

**MICHIGAN STATE**  

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**U N I V E R S I T Y**

# Project Plan

## Analysis of Autonomous Vehicle Testing Video

### The Capstone Experience

Team Aptiv

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*From Students...  
...to Professionals*

# Functional Specifications

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- Design schema to house information pulled from images (file name, objects, environment)
- Create an image processing algorithm to identify these pre-determined scenarios
- Stream results from the model into the database so scenarios can be queried
- Develop a web application to utilize database for easy user experience



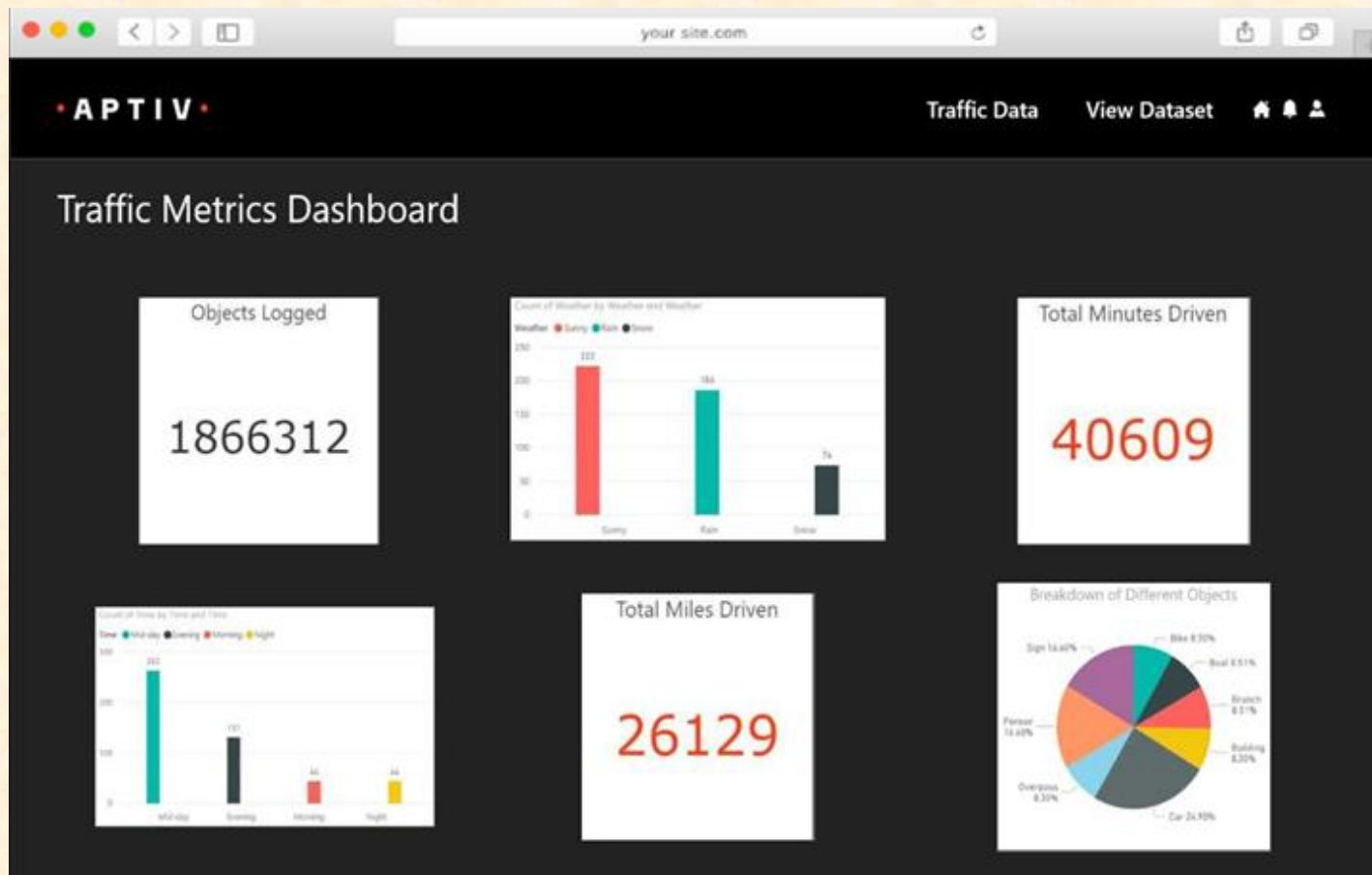
# Design Specifications

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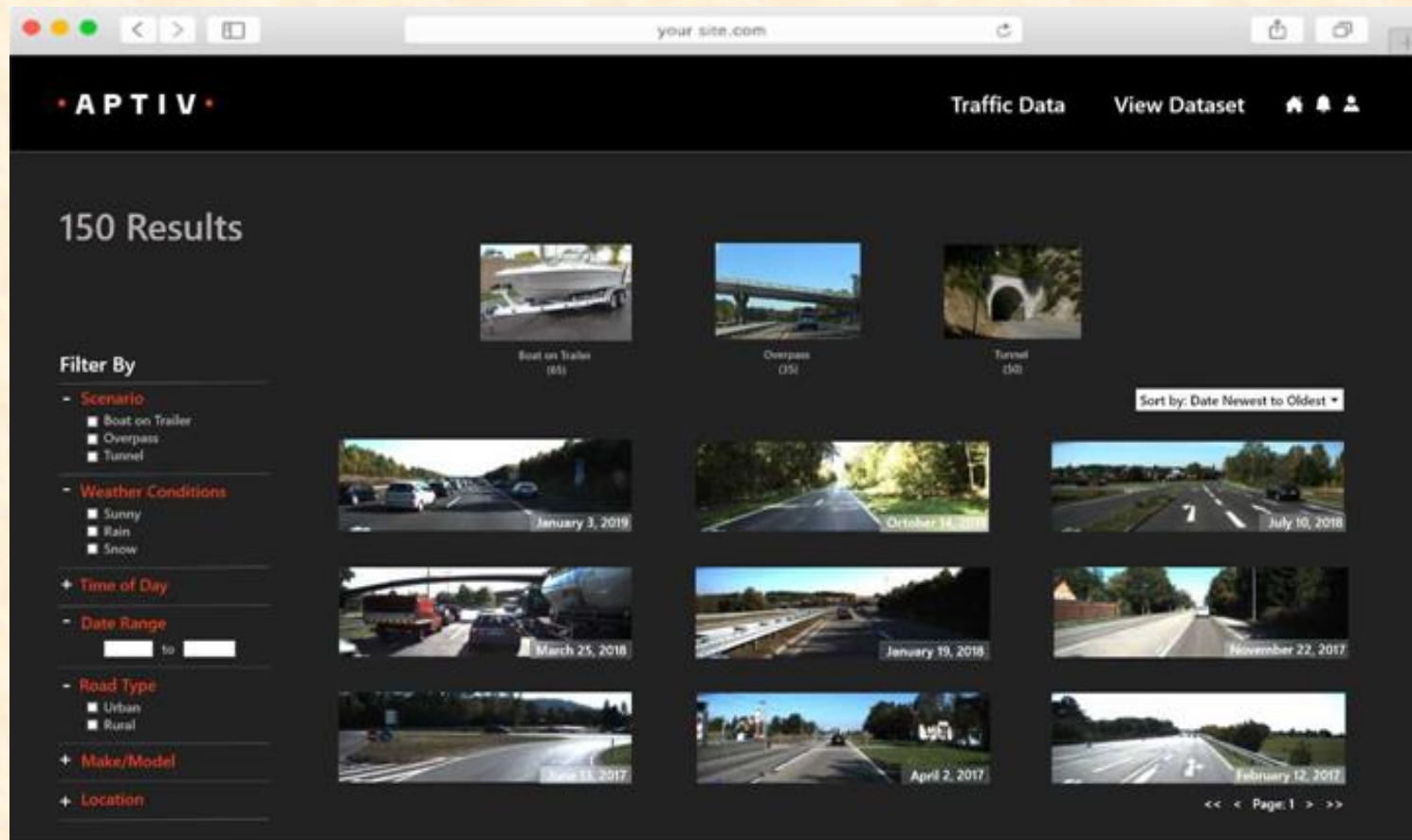
- Labeling videos
  - Create models for training data, testing data, validating data
  - Annotating videos and images
- PostgreSQL
  - Store data into database
- Prototype Web application
  - Data visualization



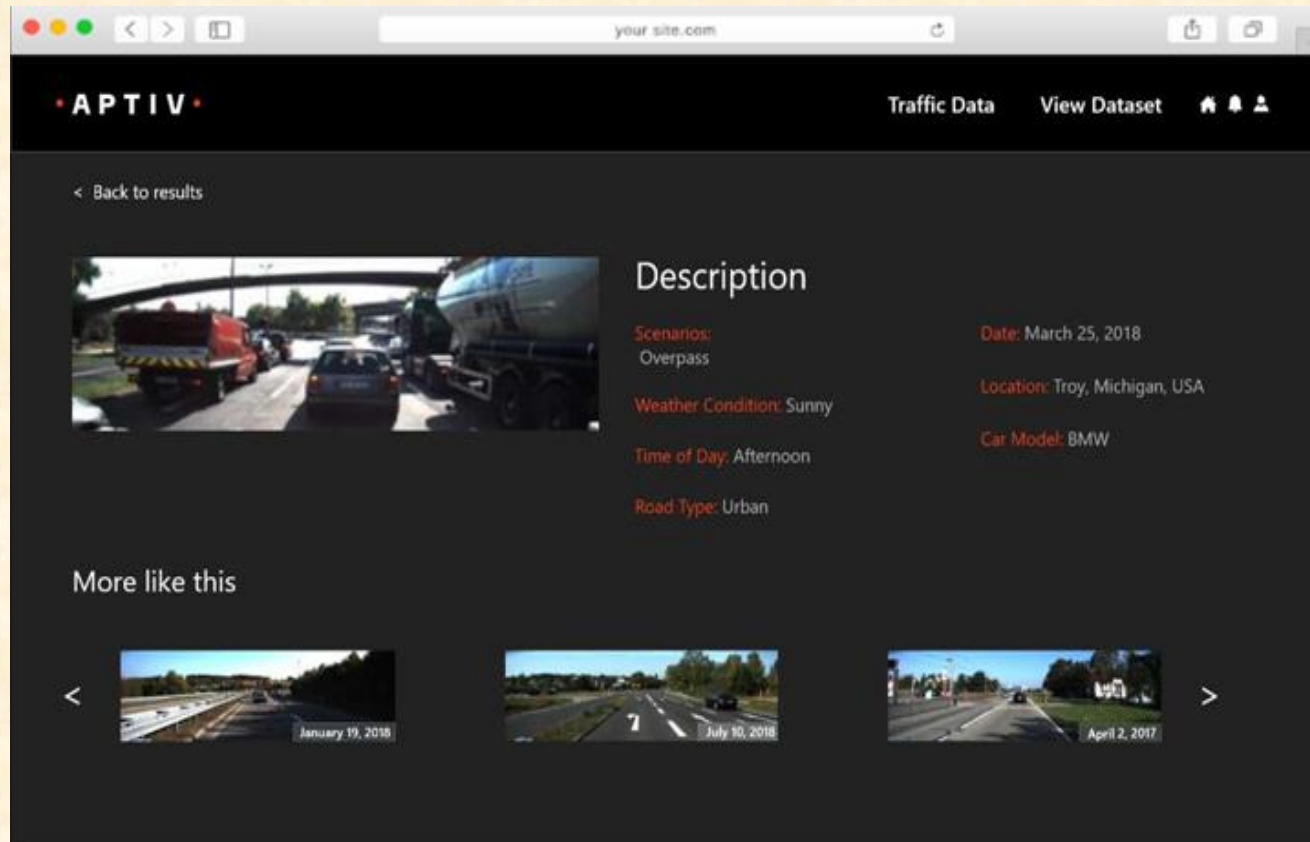
# Screen Mockup: Dashboard



# Screen Mockup: Traffic Data Results

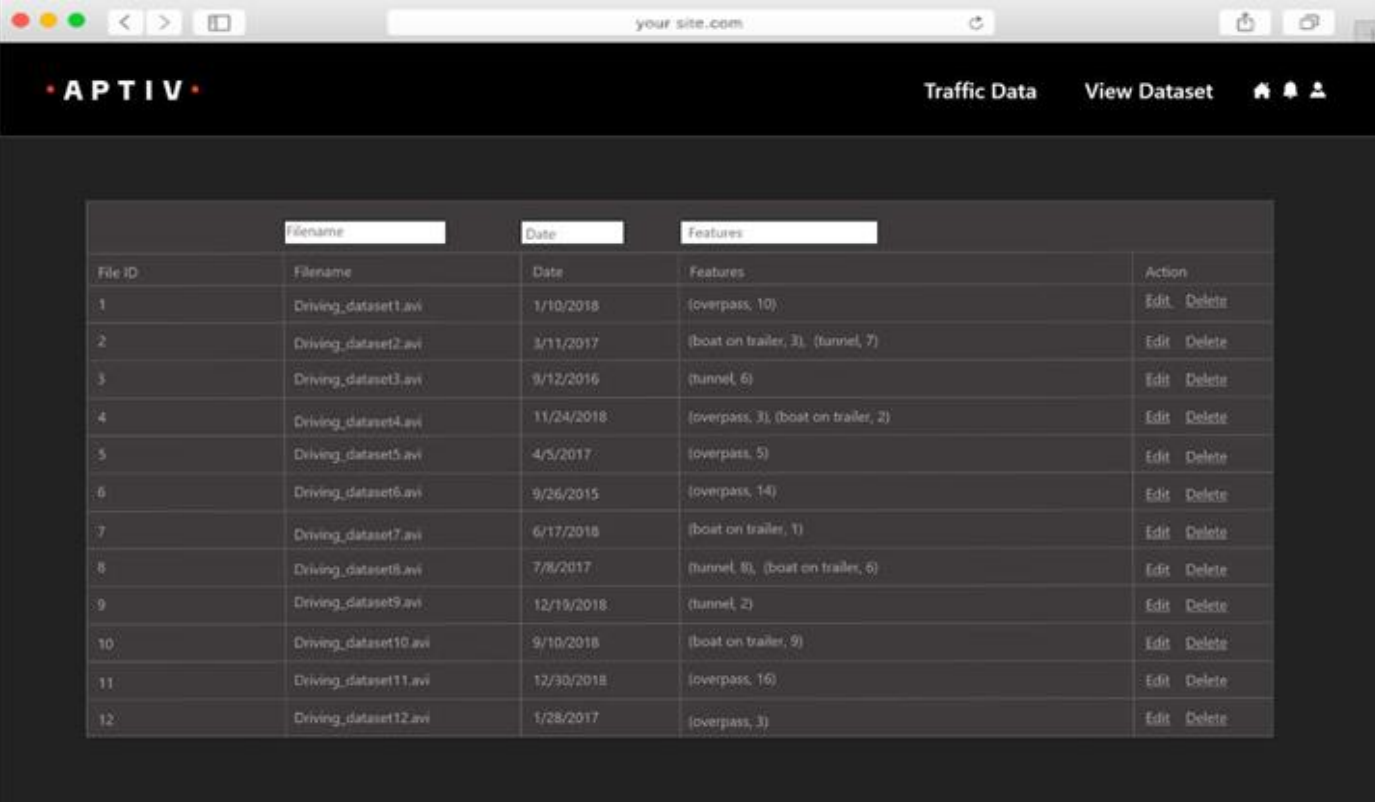


# Screen Mockup: Single Image Page





# Screen Mockup: Database Visual



The screenshot shows a web browser window with the URL "your site.com". The page header features the "APTIV" logo on the left and navigation links for "Traffic Data" and "View Dataset" on the right. Below the header is a table with 12 rows of driving dataset information. Each row includes a File ID, Filename, Date, Features, and Action columns.

File ID	Filename	Date	Features	Action
1	Driving_dataset1.avi	1/10/2018	(overpass, 10)	Edit Delete
2	Driving_dataset2.avi	3/11/2017	(boat on trailer, 3), (tunnel, 7)	Edit Delete
3	Driving_dataset3.avi	9/12/2016	(tunnel, 6)	Edit Delete
4	Driving_dataset4.avi	11/24/2018	(overpass, 3), (boat on trailer, 2)	Edit Delete
5	Driving_dataset5.avi	4/5/2017	(overpass, 5)	Edit Delete
6	Driving_dataset6.avi	9/26/2015	(overpass, 14)	Edit Delete
7	Driving_dataset7.avi	6/17/2018	(boat on trailer, 1)	Edit Delete
8	Driving_dataset8.avi	7/8/2017	(tunnel, 8), (boat on trailer, 6)	Edit Delete
9	Driving_dataset9.avi	12/15/2018	(tunnel, 2)	Edit Delete
10	Driving_dataset10.avi	9/10/2018	(boat on trailer, 9)	Edit Delete
11	Driving_dataset11.avi	12/30/2018	(overpass, 16)	Edit Delete
12	Driving_dataset12.avi	1/28/2017	(overpass, 3)	Edit Delete



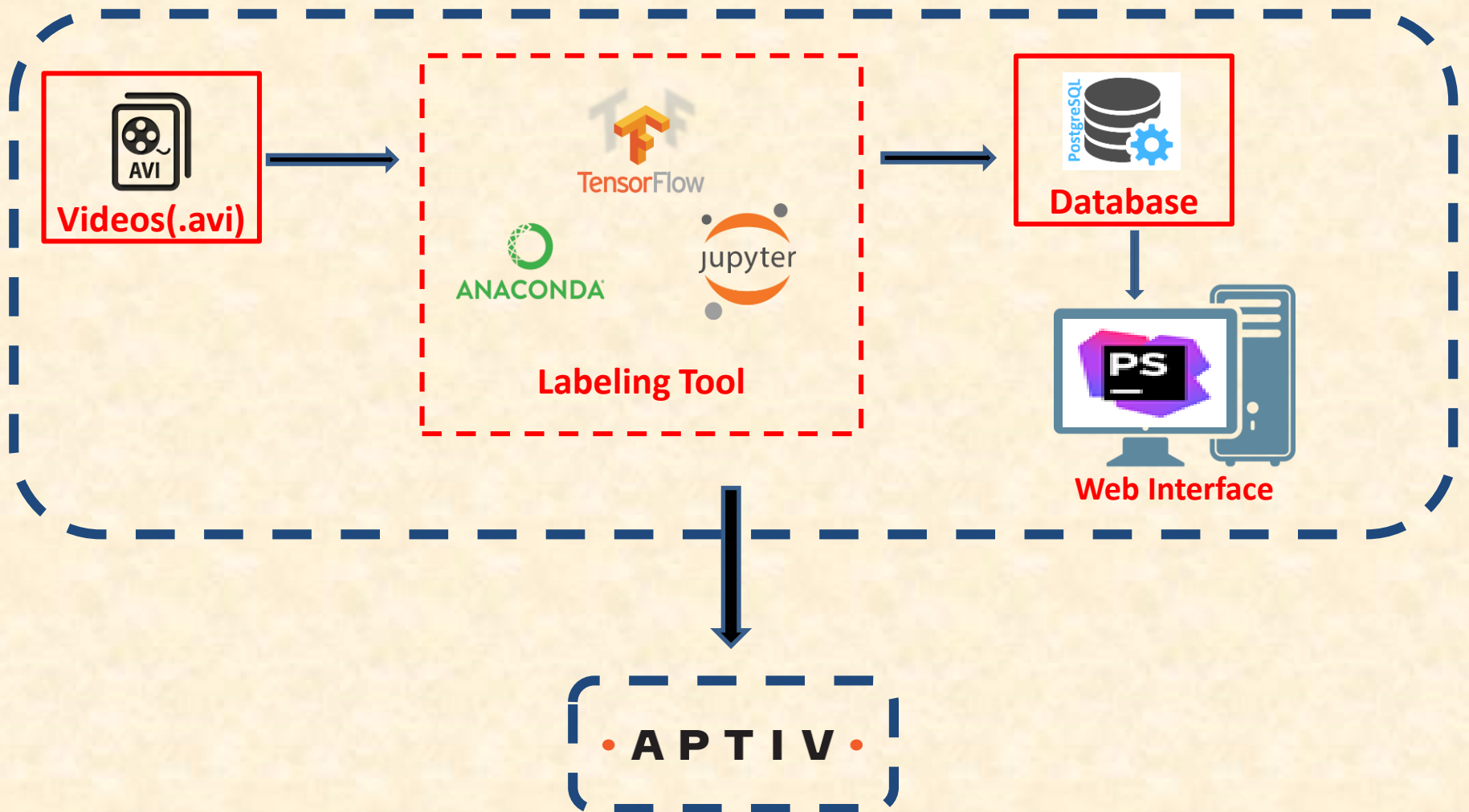
# Technical Specifications

- Backend
  - PostgreSQL 11.1
  - Jupyter Notebook 5.4
  - TensorFlow 1.5 API
- Frontend
  - Web based application developed in HTML 5, CSS 3, JavaScript 1.8.5, and PHP 3.5+
- API
  - Python 3.6.1





# System Architecture



# System Components

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- Hardware Platforms
  - Rack mount server
  - Aptiv provided PCs
- Software Platforms / Technologies
  - TensorFlow/Jupyter Notebook
  - Machine Learning and deep learning
  - PostgreSQL Database
  - HTML, CSS, JavaScript, PHP



# Risks

- Knowledge Gap
  - Description: Lack of experience with Deep Learning Framework
  - Mitigation: Do tensorflow.org tutorials. Contact Prof. Tang.
- Lack of Large Dataset for Training Model
  - Description: Attempted to use Berkeley Driving Dataset, but data is in incorrect format and is unusable.
  - Mitigation: Client has given us data through Aptiv laptops and an external link as well.
- Communication with Client
  - Description: Team and Client not on within proximity to meet often.
  - Mitigation: Client has come forward to be more available through email.
- Image Processing Capabilities
  - Description: Need a machine with high computational power and memory to process video.
  - Mitigation: Spoke with Ryan to use MSU machines. Using Aptiv laptops as of now.



# Questions?

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