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PROJECT PHASE – I

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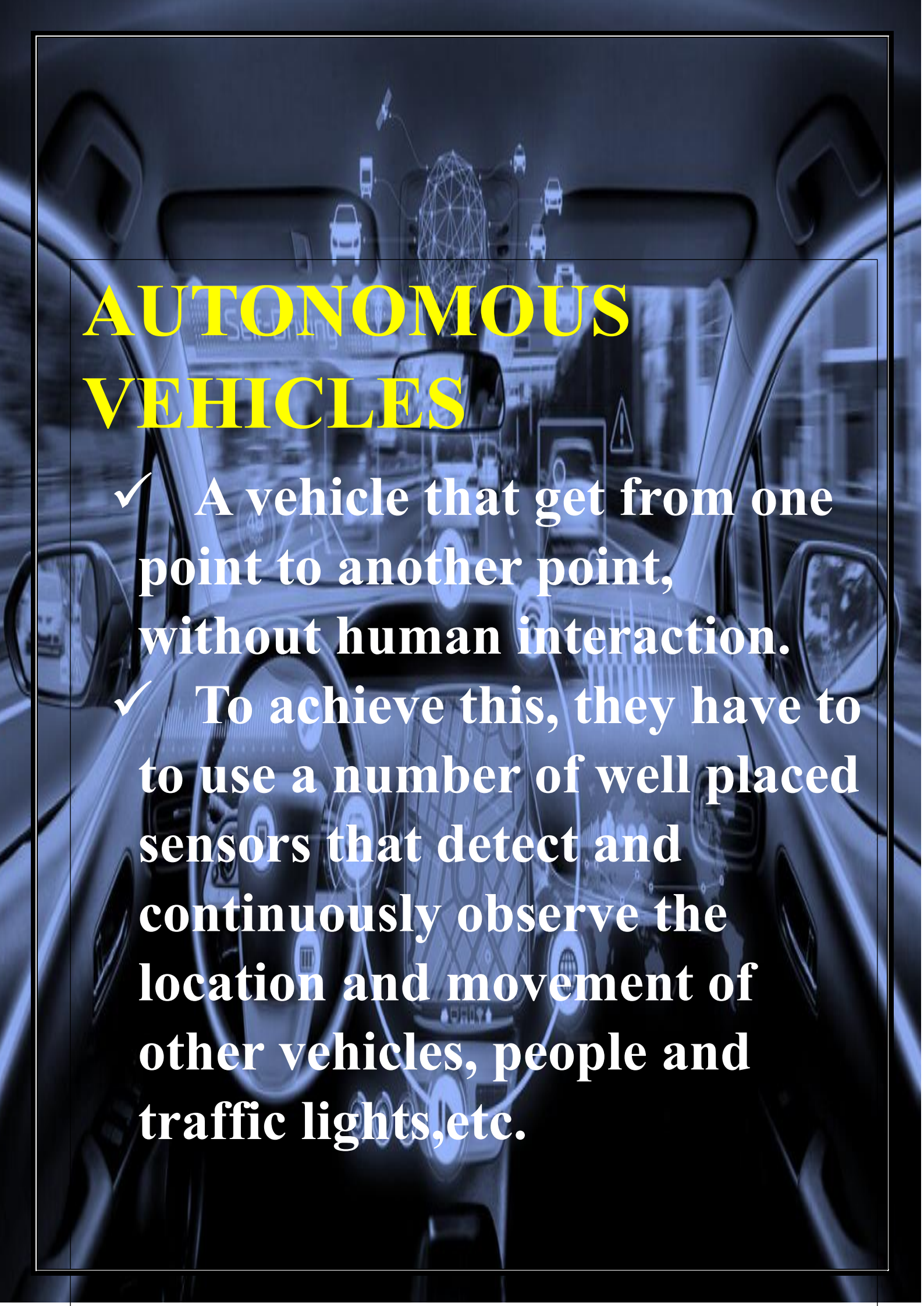
DOMAIN : ARTIFICIAL INTELLIGENCE

TOPIC : DEVELOPMENT – AUTONOMOUS VEHICLES

DEPARTMENT : COMPUTER SCIENCE

COLLEGE : 8201 – A.R.J COLLEGE OF ENGINEERING AND TECHNOLOGY



AUTONOMOUS VEHICLES

- ✓ A vehicle that get from one point to another point, without human interaction.
- ✓ To achieve this, they have to to use a number of well placed sensors that detect and continuously observe the location and movement of other vehicles, people and traffic lights,etc.

ABSTRACT

Autonomous vehicles have been invented to increate the safety of transportation users. These vehicles can sense their environment and make decisions without external aid to produce an optimal route to reach a destination. Even though the idea sounds futuristic and if implemented successfully, many current issues related to transportation will be solved, care needs to be taken before implementing the solution.

INTRODUCTION

Seen yesterday as a dream, autonomous vehicles (AVs) are closer and closer to

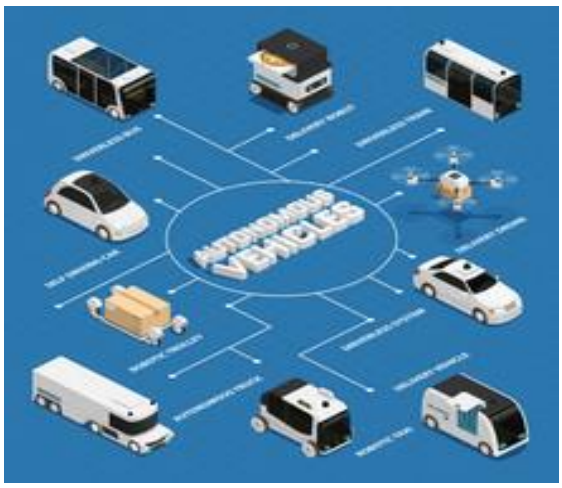
become  to reality. Research on AVs is bringing to light the huge impacts that they might imply for different fields. Consequences of vehicle automation on global mobility, on traffic efficiency, on competitiveness, on the labor market, on the occupancy of the territory, etc. However, the most controversial topic has to do with the vehicle decision-making process. Controversy emerges in case of danger, as the AVs behaviour will not be based on individual moral or impulsive reactions.

METHODOLOGY

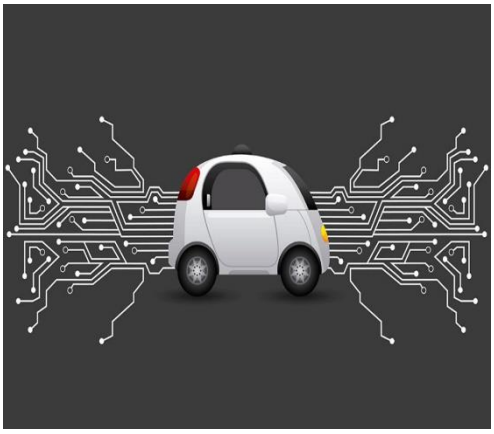
The methodology of autonomous vehicles typically involves several key components,

1.PERCEPTION : Utilizing sensors such as cameras, lidar, radar, and ultrasonic sensors to detect and interpret the vehicle's surroundings, including other vehicles, pedestrians, road signs, and obstacles.

2.LOCALIZATION : Determining the vehicle's precise position and orientation within its environment using GPS, inertial measurement units (IMS) and other localization techniques.



3.MAPPING : Creating and updating maps of vehicle's operating environment, including road layouts, lane marking, traffic signs, and landmarks.



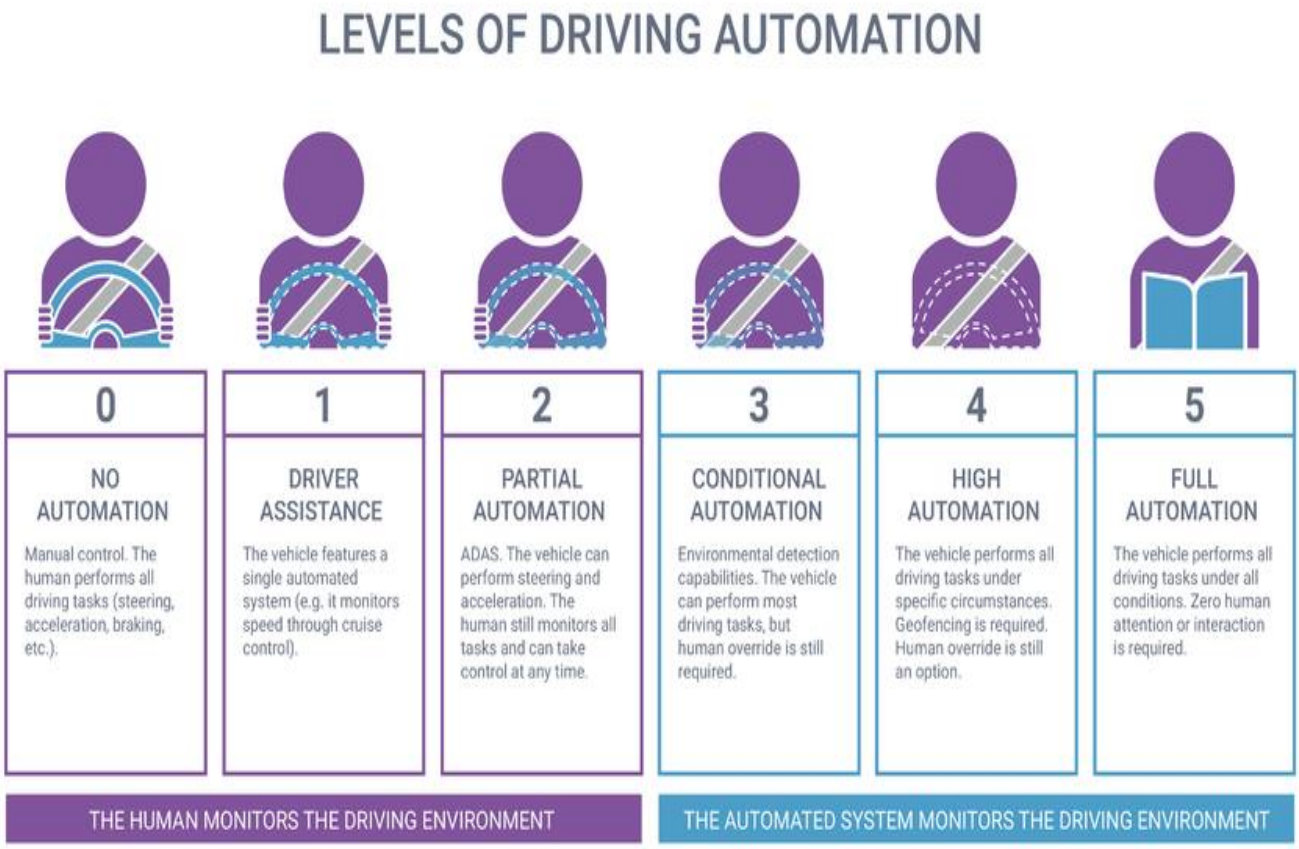
4.PATH PLANNING : Generating safe and efficient trajectories for the vehicle to follow based on its perception of the environment, traffic conditions, and navigation objectives.

5.CONTROL : Implementing algorithms to control the vehicle's acceleration, braking, steering and other actuators to execute the planned trajectory while ensuring safety and comfort.

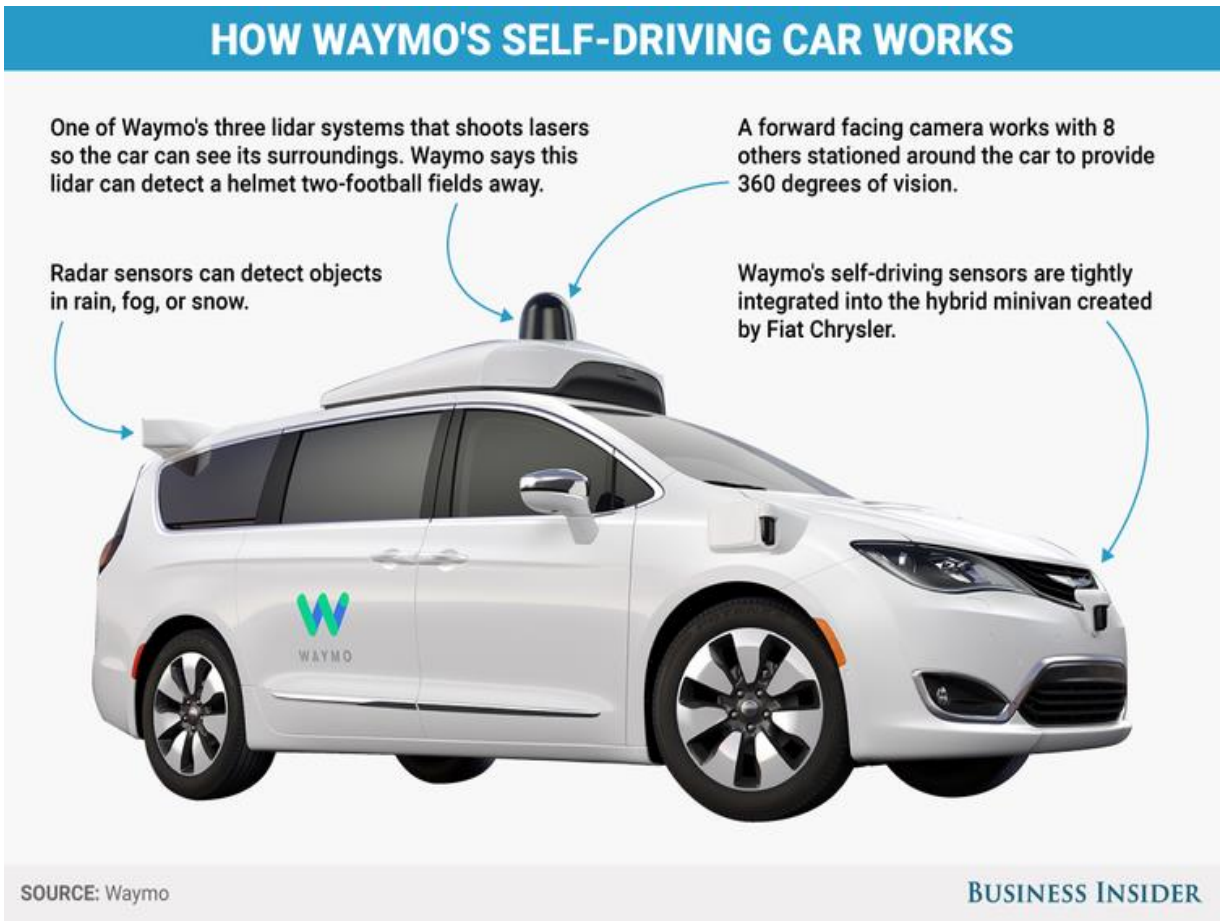
6.DECISION MAKING : Making high-level decisions such as lane changes, merging into traffic, navigating intersections, and responding to unexpected events or obstacles.

EXISTING WORK

The automated vehicles are classified into six levels. They are,



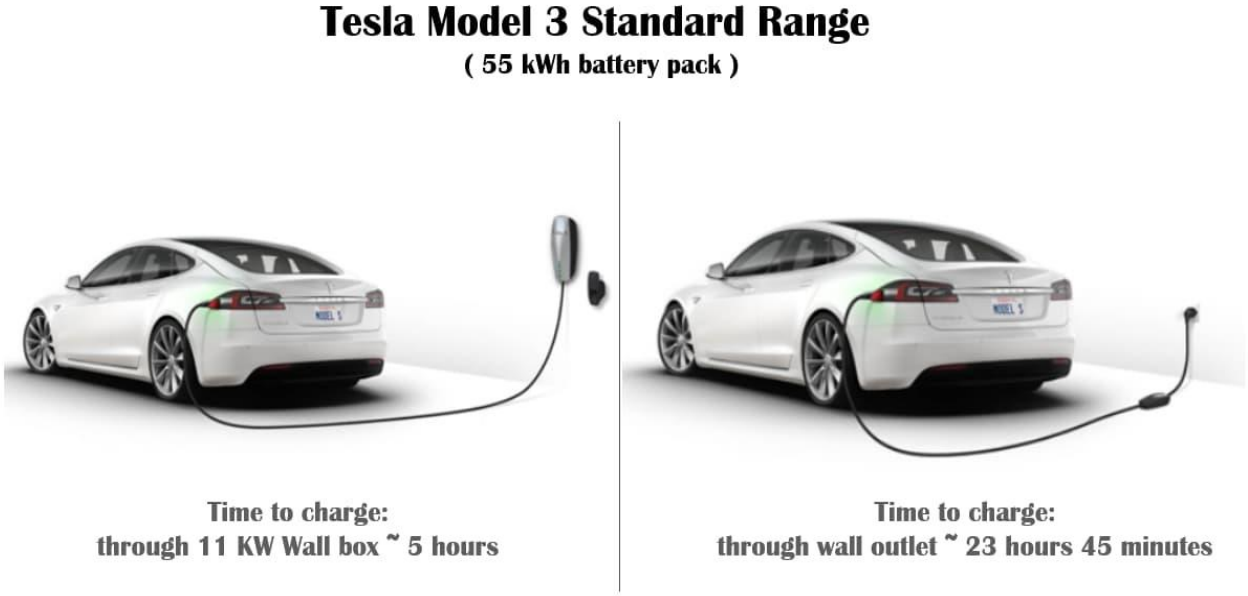
NEW / PROPOSED WORK



Several companies have developed and deployed automated vehicles to varying degrees of autonomy. Some notable examples include:

1.WAYMO : Waymo operates a commercial ride-hailing service in select

areas, offering rides in fully autonomous vehicles without safety drivers behind the wheel.

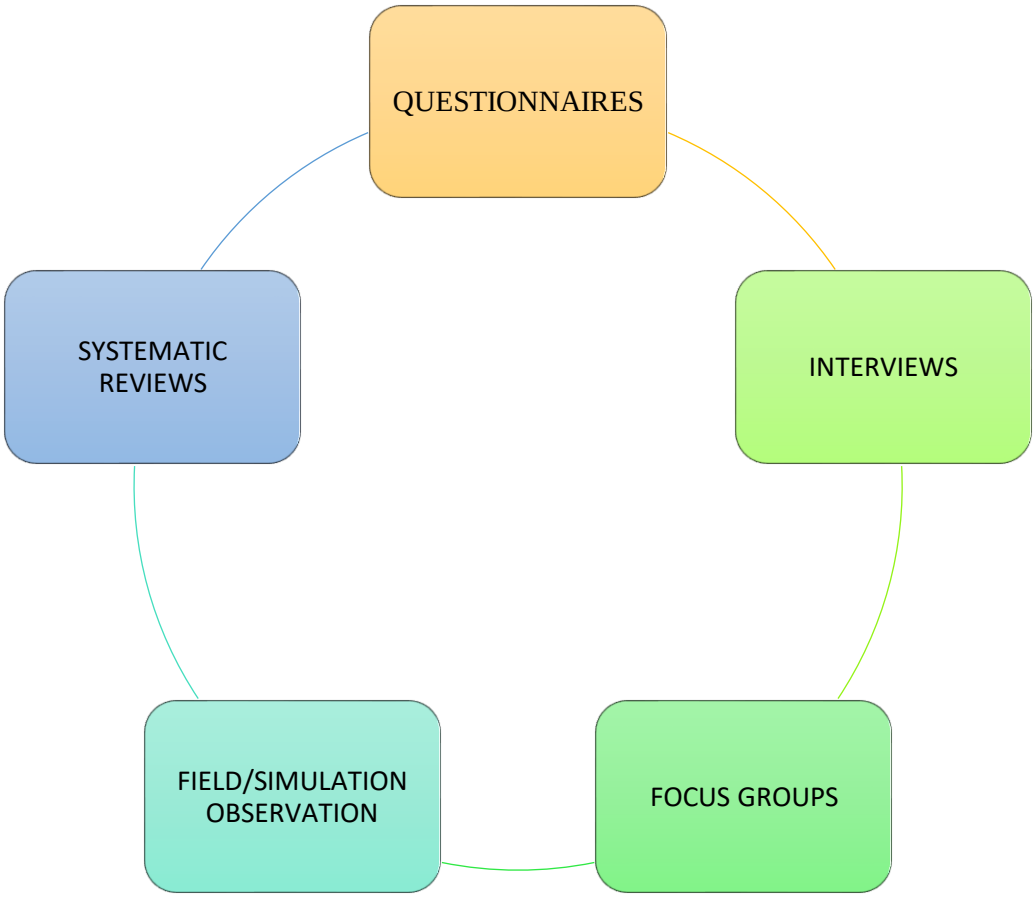


2.TESLA : Tesla's Autopilot system provides driver assistance features such as adaptive cruise control, lane-keeping assistance, and automated lane changes. Tesla aims to achieve full self-driving capability through software updates.

3.Cruise, Uber ATG, Ford.

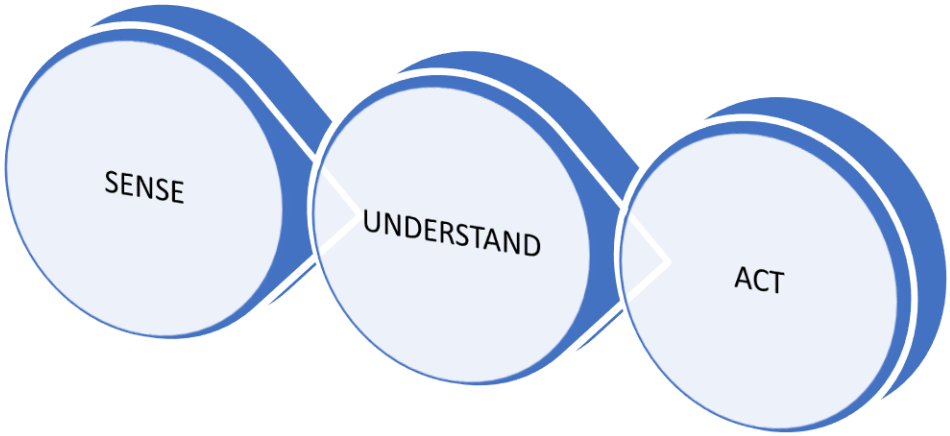
REQUIREMENTS

User requirements can be extracted in a number of ways ranging from qualitative method to those which afford the researcher the opportunity to collect vast amounts of quantitative data. Some of the methods to extract user requirements are as follows,

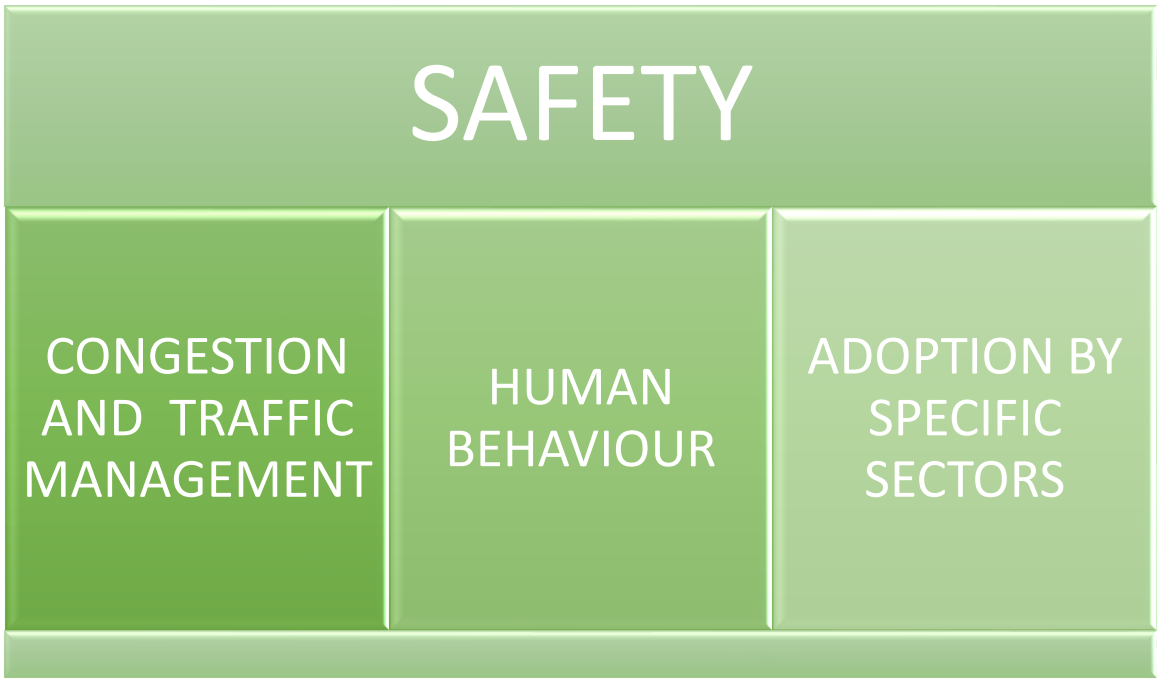


PHASES

The automation systems of automated vehicles follows three phases. They are,



BENEFITS



IMPLEMENTATION ISSUES

- Technology issues
- Vehicle costs
- Liability and law issues
- Security and privacy issues
- Ethical issues
- Increased traffic

SECURITY ATTACKS

- Attacks against ultrasonic sensors
- Attacks against MMW radars
- Attacks against on-board cameras
- Attacks against LiDAR system
- Attacks against the GPS
- Attacks against the communication system

DRAWBACKS

1).Although there are people who want the technology in their cars, it can cost:

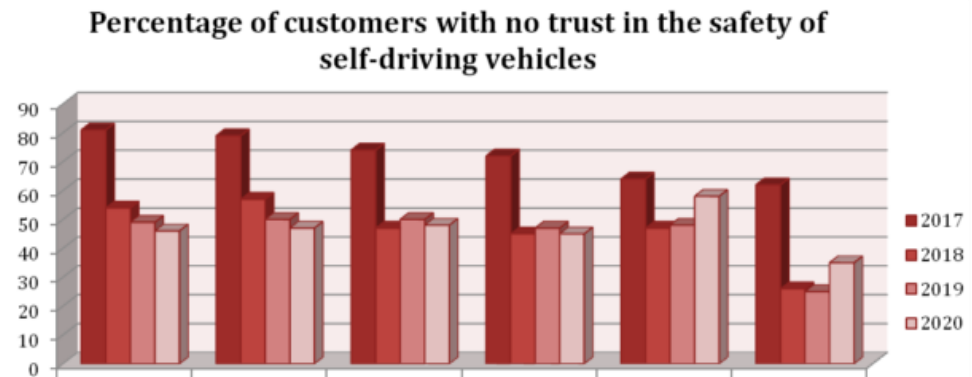
i.$2,000 on average for safety-related tech(not automation)

ii.$10,000 for the "Cruise" autonomous system in the Audi S4s.

2).Poor performance in adverse weather conditions.

3).Who is to blame in the case of an accident?

i. The programmer? ii. The driver?



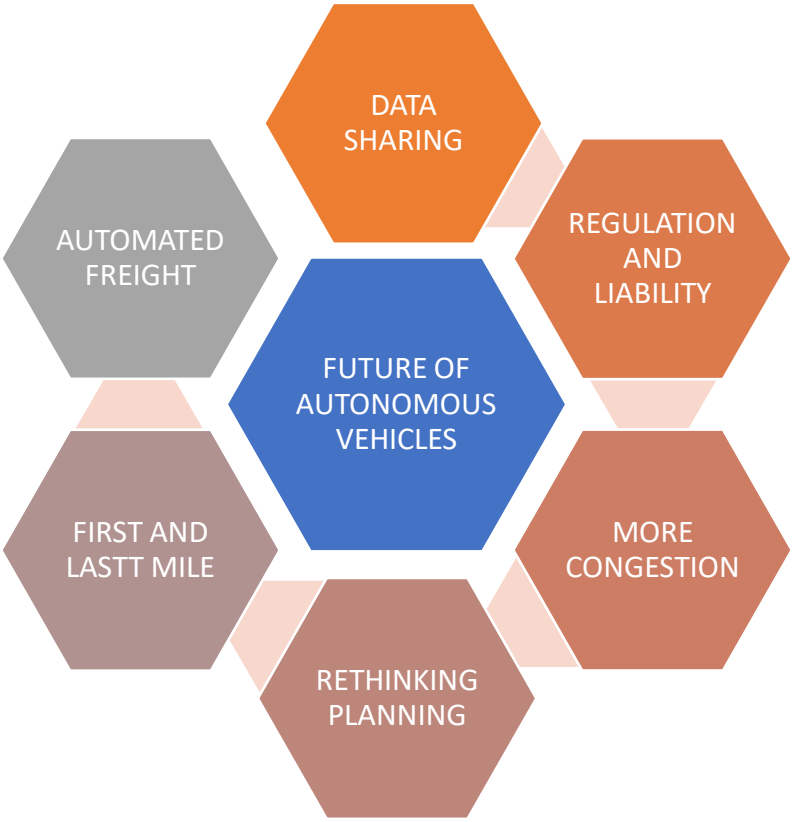
	Soth Korea	Japan	USA	Germany	India	China
2017	81	79	74	72	64	62
2018	54	57	47	45	47	26
2019	49	50	50	47	48	25
2020	46	47	48	45	58	35

ALGORITHMS NEEDED FOR AV

- 3D imaging with multiple 1064 nm (nanometer) lasers.
- Edge Detection algorithm
- Motion Detection algorithm
- Tracking algorithm

FUTURE WORK

The future of autonomous vehicles looks promising, with advancements in technology aiming for safer, more efficient transportation. We can expect continued improvements in AI, sensor technology, and regulations to drive their development and adoption.



CONCLUSION

In conclusion, autonomous vehicles represent a transformative shift in transportation, offering the potential for safer roads, reduced congestion, and increased accessibility. while challenges remain, continued advancements in technology and regulatory frameworks suggest a promising feature for autonomous vehicles.