Organizer:

EagleVision Inc.

ENSC 405 PoC Presentation

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- Business Case and Costs
- Technical Case
- Risk Analysis & Management
- Engineering Standards
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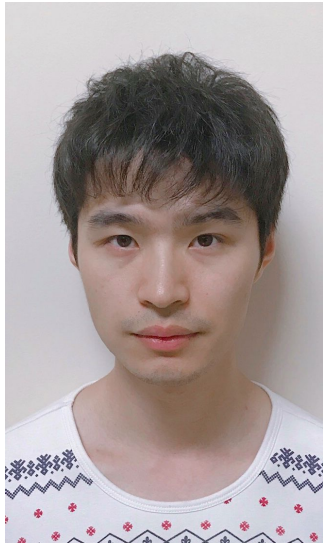
Personnel

John Xing
Chief Executive Officer
5th Year
System Engineering



Billy Luo
Chief Communications Officer
5th Year
Computer Engineering

John Zhang
Developer
Electronics Engineer
5th Year
Electronic Engineering

Introduction

- EagleVision - 2019 Startup focused on machine learning applications
- Looking to disrupt the machine learning sector in the consumer vehicle industry
- Passionate about reduction of pedestrian vehicular collisions
- Contribute towards lowering costs of development for the machine learning industry

Background

The NightEagle

Motivation

- Driving is an universal act that the majority of modern society partakes in:
  - Improvements impacts both us and consumers personally
  - The team is passionate about improving pedestrian and driver safety
- Night-time vehicular collision rates with pedestrians have increased. [1]
- The team is heavily invested in cutting edge Machine Learning.
- Create an affordable, highly marketable, and cutting-edge product.

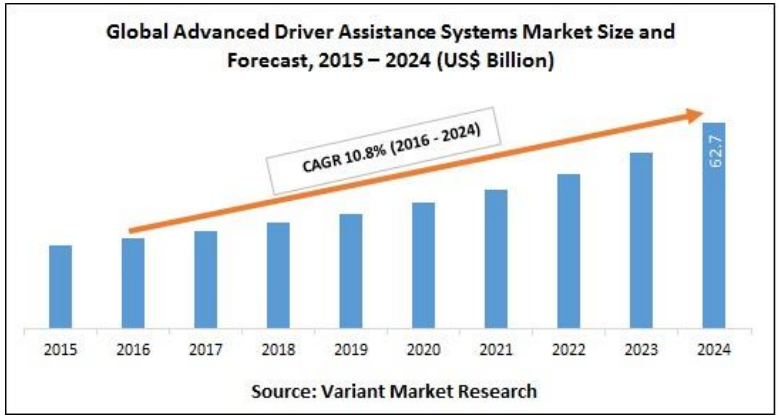
Business Case

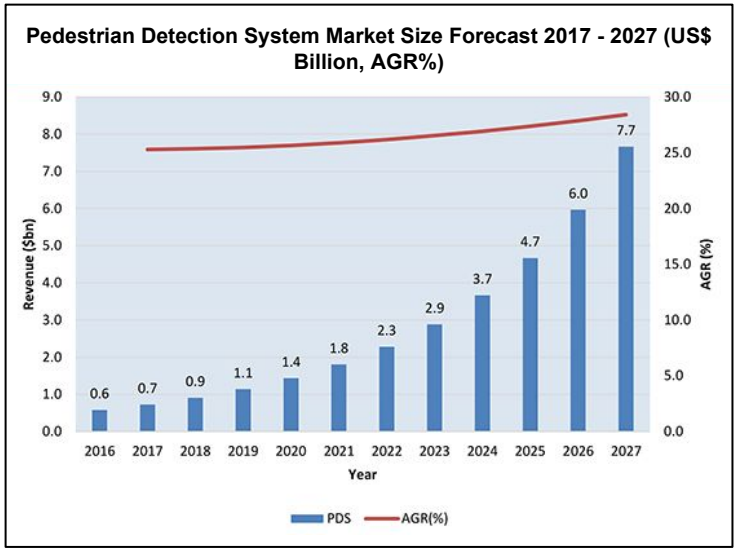
- Market Trends
- Financing
- Competition
- Ideal Customer Consideration

Market Trends

Market Size

Worldwide ADAS market size will reach **US$62.7 billion** by **2024**





Worldwide Pedestrian Detection System (PDS) market size will reach **US$7.7 billion** by **2027** with **28.33%** Aggregate Gross Rate (AGR)

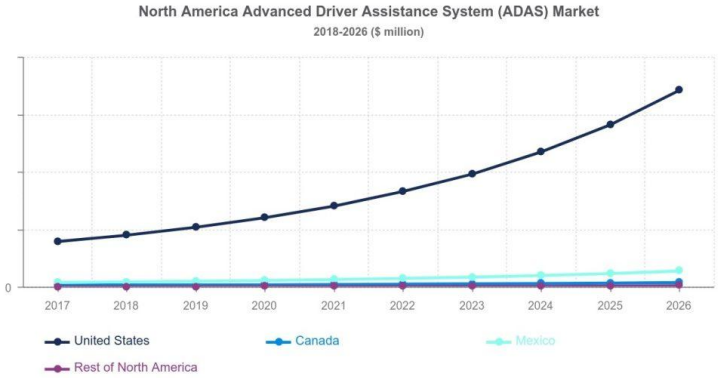
Market Trends

Market Compound Annual Groth Rate (CAGR)

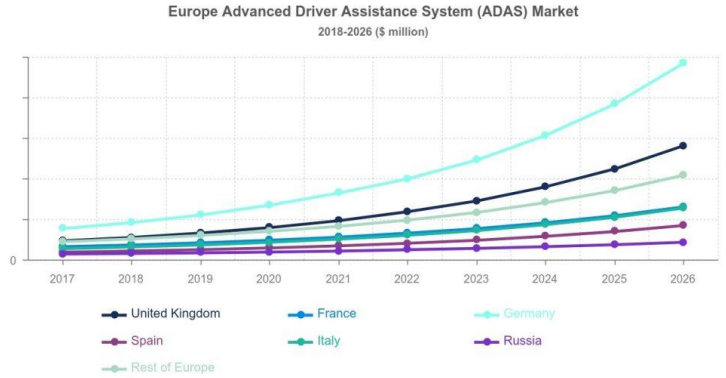
North America ADAS market will grow at **CAGR of 17.6%** by **2026**

Europe ADAS market will reach **20.41% CAGR** over the forecast period of **2018-2027**

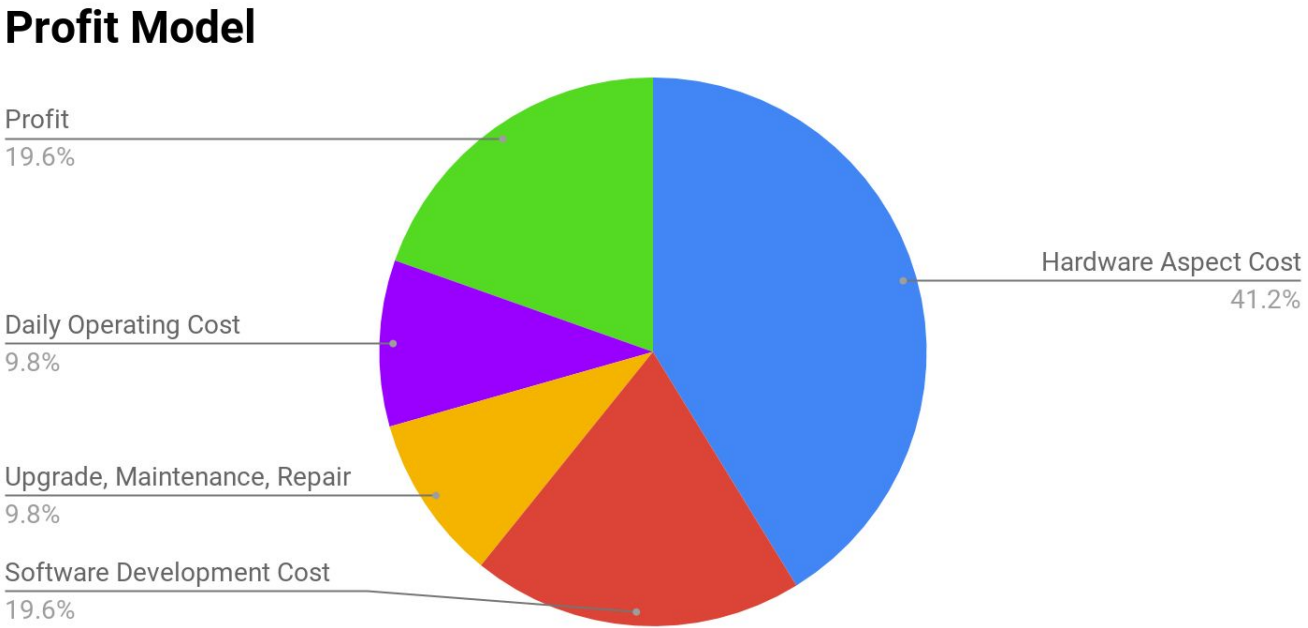
NORTH AMERICA ADVANCED DRIVER ASSISTANCE SYSTEM (ADAS) MARKET



EUROPE ADVANCED DRIVER ASSISTANCE SYSTEM (ADAS) MARKET



Financing



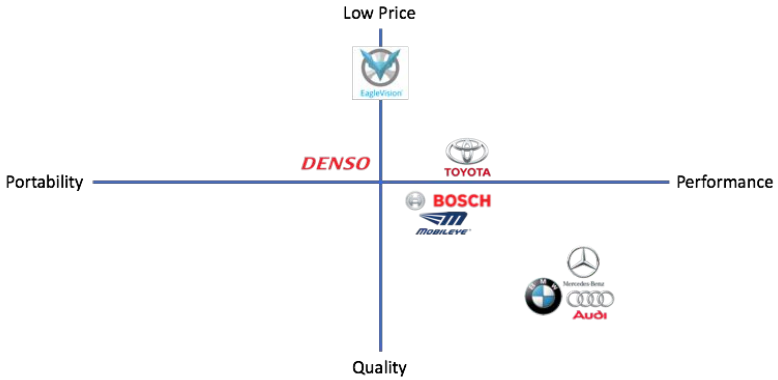
Competition

Table of Comparison

	EagleVision	TOYOTA	DENSO	BOSCH	MOBILEYE	Audi	Mercedes-Benz	BMW
Low Price	✓	✓	✓					
Portability	✓							
Quality				✓	✓	✓	✓	✓
Performance	✓	✓		✓	✓	✓	✓	✓

Table of Comparison

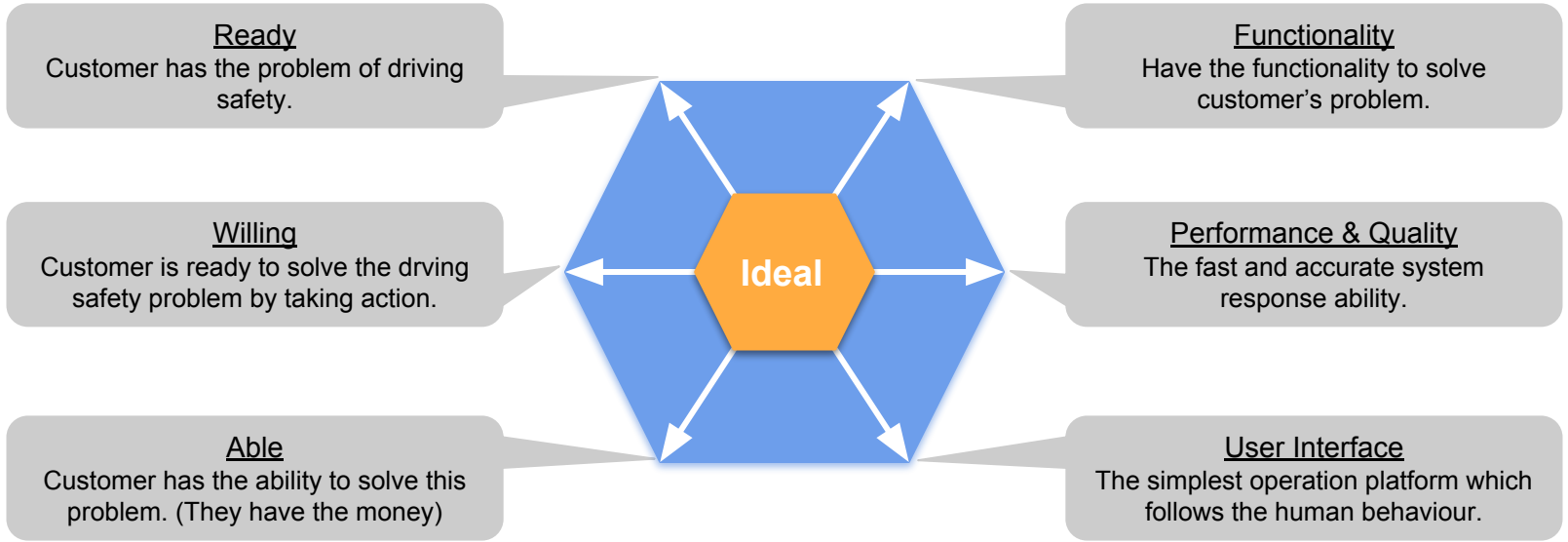
EagleVision is creating a **new market share** in the low-level PDS market.



Ideal Customer Consideration

Business Aspect

Technology Aspect

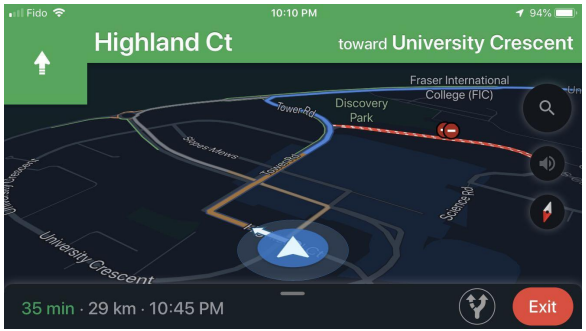


Technical Case

- Main Functions & Project Modules
- Software Programming
- Materials
- Design Consideration
- Schedule
  - Actual-date
  - Estimated
- Major changes in scope and design

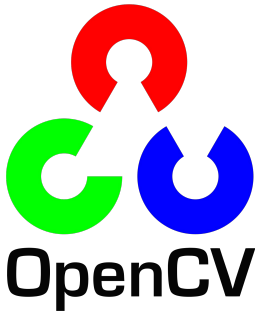
Main Functions & Project Modules

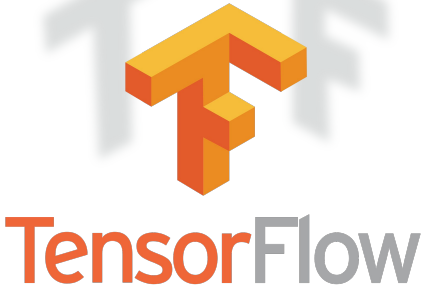
Modular UI Design



Main Program Library & Framework

- OpenCV - A library aimed at real-time computer vision
  - Haar Feature-based Cascade Classifier
- TensorFlow Object Detection API - Open source framework which can easily construct, train, and deploy object detection models.
  - SSDLite_Modilenet Model





Materials

- Raspberry Pi 3 B+
- Raspberry Pi Night Vision Camera
- Raspberry Pi Touchscreen
- MicroSDHC UHS-I Card
- Final Product Casing
- UPS HAT Board Module 2500mAh Lithium Battery



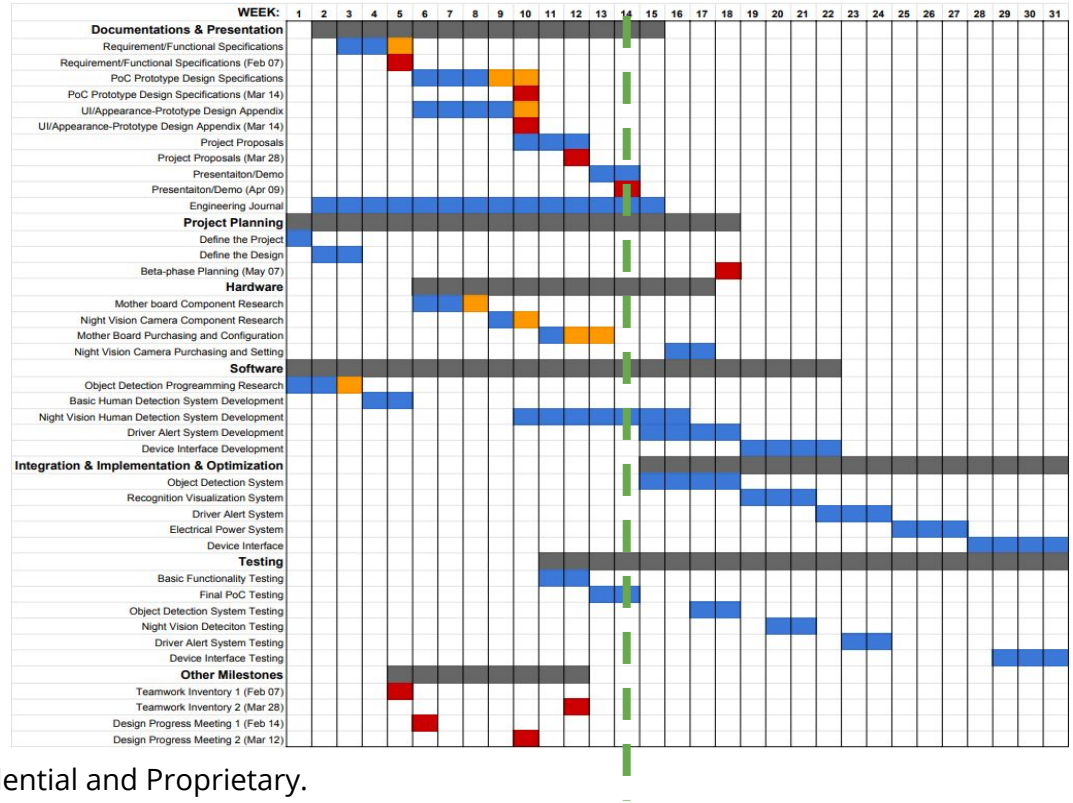

Design Consideration

- Cradle to Cradle
  - Reuse
  - Recycle
- Going Green
- Labour Fairness

Costs

- Prototype estimated total cost: C$ 412.82 (including 30% contingency and taxes)
- Single most expensive component: touchscreen display
- Prototype funding
  - School resources
  - Self funding
- Cost reduction efforts

ENSC 405 Schedule



Estimated Finishing Date

Actual Exceeding Finishing Date

Deadline

Total Finishing Date for each section

Major Changes

- No major change currently.
- In the 440 period:
  - Alert expression method
    - Audio / Vision
  - AC power => Raspberry Pi Battery

Risk Analysis & Management

- Product Safety
- Business Risks
- Product Risks

Product Safety

- Electrical safety
  - Electrical components
  - Electrical connections
- Mechanical safety
- Cyber security and information privacy

Business Risks

- Cost control
- Schedule

Product Risks

- Speed
- Feature creep

Engineering Standards

- Overall design: IEEE recommendations
- Electrical: UL 94 - The Standard for Safety of Flammability of Plastic Materials for Parts in Devices and Appliances Testing
- Radiation: RSS 102 - Radio Frequency (RF) Exposure Compliance of Radio Communication Apparatus
- Coding: Google’s coding standards

Self-Reflection

Learning Experiences

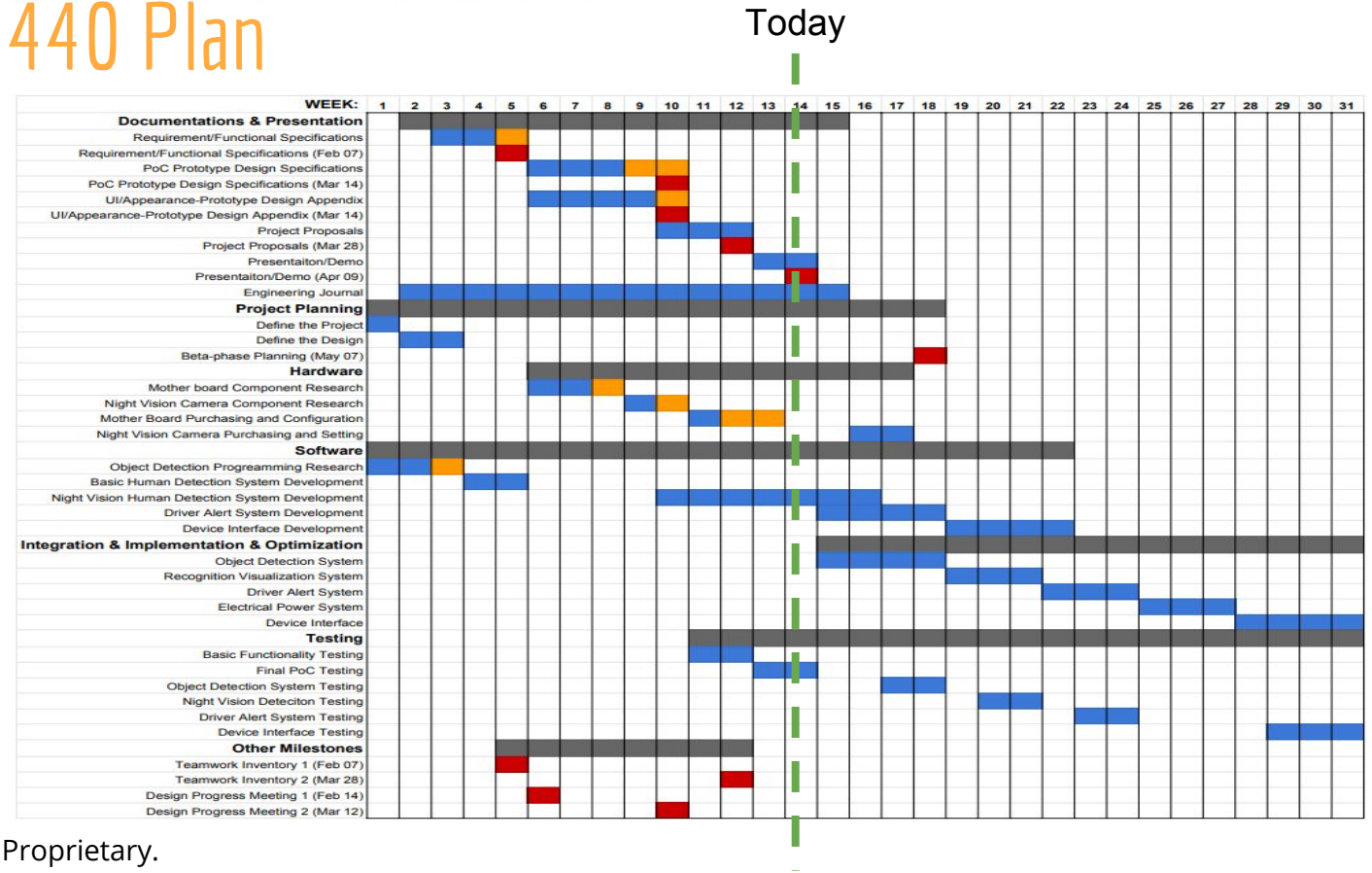
- When designing a product, should aim to solve a problem instead of trying to implement a technology
- Keeping track of issues, progress, and goals with Gitlab is very important for a development and iteration-based team
- Engineering standards and ethics should not be an afterthought during development process
- Hard and Software UI both play an integral role in the end user experience and can determine the failure or success of the product
- “Real talk” guest lecture was useful in improving team communications

Self-Reflection

Improvements and Changes

- Will try to incorporate Gitlab even more into development/iteration cycle, along with Disciplined Agile
- Will aim to host more team meetings, both in person and online, try to encourage more “real talk” to improve team bonding
- Will take more time to consider UI, test cases, and standards in ENSC 440

ENSC 440 Plan



Conclusion

- Project Summary
- Key learning objectives
  - Technical Brainstorming
  - Professional technical documentation
  - Leadership, teamwork elements, and organizational learning experiences
- Acknowledgements

References

[1] S Plainis, I J Murray, and I G Pallikaris, “Road traffic casualties: understanding the night-time death toll”, NCBI, 2006. [Online]. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2564438/
[2] “Advanced Driver Assistance System (ADAS) Market”, Variant Market Research, 2017. [Online]. Available: https://www.variantmarketresearch.com/report-categories/automotive/adas-market
[3] “Automotive Advanced Driver Assistance System (ADAS) Market Report 2017-2027”, Visiongain, 2017. [Online]. Available: https://www.visiongain.com/report/automotive-advanced-driver-assistance-systems-adas-market-report-2017-2027/
[4] “North America Advanced Driver Assistance System (ADAS) Market Forecast 2018-2026”, InkWood, 2018. [Online]. Available: https://www.inkwoodresearch.com/reports/north-america-advanced-driver-assistance-system-adas-market/
[5] “Europe Advanced Driver Assistance System (ADAS) Market Forecast 2018-2026”, InkWood, 2018. [Online]. Available: https://www.inkwoodresearch.com/reports/european-advanced-driver-assistance-system-adas-market/

Questions Period