Automotive Ethics Glossary

This list is partial to SAE Level 4 and 5 Automated Vehicles; it will be revised and updated continuously. Terms that are underlined appear elsewhere in this wordlist.

Terms	Definitions
Accident	An event with serious consequences (e.g. major injury, fatality, or property damage). Current understanding regards accidents as unplanned and unforeseen. Therefore, it assigns accountability only in cases of criminal negligence, such as drunk driving.
Advanced Driver-Assistance System (ADAS)	Technologies that are designed to enhance vehicle safety and improve the driving experience. The first ADAS was Adaptive Cruise Control (ACC), which was invented in 1948 by Ralph Teetor. Others include Lane Departure Warning (LDW), Automatic Emergency Braking (AEB), Blind Spot Detection (BSD), Traffic Sign Recognition (TSR), and Driver Drowsiness Detection. ADAS technologies are paving the way toward Level 5 vehicles. https://www.synopsys.com/glossary/what-is-adas.html Advanced driver-assistance system - Wikipedia
Artificial General Intelligence (AGI)	AGI is a theoretical possibility that does not yet exist; see: Artificial Intelligence.
Artificial Intelligence (AI)	The ability of machines to learn and do things that required human intelligence and agency before. AI can be *narrow* or *strong*. Narrow AI has intelligence sufficient for specific tasks, such as driving a car. Strong AI (also called Artificial General Intelligence, or AGI) has open-ended intelligence, adaptability, reflexivity, and consciousness.
Automated Vehicle (AV)	A system which combines the use of a vehicle to take occupants or cargo from one place to another, also known as a selfdriving car or truck. High level AVs use a combination of sensors, cameras, radar, LiDAR, GPS, machine learning, and Artificial Intelligence to travel to given destinations without a human operator.
Automatic	A system or device that operates without human intervention, following a pre-set sequence of actions or a programmed set of instructions. Automatic systems usually require an initial setup but then function independently (e.g. an automatic gear transmission or a robotic arm in manufacturing). See also: Autonomous.

Automation Levels	Six Levels from Level 0 to Level 5. The International Society of Automobile Engineers (SAE International) has defined these levels of driving automation in Standard J3016.
Automotive AI	The system of intelligent software and sensor inputs that steers an Automated Vehicle through traffic and, occasionally, also into Accidents.
Automotive Ethics	Applied ethics for the behavior and decision-making of Automated Vehicles, especially difficult in Moral Dilemma cases. It involves a focus shift from people to machines, or ethics for humans to ethics for robots.
Automotive Safety	The implementation of motor vehicle and road features to prevent the occurrence or minimize the consequences of Traffic Accidents and Collisions. It combines *active* and *passive* elements in the design, construction, equipment, and regulation of motor vehicles. Active components incorporate smart lights and signals as well as Anti-lock Braking (ABS) and Traction Control Systems (TCS). Passive measures include airbags and seatbelts.
Autonomous	The ability and the right to govern itself (from the Greek "auto" for "self" and "nomos" for "law"). For Automated Vehicles, it means that a vehicle can perform tasks and make decisions independently, without external control or human intervention. However, an AV without Artificial General Intelligence cannot, for example, decide on its own to start a road race with other AVs. See also: Automatic.
AV Driver	See: Automotive AI
Cognitive Computing	See: Artificial Intelligence
Collision	A collision is an event where two or more objects crash into each other, typically resulting in property damage, injury, or both. In automotive ethics, collisions with other vehicles, pedestrians, or stationary objects are studied to understand the decision-making of Automated Vehicles.
Collision Path	A collision path refers to the trajectory that leads to a crash between two or more objects.
Consent	**Atri:** A passenger's commitment to entrust an Automated Vehicle with authority over every decision and maneuver in any scenario – rare or foreseen. By giving consent, the passenger allows the vehicle to navigate all paths independently from origin to destination without intervention.

	Bioethics: Patient needs 1. full Information, 2. Comprehension, 3. Voluntariness Source:
Corner Case	**Boyang**: A unique, uncommon, or extreme scenario that lies outside typical operating conditions but could still occur in real-world situations. ~~These cases often present challenging situations that push the limits of an autonomous vehicle's sensors, and decision-making processes.~~ A situation where a system operates on at least two extreme parameters. See also: Edge Case
Cost Benefit Analysis (CBA)	**Expand:** can be described as a systematic approach to assigning benefit and therefore morality.
Danger Cone	A danger cone is a concept in collision avoidance systems, where it represents the area in which a vehicle's current trajectory (forward or backward) intersects with other moving or stationary objects. The cone travels with the vehicle and measures the paths and distances to potential Collisions.
Driving Mode	Combines an Operational Design Domain with specific Dynamic Driving Tasks, such as driving on a highway or in a traffic jam.
Dynamic Driving Tasks	Combine *operational* and *strategic* aspects. Operational aspects involve steering, braking, accelerating, monitoring the vehicle and the road. Strategic aspects include determining the destination and the Driving Mode.
Edge Case	A situation where a system operates on one extreme parameter. See also: Corner Case
Ethics	A framework of principles to guide behavior and decision-making in terms of what is objectively right or wrong. It goes beyond and above personal beliefs about right and wrong (subjective morality) and sets external standards for moral behavior and decision-making. Ethics can be *normative* or *applied*. Normative ethics seeks general principles; applied ethics examines how these principles apply in concrete situations and specific cases. A third branch called *metaethics* explores the nature of moral judgments and whether objective moral truths exist.
Incident	An unfortunate event with insignificant effects (e.g. near misses or minor damage) but holding the potential for serious consequences, especially if not addressed.

Kantianism	**Estella:** An ethical theory, also called Deontology, developed by German philosopher Immanuel Kant. The theory asserts that certain duties or ethical obligations explored herein (e.g. to always be honest) hold true regardless of contextual nuance. It thus focuses heavily on enforcing universality, impartiality, and consistency, made largely possible by Kant's emphasis on the intrinsic value of individuals, and, by extension, autonomy and equality. Add: Kantian ethic requires that no person is ever used as a mere means to an end (even if that end is laudable). Sources:
Level 0	*No Automation*: Full-time performance and supervision of all aspects of driving by a human driver. The aspects of driving include Dynamic Driving Tasks like steering and braking as well as the Driving Mode, such as expressway merging.
Level 1	*Driver Assistance*: Human driver performs all driving tasks but is supported by an Advanced Driver Assistance System (ADAS) controlling either speed or steering.
Level 2	*Partial Automation*: Human driver performs all driving tasks but is supported by an ADAS controlling both speed and steering.
Level 3	*Conditional Automation*: Mode-specific control by an ADAS of all aspects of driving in some Driving Modes. A Level 3 Automated Vehicle operates in a well-defined Operational Design Domain. A human driver must take control of the AV when requested.
Level 4	*High Automation*: Mode-specific control by an ADAS of all aspects of driving in many Driving Modes. A human driver is no longer necessary in an approved Operational Design Domain. The Automated Vehicle pulls over and stops when a system failure occurs.
Level 5	*Full Automation*: The ADAS controls the Automated Vehicle under all driving conditions and in all Driving Modes. The AV does not have to have a steering wheel and a brake pedal.
Libertarianism	**Hojat:** Libertarianism emphasizes the importance of individual rights, asserting that every person has the freedom to act as they choose, so long as their actions do not infringe upon the rights of others. This principle applies equally to interactions between individuals and society. From a libertarian perspective, it is just as wrong for an individual to violate someone else's rights as it is for society, whether through laws or government actions, to infringe on personal freedoms. In this view, no one's rights take precedence over another's, and all individuals must be treated with equal moral consideration.

	Add: L. asserts that the sole legitimate purpose of government is to protect an individual's rights https://www.researchgate.net/publication/303847524_Will_My_Next_Car_Be_a_Libertarian_or_a_Utilitarian_Who_Will_Decide
Machine Learning	**Labesh:** A subset of artificial intelligence that involves building algorithms to enable a computer system to learn from data and make decisions without explicit programming for each task. Source:
Moral Dilemma	A situation where any course of action infringes on moral principles. In these situations, the available choices do not allow for an uncontroversial ethical outcome. In the case of AVs, this is a situation where the vehicle's predicted path will cross the Danger Cone of another object. Literature: Leben, 103.
Moral Edge Case	See: Moral Dilemma **Or should we call it a Moral Corner Case?**
Moral Machine	An AI capable of moral behavior and decision-making.
Moral Philosophy	See: Ethics
Operational Design Domain (ODD)	**Ammar:** The specific set of conditions/limitations under which an AV is designed to operate safely and efficiently. Factors contributing to ODD include but are not limited to road conditions, traffic conditions, environmental factors (weather, terrain, etc.), and speed limit. In the context of Automotive Ethics, ODD establishes boundaries on reliable AV deployment, minimizing ethical concerns pertaining to safety and unexpected failures outside the originally imagined scope. Source:
Passenger Indicator	A Passenger Indicator is an Advanced Driver Assistance System (ADAS) that refers to a feature that detects the presence and status of passengers in an Automated Vehicle. This system uses sensors to determine if a seat is occupied and whether the passenger is wearing a seatbelt. See Copilot
Primary Goods	Literature: Leben, 82.
Random Decision Generator	**Nicole:** Random generators are used in self-driving car testing to create a variety of unpredictable scenarios, including edge cases and rare events, to validate the car's decision-making capabilities. They support probabilistic reasoning and help predict the behavior of other road users, thus training the

	algorithms efficiently under various conditions. While introducing unpredictability, the aim is to ensure that the vehicle consistently makes safe decisions in all situations. https://www.mathworks.com/help/driving/ug/automatic-scenario-generation.html https://www.ptc.com/en/blogs/alm/simulation-testing-in-autonomous-driving-development
Scenario	A specific set of circumstances or events that describes a situation an Automated Vehicle might encounter. Scenarios can include factors like AV system status, road conditions, traffic patterns, pedestrian behavior, and weather. In the context of automotive ethics, a scenario is a simulated real-world situation.
Selfdriving Car	See: Automated Vehicle
Self-Sacrifice	**Shireen:** An event where a self-driving vehicle makes the decision to minimize harm to other road users (including pedestrians, cyclists, and animals) in exchange for the safety of the occupants of the vehicle and/or the vehicle itself in an unavoidable crash scenario. Sources:
Traffic	The flow of vehicles on roads and highways (road traffic) including the movement of people walking in public spaces (pedestrian traffic).
Traffic Accident	A road traffic event with serious consequences. The sense of surprise and blamelessness related to accidentalness fades if an Automated Vehicle can recognize an Accident as imminent and make driving decisions up to the point of Collision. Hence, the understanding of accidents involving higher level AVs is likely to increase the accountability of the automotive Artificial Intelligence and its makers. This accrual of responsibility is especially relevant in Moral Dilemma cases.
Utilitarianism	**Thomas:** A philosophical framework derived from Jeremy Bentham's goal to seek the "greatest good for the greatest number." This is a computational-friendly principle that allows to sacrifice some lives for a greater good. It will maximize the wellbeing and happiness of the most individuals even if that does not include the individual that may suffer from a utilitarian decision. Acting morally must always weigh the consequences which result in the most benefit for the largest group of people. The consequences are determined by a Cost Benefit Analysis (CBA). https://www.britannica.com/topic/utilitarianism-philosophy Cost benefit analysis: https://en.wikipedia.org/wiki/Cost%E2%80%93benefit_analysis

Values	Standards or principles of behavior. They can be technical and/or moral as well as personal, organizational, cultural, social, political, economic, and are essential to Ethics. They come into play for Automatic Vehicles when the AV encounters a Moral Dilemma situation and must choose between alternative Collision Paths.
Virtue Ethics	Virtue Ethics is an approach to Ethics that emphasizes embodying the traits of one who is ethical rather than outlining specific rules to follow (Kantianism) or evaluating consequences (Utilitarianism). It focuses on being rather than doing. The main appeals of this theory include a lack of fixity and openness to improvement, which makes virtue ethics adaptable to Machine Learning. Literature: Leben, 44, 47.