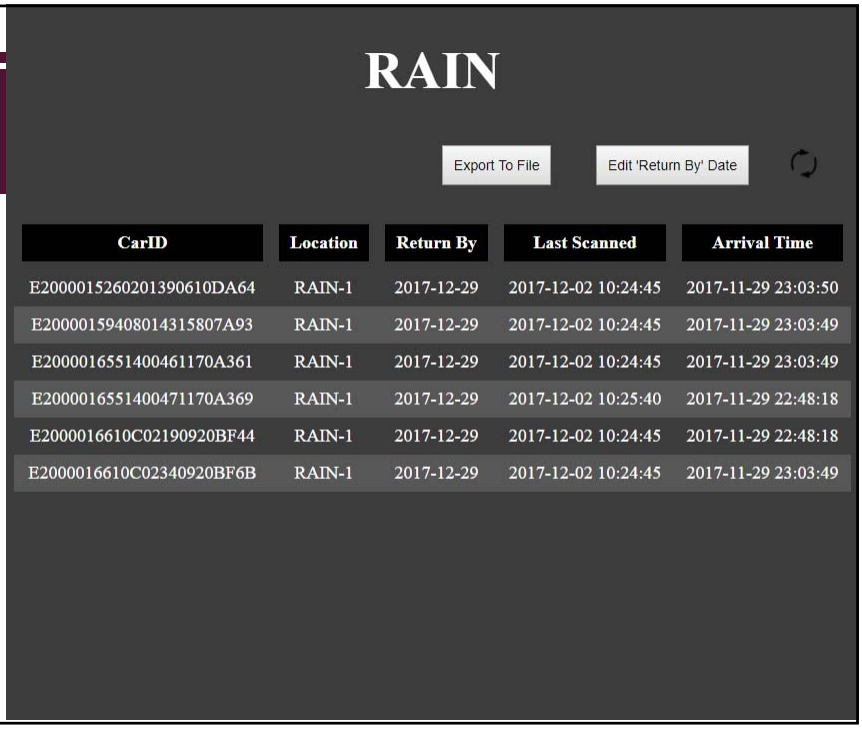
RAIN

- phpMyAdmin installed with MySQL
- Manages MySQL

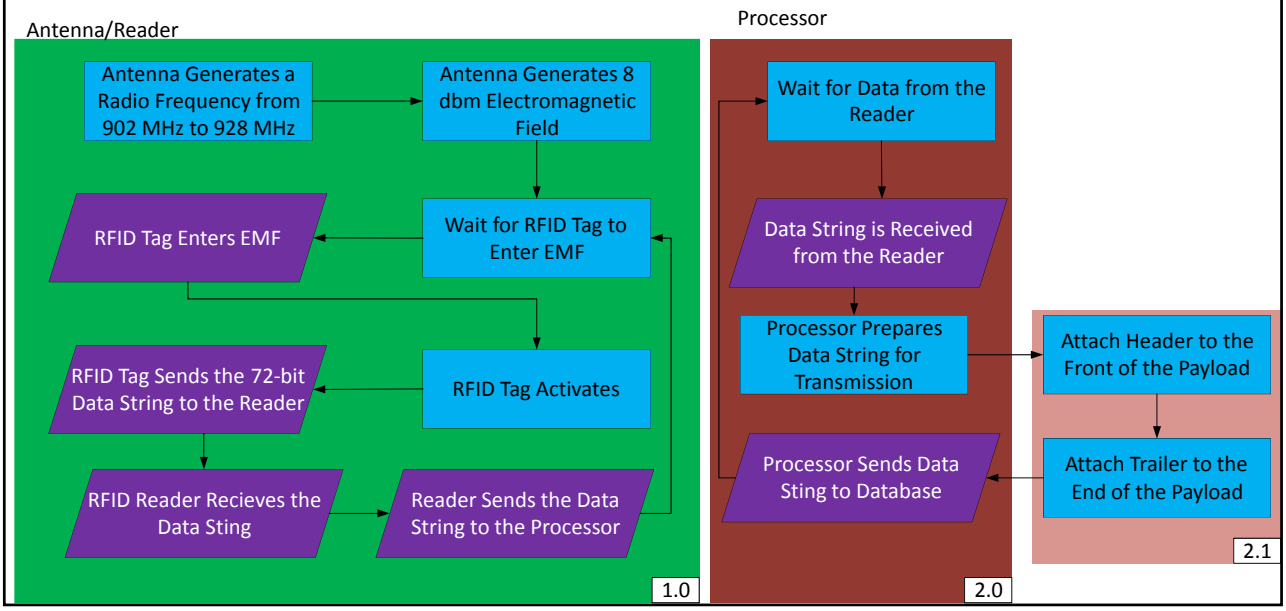


RAIN

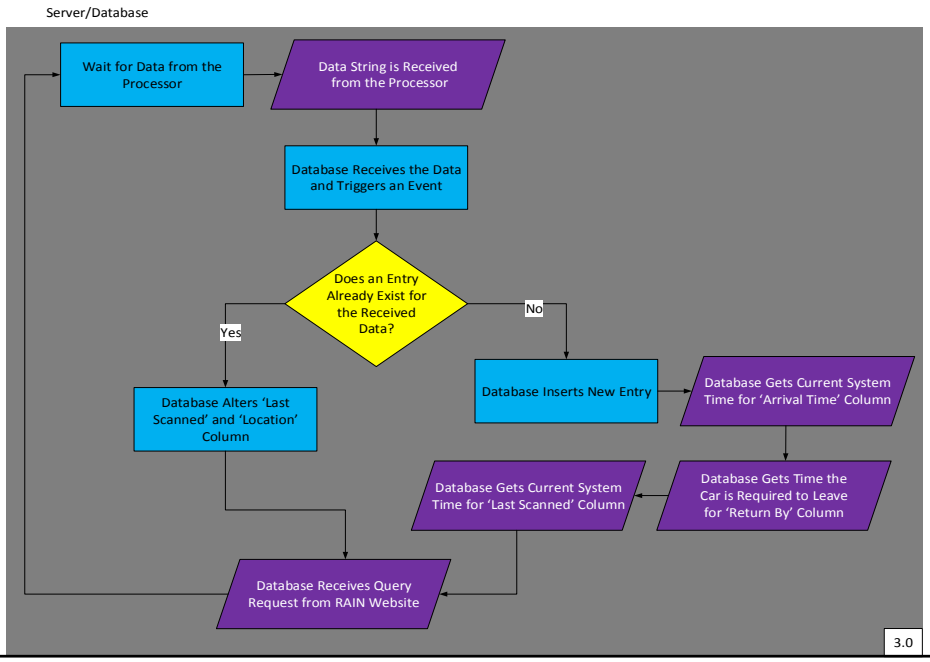
- RAIN Website
- Designed using HTML, CSS, JavaScript, and PHP



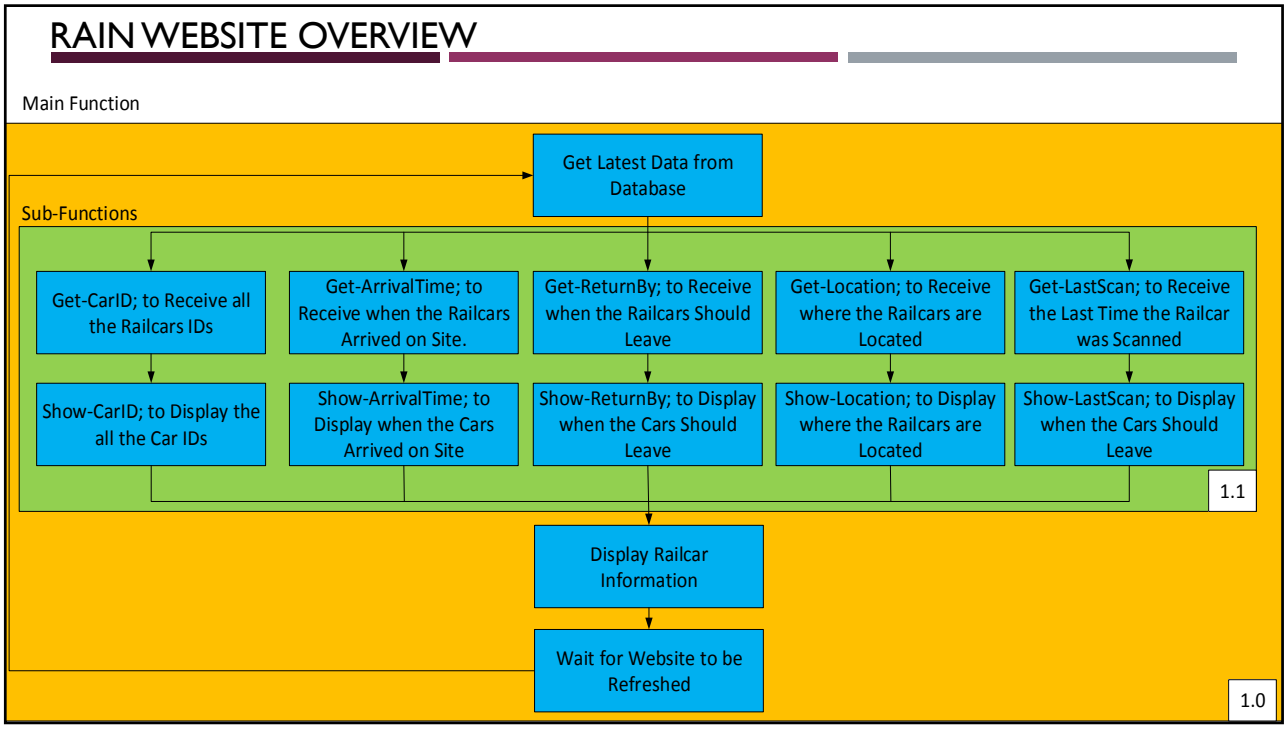
RAIN TECHNICAL OVERVIEW



RAIN TECHNICAL OVERVIEW



RAIN WEBSITE OVERVIEW



MATERIAL COST

Item	Cost Each	Qty	Total Cost
NexBox Mini PC	$ 159.99	1	$ 159.99
RFID Antenna and Reader	$ 209.90	1	$ 209.90
USB to RS232	$ 15.88	1	$ 15.88
Material Total			$ 385.77

PROBLEMS

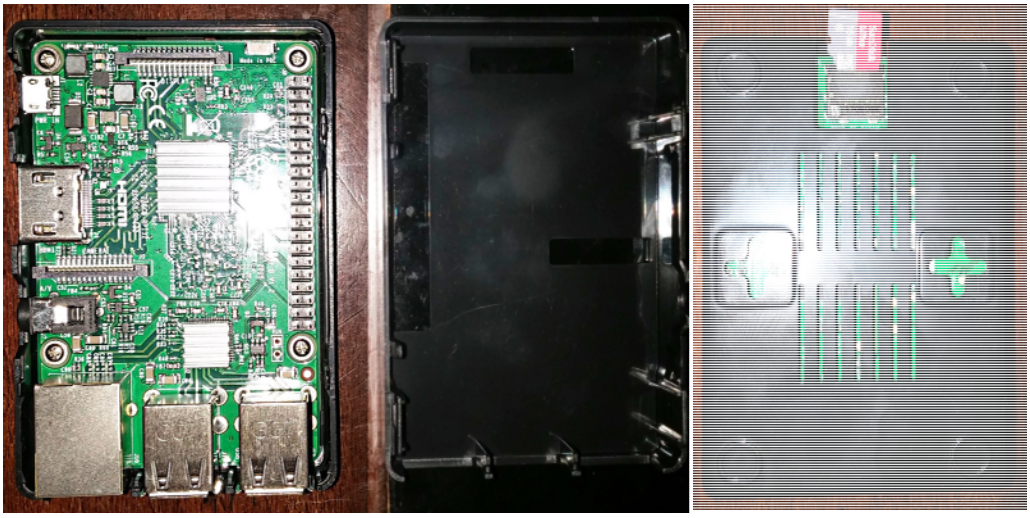
- As I worked to learn the logic ChaFon uses to reengineer it to work on the Raspberry Pi, I learned one DLL wouldn't attach, and each time it was run, an error would occur.
- Unfortunately, this problem was determined later in the system's development process, and became time-consuming, at the expense of other aspects of the system.

LESSONS LEARNED

- In the process of testing system components, it arose that the processor selected for this project, Raspberry Pi, was not working in sync with the RFID scanner, as the DLLs ChaFon provides are not compatible with the language the Raspberry Pi is capable of running
- This problem was determined later in the system's development process, and became time-consuming, at the expense of other aspects of the system.

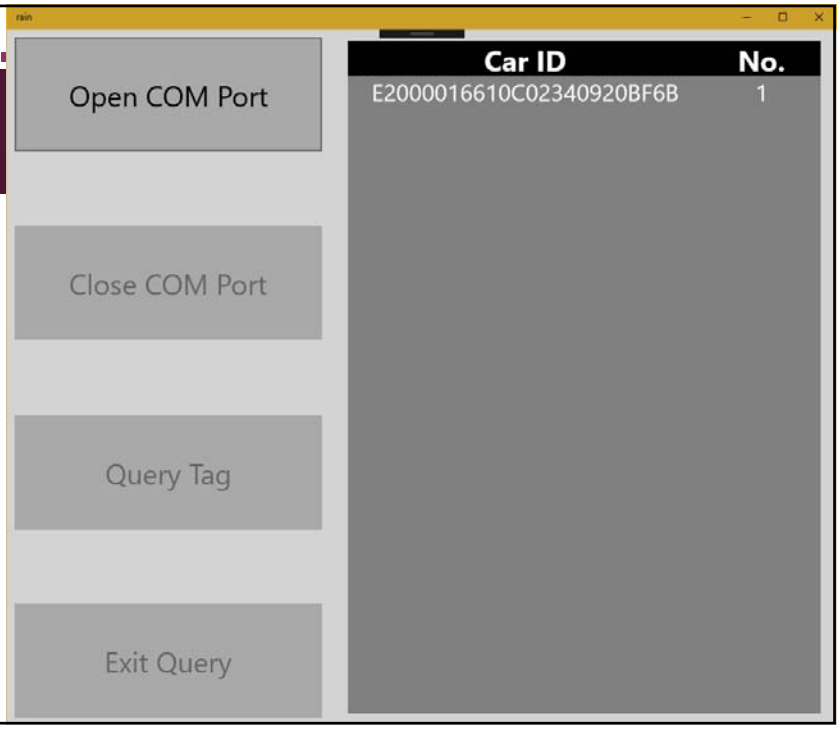
RAIN

Raspberry Pi with Case and 16 GB Micro SD Card



RAIN

- RAIN Application
- Capable of opening the communication port, close the communication port, query tags, exit a tag query, and display the Car ID.



MATERIAL COST

Item	Cost Each	Qty	Total Cost
Raspberry Pi	$ 35.49	1	$ 35.49
Raspberry Pi Case	$ 6.95	1	$ 6.95
Raspberry Pi Power Supply	$ 9.99	1	$ 9.99
RFID Antenna and Reader	$ 209.90	1	$ 209.90
USB to RS232	$ 15.88	1	$ 15.88
Micro SD Card	$ 10.90	1	$ 10.90
NexBox Mini PC	$ 159.99	1	$ 159.99
Material Total			$ 449.10

CONCLUSION

- The use of this cost-effective system will help create additional efficiency within the SDI Butler campus, by better tracking scrap shipments through strategic scan points on the campus, and ensuring timely return of railcars to avoid unnecessary costs.
- Along with this project, the SDI Butler campus is looking at this project for employee entrance security.

RFID AREA INFORMATION NETWORK - RAIN

Demonstration

Rainweb.zapto.org

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Thank you

Questions?