

EcoCAR3

Year 3

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- Agenda



1. Introduction & Overview
2. Project Requirements
3. Law Enforcement, Settings Modules
4. UI
5. Conclusion



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Introduction to EcoCAR3

By Enrique Gomez

● What is EcoCAR3?

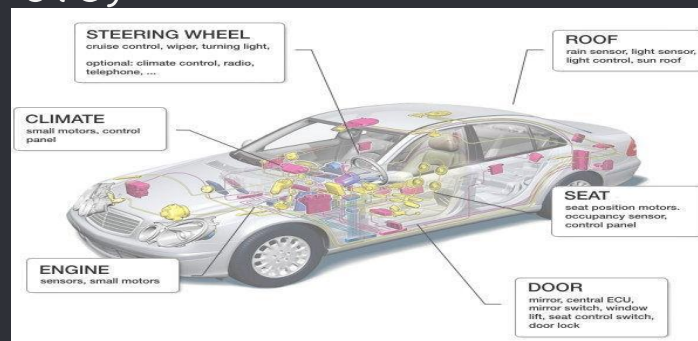
- 4-year competition that challenges 16 universities across the country to redesign a Camaro to reduce its environmental impact.
- Teams apply the latest cutting-edge technologies and incorporate new innovative ideas.
- Police vehicle



U.S. DEPARTMENT OF
ENERGY

● Project Technologies

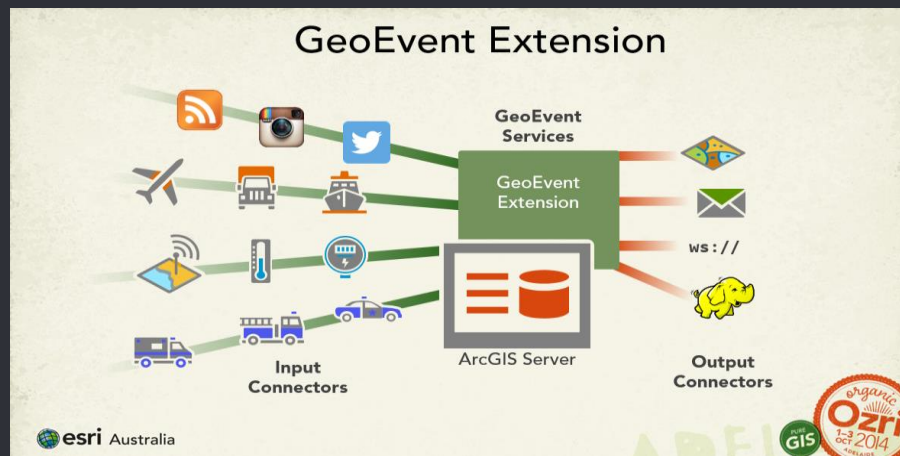
- **Programming Framework** - Qt is a cross-platform application framework that uses standard C++. It's used for developing application software that contain GUI's.
- **Hardware** - Standalone board connected to a touchscreen display.
- **CAN Signals** - Signals (composed of bytes of data) sent to systems in the car that will control their operation or receive information on the car (a/c, temperature, battery level, etc)



● Project Technologies

ArcGIS

- Geographic information system data
- Will display this data on a map as navigation system
- Routing around closures and events in real time
 - Trains, construction, etc
- Implemented by another team



● Project Challenges

- Inexperienced Liaison - 1st year as a liaison for our team; learning process
- Receiving requirements - Difficulty communicating what we can/cannot do
- No available touchscreen display - Board needed to be replaced; delayed progress, uncertainty
- Working with QT - Frequent crashes and re-installing



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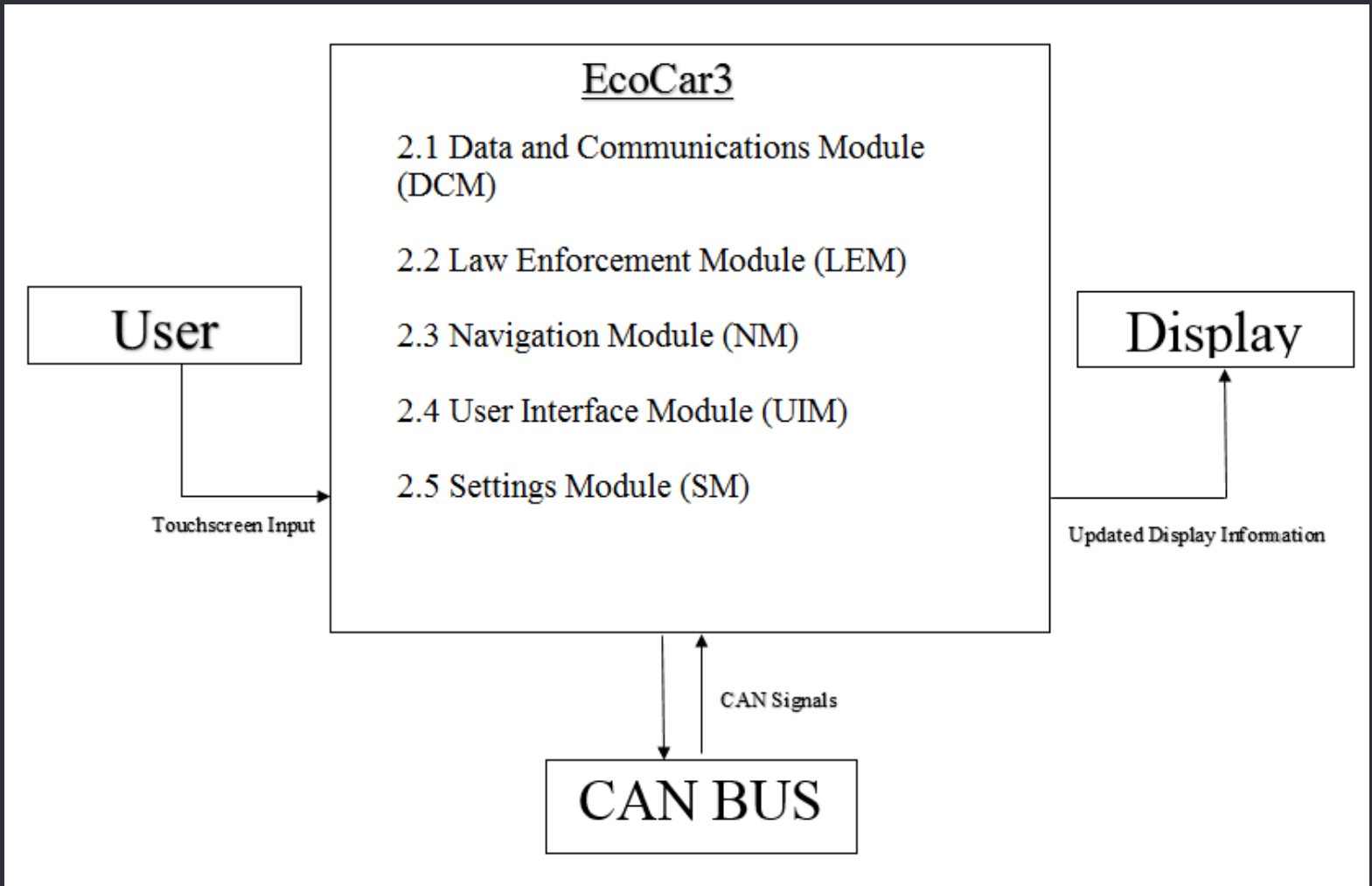
Project Requirements

By Abhishek Patel

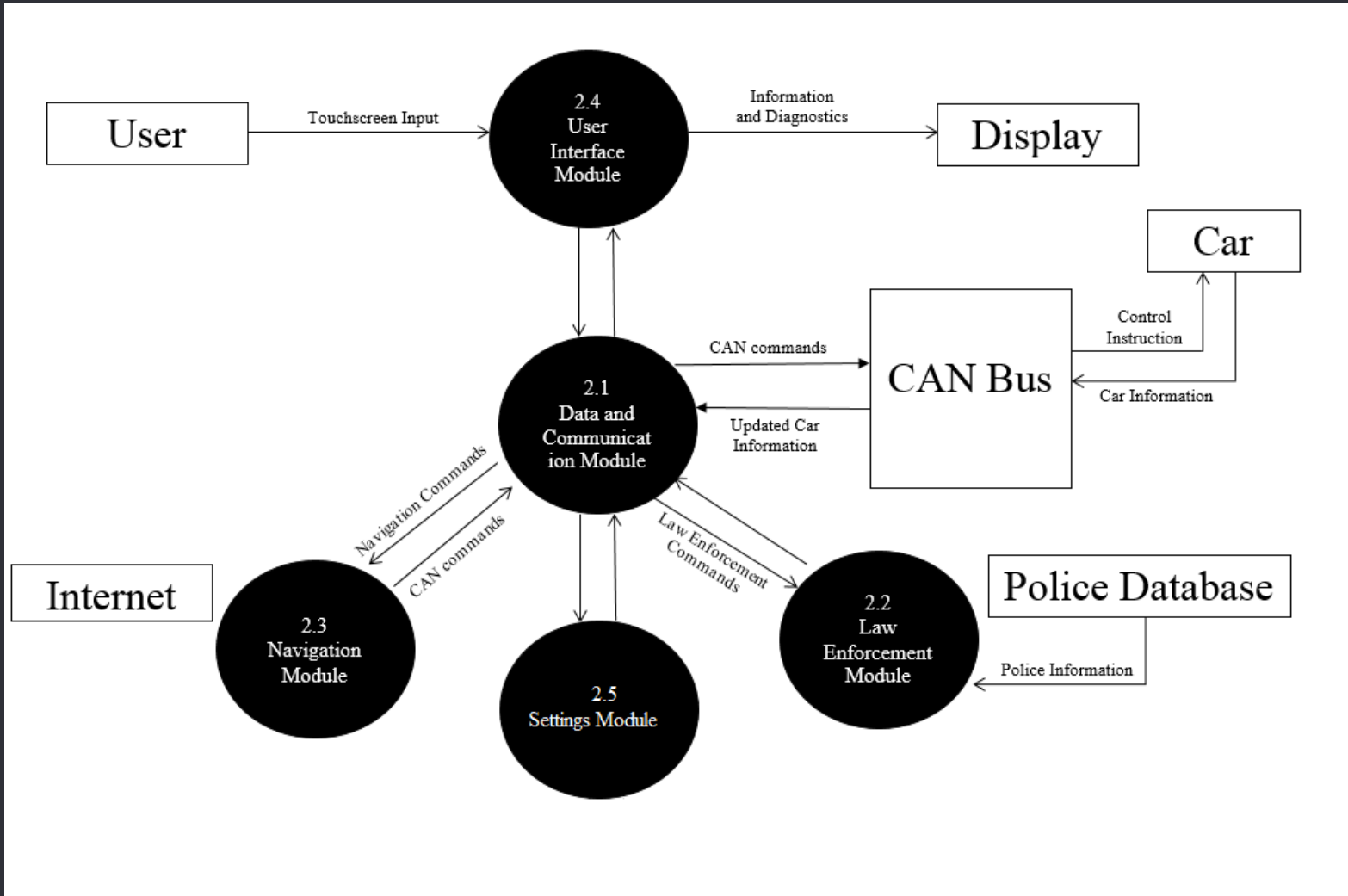
● Project Requirements

- ◦ Build a touchscreen GUI that will replace most physical buttons in the car
- ◦ Build a simulated police database
- ◦ Integrate ArcGIS navigation software when completed
- ◦ Integrate CAN signal controls when completed

DFD 0



DFD 1



● Transfer of Knowledge

- **GitLab** - All of the code will be saved here.
- **Google Groups** - All of the documentation is shared on here.
- **Liaison** - Shares knowledge/experience with the future team (Year 4)



Google
Groups



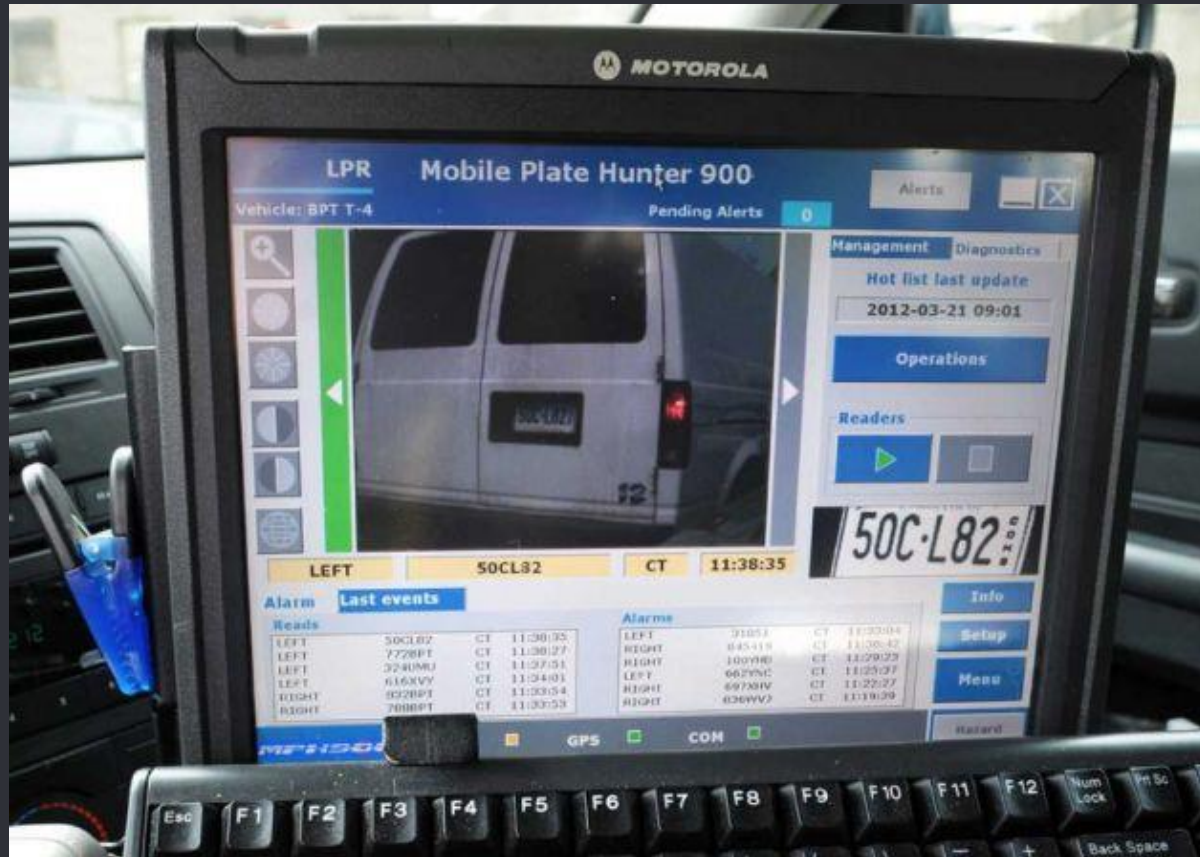
GitLab

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Police Database

By Vincent Luu

POLICE MOBILE COMPUTERS



- Simulate mobile computers used by police
 - track license plates, cross reference databases, check felonies

POLICE MOBILE COMPUTERS

PERSON TABLE	
<u>DL #</u>	String (DMV driver's license number)
FNAME	String
LNAME	String
ADDR	String (Street Address)
SEX	String (gender)
EYES	String (eye color)
HAIR	String (hair color)
HGT	INT (Height of person in cm.)
WGT	INT (Weight of person in lbs.)

POLICE MOBILE COMPUTERS

CAR TABLE	
<u>L. PLATE #</u>	String (license plate number)
<u>STATE</u>	String
<u>VIN #</u>	String (car's VIN number)
MAKE	String (Car Make)
MODEL	String (Car Model)
YEAR	INT (Car Year)
OID	String (owner id, references PERSON table DL # attribute)
REPORTED STOLEN?	Boolean

POLICE MOBILE COMPUTERS

WARRANT TABLE	
<u>PID #</u>	String (person ID, references PERSON table DL # attribute)
WID	INT (if 0, person has no criminal record: (CRIME TYPE and RISK LEVEL null. If 1, person has a criminal record: CRIME TYPE and RISK LEVEL are not null)
CRIME TYPE	String (type of crime committed)
RISK LEVEL	INT (range from 0-10 in severity of crime)

- Settings Module





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UI Design

By Mason Nguyen

● UI Design Considerations

- Need to consider usability
- Will be operated by someone on driver side of vehicle
- Layout needs to be designed with function over style in mind
 - Readable
 - “Eyeball-able”

● Usability Ideas

- Buttons should be vertically stacked on the driver side of the screen
- Buttons should be large, and easy to press without misclicking
- Tasks should be accomplished with few screen transitions
- Test runs with unfamiliar users to test ease of use

● Readability

- Low visual noise overall
 - No distracting graphics or effects
- High contrast colors
 - Possible color coding
- Recognize UI elements with peripheral vision
 - Minimize amount of time spent searching for controls

Current Appearance



- Buttons require reaching
- Graphics not needed (we want Windows 10-like)
- Wasted empty space, buttons could be larger
- Button icons needlessly flashy
- Functions of buttons not immediately clear for unfamiliar users



Conclusion



● Fall Accomplishments

- Introduction to EcoCar3 members and goals
- Discussion and finalization of requirements
- Reproduced and studied last year's progress
- Familiarized with Qt IDE

● Timeline



UI + Database Redesign

Winter vacation - First half of Spring semester

Integration of ArcGIS, car controls

Throughout Spring semester

In-car Testing

Second half of Spring Semester.