EVER 2024 BUSINESS CASE

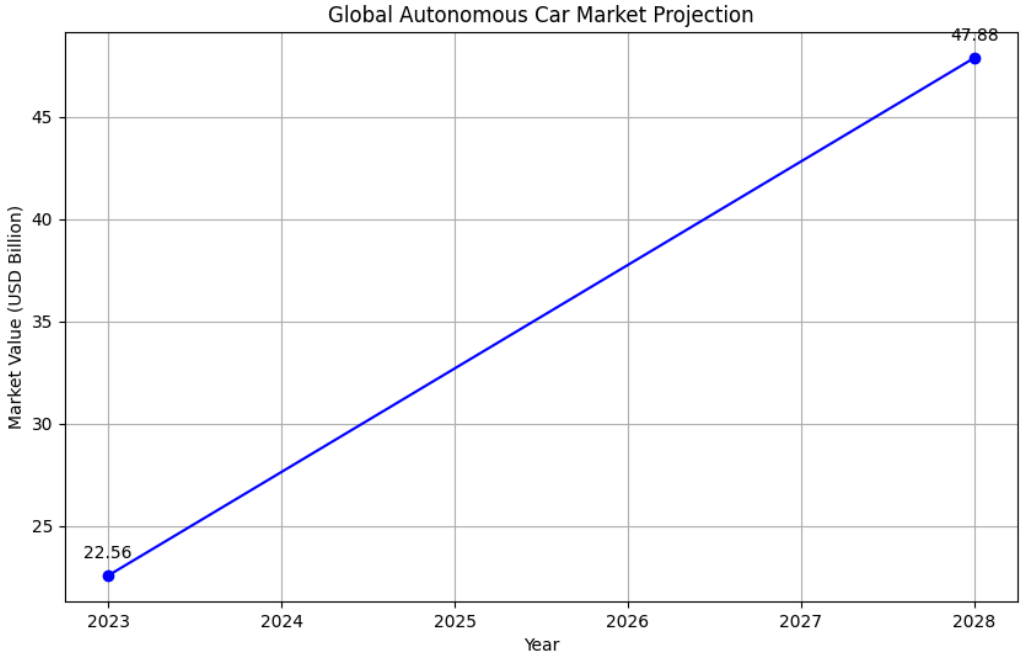
Institution /Team Identification: **IEEE Zagazig SB**

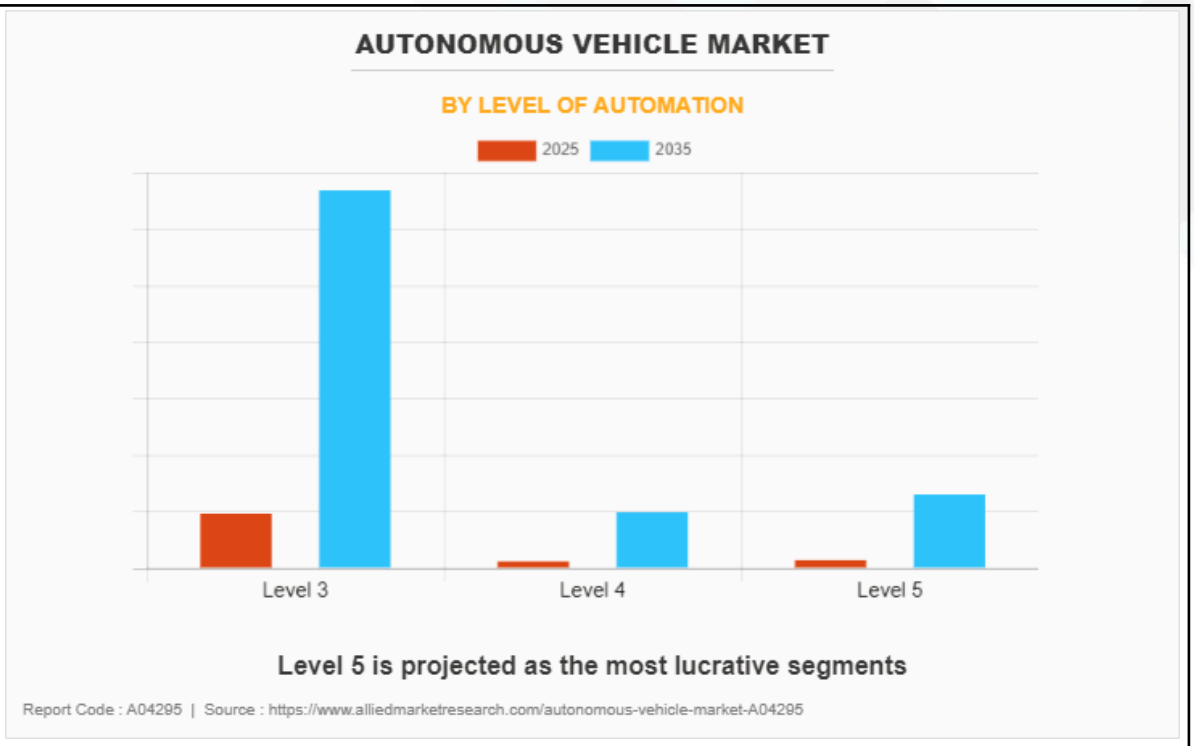
Analysis of Market Data

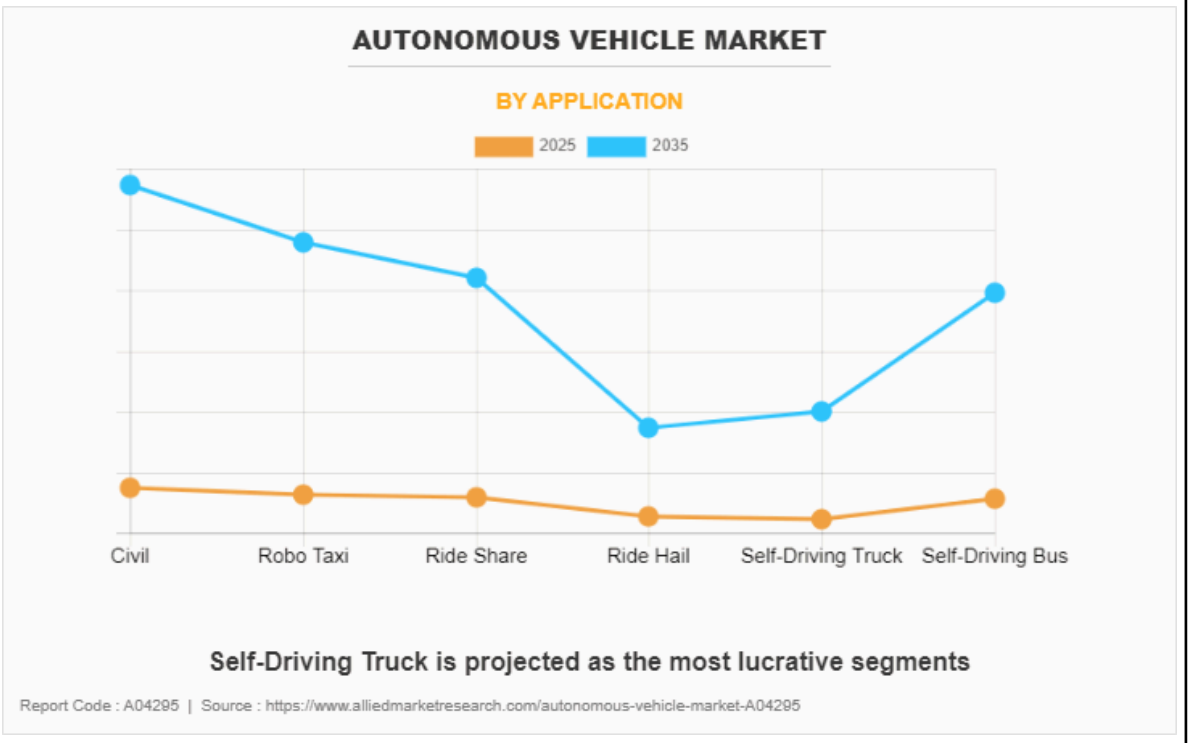
This analysis aims to provide insights into the potential market size, growth prospects, target customers, and competitive advantages of the autonomous car product

1- Market Size and Growth:

The market size of autonomous cars has been steadily expanding, driven by advancements in self-driving technology and the increasing demand for safer and more efficient transportation. Currently, around one million people die annually in car accidents. However, with the widespread adoption of self-driving cars, this number is expected to decrease by 90%. According to market research reports, the global autonomous car market was valued at USD 22.56 billion in 2023 and is projected to reach USD 47.88 billion by 2028, growing at a compound annual growth rate (CAGR) of 13.24% during the forecast period.




AUTONOMOUS VEHICLE MARKET
BY LEVEL OF AUTOMATION
2025
2035
Level 3
Level 4
Level 5
Level 5 is projected as the most lucrative segments
Report Code : A04295 | Source : https://www.alliedmarketresearch.com/autonomous-vehicle-market-A04295


AUTONOMOUS VEHICLE MARKET
BY APPLICATION
2025
2035
Civil
Robo Taxi
Ride Share
Ride Hail
Self-Driving Truck
Self-Driving Bus
Self-Driving Truck is projected as the most lucrative segments
Report Code : A04295 | Source : https://www.alliedmarketresearch.com/autonomous-vehicle-market-A04295

2- Target Customers:
As an automotive Company and aim for self-driving car technology continues to develop, self-driving cars are expected to become available in different levels of capabilities.This will target a multi-level marketing approach that targets different consumer (b2c) and business (b2b)segments.

3-Competitive Landscape:
Some of the key players in the market such as Tesla, Waymo, GM, and Ford are actively investing in the development of autonomous driving technology. in the Middle East WeRide in Dubai aims to have 30% of its transportation self-driving by 2030. Similarly, Saudi Arabia aims to make the entire city of Neom self-driving, and Riyadh plans to introduce self-driving buses. They are also working on expanding these initiatives to multiple locations.

4-Regulatory Environment:
The Egyptian government is actively promoting the adoption of self-driving cars as part of its vision for Fourth generation cities such as The New Administrative Capital & Alalamen City. And also by building infrastructure, bridges, and roads worth 400 billion Egyptian pounds.

5-Technological Differentiation:
There are 5 levels of autonomy, We aim to provide all according to what you need.

6-Partnerships and Ecosystem:
We can make Partnerships with TIER 2 companies to get our hardware needs (MCUs, Cameras, LIDARs...and so on) .

Company Strategy

The vision: Achieve the highest quality and the fastest rise in Egypt
To achieve this:
1. Our company specializes in autonomous car (hardware and software), and our strategy includes a strong focus on Research and Development (R&D) to drive innovation and ensure we remain at the forefront of our industry

2. Recruiting top talents in the market.

3. Hire exceptional graduates.

4. Bringing in talents from outside Egypt.

5. Offer training courses to develop skills.

6.Contracting with strategic companies

7. We will contract with companies like Bosch, Velodyne to purchase hardware parts.

8. We hope to have agreements with some OEMs such as Volkswagen and Hyundai to supply them with specific components for their vehicles.

9. Provide internships for outstanding students.

10. Organize annual competitions to benefit from developers' minds.

11. Implement a culture of continuous improvement to enhance processes, products, and services.

12. Customer Focus: Prioritize customer satisfaction and feedback to drive product/service improvements.

13. Taking regular feedback from all clients or another company and responding promptly to any requested changes.

14. Conducting annual update

The objective:
We aim to sell **500** units (both software and hardware) annually.
We are expanding our services to new cities in Egypt, such as Almen.
Expanding into the Middle East after 15 months.
Competing with global companies using a locally-produced product that delivers the same performance at a lower price and high quality.
Achieving an annual profit of 400,000$.

Roadmap:
In the first six months, we aim to target cars including private cars(**B2C**), Car rental companies that offer rental services for both long and short periods including the Egyptian NationalHailing companies or Ride such as Uber, Careem, and Indrive(**B2B**)**.**
In the next four months(B2B), we aim to target buses including Large bus companies that operate public transportation services in cities Including Cairo Transport Authority (CTA) and Alexandria Passenger Transportation Authority in Egypt.
In the following six months(B2B), we aim to target public transport companies including delivery and shipping companies including Aramex, DHL, FedEx, and UPS.
After 15 months, we will expand into the whole Arab region**.**

Product/Service Strategy & Performance

- **Market:**
  According to market research reports, the global autonomous car market was valued at USD 22.56 billion in 2023 and is projected to reach USD 47.88 billion by 2028. Technological Impacts Self-driving cars are witnessing significant technological developments, with a focus on improving road safety. Advances in areas such as artificial intelligence, machine learning, and sensor technologies like RADAR, LIDAR, and GPS are key factors that enable manufacturers to enhance the autonomous driving capabilities of vehicles.
- **Current and Future Levels:**
  Currently, self-driving cars at Level 2 and Level 3 dominate, but it is expected that the development will progress to achieve wider acceptance for Level 4 and Level 5 vehicles by 2030, however of course this will change significantly when we enter the market and reach those levels before the year 2030.
  Key Markets: North America is a major player in this market, and the continent of Asia, especially countries like China, Japan, India, and South Korea.
- **Customers**
  1-Ride-Hailing companies
  2-Freight shipping companies
  3-Government sectors to be used in public transportation.
- **Features**
  1. All-Weather Capabilities:
  The vehicle can function in a variety of weather circumstances, such as rain or fog, and it can easily
  traverse through arid regions and uneven terrain.
  2. Speed Selection:
  The vehicle decides how fast to go on the given road.
  3. Regular Updates: Through our system tracking, the vehicle receives updates every six months and is periodically updated whenever a system problem arises.

- **Our Market Strategy:**
  We start with Ride-Hailing cars and private vehicles, then after 6 months, we begin with public transport buses. Following that, we move on to product shipping companies and freight shipping companies. Then, after three years of the company's operation, we work on upgrading the software to levels four and five.

- **Service Provided**

  We provide a fully autonomous car that does not require any human intervention. This product is divided into two parts:

  1-Software: It completely controls the car, including its movement and speed, through a set of sensors and a camera. The software creates a map for the car to follow and deals with natural road conditions, whether it's other cars, pedestrians, or curbs until it reaches the desired point.

  2-Hardware: This consists of sensors that provide values and readings to the software controlling the car. Here are some of the sensors and their functions:

  - **LIDAR:** provides highly accurate 3D maps of surroundings, helping autonomous vehicles detect obstacles, pedestrians, and other vehicles.
  - **Radar:** emits radio waves to detect objects' presence, speed, and distance. They are effective in various weather conditions and can detect objects at longer ranges compared to other sensors.
  - **Cameras**: capture visual data from the vehicle's surroundings. They are essential for identifying lane markings, traffic signs, traffic lights, and other visual cues. Advanced computer vision algorithms analyze camera feeds to interpret the environment.
  - **GPS**: receivers determine the vehicle's precise location using signals from satellites. it is often combined with other sensors for accurate localization and navigation, especially in urban environments where GPS signals may be obstructed.
  - **Computing Part (Raspberry Pi)**: The computing part serves as the brain of the autonomous vehicle, processing data from sensors, running algorithms for perception, decision-making, and control, and executing commands for vehicle operation.
  - **Other Sensors**: Additional sensors may include ultrasonic sensors for detecting nearby objects at close range and inertial measurement units (IMUs) for measuring vehicle acceleration, orientation, and angular velocity.

- **Performance**
  The transition to autonomous vehicles aims to reduce traffic congestion and accidents, which are difficulties connected with traditional autos. These cars stand out for their exceptional efficiency when it comes to passenger comfort and safety. They also respond quickly to changes in the road and adapt to their surroundings without causing any problems on the road

Plans for Efficient Design/Development (and Manufacturing/Production)

Egypt is now ready to indulge the streets with automated vehicles, investments in improving and renovating the infrastructure of the roads for the last 10 years have not just cost 400 billion EGP but exceeded it. Newer cities are now qualified field ready to adopt automated cars with ease, namely the Administrative Capital, this shows the government's interest in accommodating such technologies.

Design and Development plans:

- **Idea Generation:**
  The product idea is level 1 to level 5 autonomous cars that deal with both hardware and software development of the product.

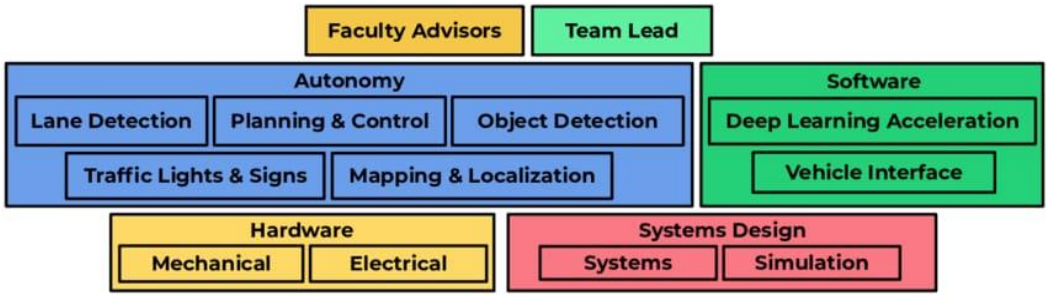
- **Evaluation and Screening:**
  The idea obtained is evaluated and screened to check for feasibility of manufacturing and breaking into the market, via extended research of the market potential, product profitability, and customer acceptance, as well as the product's alignment with the goals and resources of the company.

- **Concept development:**
  The conceptual design of the product was optimized, utilizing market research to identify emerging trends, and customer feedback/preferences, and realized with sketches of the product. The idea of autonomous cars is not a new concept, however, our product aims to be a turning point in the Egyptian market and the Arab sector, ideation and validation of the concept will ensure alignment with the customer's needs and market trends. Overall the design layout is implemented in digital designing apps with all its components and details
  Client/Customer feedback was gathered through surveys, focus groups, and usability testing to understand customers' needs and that has helped in refining the design concept.

- **Prototyping:**
  Digital prototyping is used heavily in the demand for rapid changes and several tweaks in the process for developing market demands and keeping pace with the market development. The rapid prototyping technique used to enhance development is Virtual simulation, which is employed to quickly iterate on design concepts and validate feasibility. Creating mockups and prototypes has helped visualize proposed features and functionalities. This technique helped with the assessment of functionality, allowing for early identification of design flaws and opportunities for improvement.The utilization of virtual simulations has permitted the freedom to model system behaviors under various operating conditions, enabling performance optimization and risk mitigation before moving to physical prototyping.

- **Testing and Validation:**
  An extensive testing plan has been conducted to evaluate the performance, functionality, and reliability of the automated car throughout the development process.Testing methodologies will include usability testing and functional tests to ensure alignment with regulatory standards and customer expectations. Validation criteria have been established for each stage of development, with clear and defined acceptance criteria to assess whether design requirements have been met before progressing to the next phase.

- **Team Structure and Roles:**
  Our development team is comprised of Faculty Advisors, Team Lead, Autonomy Engineers, Software Engineers, Hardware Engineers, and System Design Engineers. As well as domain experts with expertise in robotics, artificial intelligence, and automotive systems. Roles and responsibilities will be clearly defined, with cross-functional collaboration encouraged to facilitate knowledge sharing and innovation. Agile methodologies, such as Scrum or kanban, were employed to foster iterative development and rapid decision-making, ensuring alignment with project timelines and objectives.



- **Technology Stack:**
  The core technology stack revolves around ROS(Robotic Operating System), providing a flexible and modular framework for developing and integrating software components. Additional technologies and tools, such as Python, Coppeliasim, TensorFlow, OpenCV, LiDAR sensors, etc. will be leveraged to enable perception, localization, mapping, planning, and control functionalities. Compatibility with industry standards and protocols, such as CAN bus communication and ISO 26262 functional safety, will be ensured to facilitate interoperability and compliance with regulatory requirements.

- **Risk Mitigation:**
  A risk management plan is established to identify, assess, prioritize, and mitigate potential risks and uncertainties throughout the development process. Risks related to technical complexity, resource constraints, regulatory compliances, market dynamics, and supplier dependencies are identified and monitored proactively. Contingency plans and mitigation strategies will also be developed to address high-priority risks, with regular risk assessments conducted to track mitigation efforts and adjust plans as needed.

Manufacturing/ Production Plan

- **Sourcing and Procurement:**
  Strategic partnerships will be forged with reputable suppliers and manufacturers to source high-quality materials, components, and subsystems at competitive prices. Supplier selection criteria will include factors such as product quality, reliability, scalability, lead times, cost-effectiveness, and geographic proximity to minimize logistics overhead. Long-term agreements and supply contracts will be negotiated to secure stable supply chains and mitigate risks associated with raw shortages or price fluctuations.

- **Assembly and Production Line Setup:**
  The production line will be configured to optimize efficiency, productivity, and workflow flexibility, with a focus on lean manufacturing principles and continuous improvement. Assembly processes will be standardized and streamlined to minimize cycle times, reduce waste, and ensure consistent product quality. Modular design principles will be applied to facilitate rapid reconfiguration of production lines and accommodate changes in product variants or volume requirements.

- **Quality Control and Assurance:**
  Robust quality control measures will be implemented at every stage of the manufacturing process to detect and prevent defects before they reach the customer. In-process inspections, statistical process control (SPC) techniques, and automated testing systems will be employed to monitor product quality and identify process deviations. Quality assurance protocols will be aligned with industry standards and customer specifications, with adherence to ISO 9001 quality management systems and other relevant certifications.

- **Scalability and Flexibility:**
  Our manufacturing operations will be designed with scalability in mind to accommodate fluctuations in demand and future growth opportunities. Flexible production scheduling, capacity planning, and resource allocation strategies will be implemented to optimize resource utilization and minimize idle capacity. Investments in scalable manufacturing technologies, such as additive manufacturing (3D printing) and modular production equipment, will enable rapid scale-up without significant capital expenditure.

- **Cost optimization:**
  Cost optimization initiatives will be implemented across all aspects of manufacturing, including material sourcing, production processes, labor efficiency, and overhead expenses. Value engineering and design-to-cost principles will be applied to identify cost-saving opportunities without compromising product quality or performance. Continuous cost monitoring, variance analysis, and benchmarking against industry peers will be conducted to identify areas for improvement and drive cost reduction initiatives.

Category	*Software*	*Hardware*
Target Selling Price	2600$	3300$
Target Product/Service Production Cost	2000$	3100$
Target Annual Profit	300,000$	100,000$
Total Annual Profit	400,000$	
(Any other targets team has identified as critical to achievement of strategy success)	We aim to expand our services to new cities in Egypt, such as Almen, aligning with Egypt's vision for 2030. Our goal is to collaborate with companies and government authorities, including the Egyptian Transport Authority, Uber, Careem, and more.	

We expect to sell 500 units (both software and hardware) annually.
All prices are calculated based on the maximum cost for Level 5 Autonomy.

Key Product/Service Features
1- Computer Vision: Advanced computer vision systems analyze data from cameras to identify and classify objects and detect lane markings, traffic signs, traffic lights, and other relevant visual cues on the road.
2- Mapping and Localization: High-definition maps and GPS data help the car accurately localize itself within its environment and navigate predefined routes.
3-Communication Systems: In our service, we offer Vehicle-to-Vehicle (V2V) and Vehicle-to-Infrastructure (V2I) communication capabilities, facilitating the exchange of information regarding road conditions, traffic updates, and potential hazards. Additionally, our service includes Firmware Over-the-Air (FOTA) functionality for seamless software updates and maintenance."
4- Control Systems: Sophisticated control systems manage the vehicle's acceleration, braking, and steering based on inputs from sensors, AI algorithms, and navigation systems. These systems ensure smooth and precise vehicle control while adhering to traffic rules and safety regulations.
5- Economical price: Our service offers a notably more economical solution compared to that of other companies providing similar services.
6- Driver Monitoring: We provide an important feature which is a driver monitoring system to ensure that human drivers remain alert and ready to intervene when necessary.
7- Conversion Compatibility: Our service is compatible with every non-autonomous vehicle, enabling seamless conversion to autonomous capability.
8- Software Support: We offer a five-year guarantee along with prompt resolution of any software issues.

SWOT Analysis: