

TEACHING APPLIED GEOMETRY FOR KEEPING DYNAMIC SAFE FOLLOWING DISTANCE AMONG NOVICE CAR DRIVERS

Abstract: This article explores the teaching methodologies and theoretical frameworks pertinent to instructing novice car drivers in the applied geometry necessary for maintaining dynamic safe following distances. The study integrates principles from physics, geometry, and psychomotor abilities to provide a comprehensive understanding of the factors influencing safe driving practices. It explores the laws of motion, reaction times, and vehicle dynamics, alongside geometric relationships governing perceived distance and car size. The article also elucidates instructional strategies for novice drivers to develop critical thinking, psychomotor skills, and adaptive behaviours essential for safe distance maintenance.

Key words: safe distance, novice drivers, laws of physics, laws of geometry, braking distance, following distance

1. INTRODUCTION

Maintaining a safe distance between a car and the vehicle in front of is crucial for safe driving. This principle is rooted in the laws of physics and geometry, particularly those related to motion, reaction times, and spatial relationships. This article explores these concepts to equip novice drivers with a strong foundation for safe driving practices.

Several research studies have investigated factors affecting the safe distance between vehicles. For instance, one study found a trade-off between safety and perceived usefulness in automated vehicles: prioritizing safety reduced user perception of usefulness, while prioritizing efficiency lowered perceived safety [1]. This highlights the need to find a balance between these factors for user acceptance. Another study explored the question of whether automated driving is safer than conventional driving [2]. Research has also shown that visibility significantly influences driver behavior when overtaking cyclists [3]. The analysis of road design has revealed that oversights in geometric design can negatively impact safety [4]. Finally, a study found that adding distance information to signage improves driver alertness near road work zones [5].

2. THEORETICAL FRAMEWORK

This part of article elucidates the physics and geometry laws governing safe distance maintenance between vehicles. It delves into Newton's laws of motion, braking distance calculations, and the impact of speed, road conditions, and vehicle limitations on safe following distances. The geometric relationships between perceived distance and car size are also explored, highlighting the relevance of visual angles and perspective in distance estimation.

2.1. Laws of physics

2.1.1. Inertia and Acceleration:

Newton's First Law: A moving object remains in motion until acted upon by an external force.

Newton's Second Law: The acceleration of an object is directly proportional to the net force acting on it and

inversely proportional to its mass. These laws explain why a car in front of the novice driver, if it suddenly stops, will continue moving forward until the brakes are applied.

2.1.2. Braking Distance:

The distance required for a complete stop depends on the novice driver's car's speed, road conditions, and their reaction time. Higher speeds require a longer stopping distance. Reaction time is the time it takes for a driver to perceive the need to stop and then physically apply the brakes.

2.1.3. Following Distance:

To maintain a safe gap, the novice driver should leave enough space between their car and the one in front. This allows sufficient time for braking in case of a sudden stop by the leading vehicle.

2.1.4. Speed and Kinetic Energy:

The kinetic energy of a car increases with speed. At higher speeds, it takes more time and distance to come to a stop. Therefore, maintaining a safe distance becomes even more critical as speed increases.

2.1.5. Road Conditions:

Adverse weather conditions like rain, snow, or ice can significantly affect braking distance and traction. Novice drivers should increase their following distance in such conditions.

2.1.6. Vehicle Limitations:

Different vehicles have varying braking capabilities. Larger and heavier vehicles may require more distance to stop. Additionally, the condition of the car's tires and brakes plays a role in braking performance.

2.1.7. Anti-lock Braking Systems (ABS):

Many modern cars are equipped with ABS, which helps prevent skidding during hard braking. Understanding how ABS functions and using it effectively is important for novice drivers.

2.2. Laws of geometry

There are laws of geometry that apply to maintaining a safe distance between one car and the car in front:

2.2.1. The angle of view:

The driver's angle of view is the area visible between the sightlines from their eyes to the edges of the car in

front. A wider angle of view allows the driver more reaction time to respond to unexpected changes in traffic.

To maintain a safe distance, driver should aim for an angle of view of at least 30 degrees. This means that driver should be able to see at least 30 meters of the road ahead of the car in front of you.

2.2.2. The distance-speed triangle:

The distance-speed triangle is a geometric relationship between the distance travelled, the speed of the vehicle, and the time it takes to travel that distance.

The equation for the distance-speed triangle is:

$$D = S * T \quad (1)$$

where:

D – Distance,

S – Speed,

T – Time.

The faster a driver is going, the greater the distance they need to come to a safe stop.

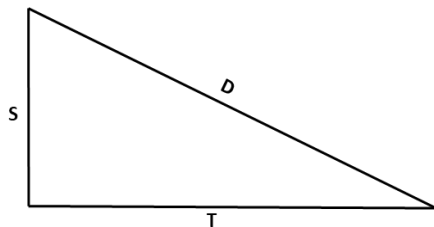


Figure 2 The Distance-Speed-Time Triangle

Explanation of the Figure 2.

D – distance travelled by vehicle,

S – speed of the vehicle,

T – time taken to travel the distance.

As demonstrated by Formula 1 and in the Figure 1, the faster a vehicle travels (higher speed), the greater the distance it takes to stop completely (longer distance). This reinforces the importance of maintaining a safe following distance that increases proportionally with speed.

The following distance formula is a mathematical formula that can be used to calculate the safe distance between two cars in motion.

The formula is:

$$FD = S * RT * BK \quad (2)$$

where:

FD – Following Distance,

S – Speed,

RT – Reaction Time,

BD – Braking Distance,

Speed is in meters per second.

Reaction time is the time it takes for a driver to perceive a hazard and begin taking action, typically around 1 second.

Braking distance is the distance a car travels from the moment the driver applies the brakes to the point of complete stop. This distance varies depending on the vehicle's speed, road conditions (wet, dry, etc.), and the type of vehicle being driven (car, motorcycle, truck).

The safe following distance as a function of the relative speed between the driver's vehicle and the lead

vehicle. The formula for calculating the dynamic safe following distance is:

$$DSFD = SoLV + ((SD * RT) / (CF)) \quad (3)$$

DSFD – Dynamic safe following distance,

SoVL – Speed of lead vehicle,

SD – Speed differential,

RT – Reaction time,

CF – Conversion factor,

Speed of lead vehicle is the speed of the vehicle ahead in meters per second,

Speed differential is the difference between the driver's speed and the speed of the lead vehicle,

Reaction time is the time it takes for the driver to perceive a hazard and react,

Conversion factor is a constant that converts the speed from meters per second to the desired unit of measurement.

2.2.3. Geometric relationship between perceived distance and car size:

This section explores the geometric relationship between the perceived distance (PD) of a car, its actual size (S), and the angle (θ) it subtends at the driver's eye. Relationship is captured by the formula 4:

$$PD = 2 \tan(\theta/2) S \quad (4)$$

PD – perceived distance,

S – actual size of vehicle,

θ – angle vehicle subtends at the driver's eye.

The tangent function, denoted by \tan , relates the opposite side (height) and adjacent side (distance) of a right triangle. However, in this case, the angle of interest is θ , which subtends the entire car, not just half of it. Therefore, the formula utilizes the *tangent of half the angle* ($\theta / 2$) to represent the *ratio of the perceived height of the car to its perceived distance* (PD). Multiplying by 2 accounts for the entire angle, and dividing the perceived size (S) by this ratio yields the *perceived distance* (PD).

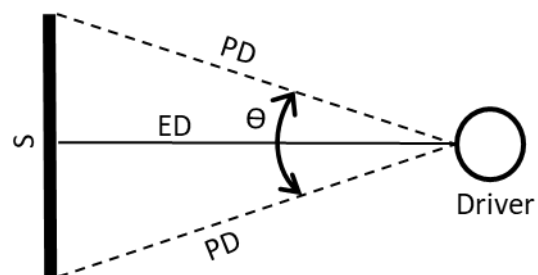


Figure 2 Geometric Relationship between Perceived Distance and Car Size

PD – perceived distance,

S – actual size of vehicle,

θ – angle vehicle subtends at the driver's eye,

ED – estimated distance.

Estimating Distance:

By observing how the apparent size of the car in front changes relative to its surroundings, the driver can estimate the angle (θ) shown in the Figure (2). Substituting this estimated value into the formula (4)

allows them to calculate the **estimated distance (ED)** from the car in front.

Adjusting Following Distance:

Based on the estimated distance (ED), the driver can then adjust their following distance to maintain a safe gap between their vehicle and the car in front. With approximation estimated distance (ED) is equal to following distance (FD). This ensures safe driving by considering both the speed and stopping distance of their own vehicle.

Summation:

The formula (4) highlights the influence of visual angles and perspective on the driver's perception of distance. By utilizing this understanding, drivers can make informed decisions about following distances, contributing to safer driving practices.

2.3. Leveraging the Power of Geometry:

Drawing from research in physics education, this approach emphasizes the importance of vectors, coordinate systems, and geometric transformations for understanding traffic dynamics and driver behaviour. By integrating these concepts into driver education, novice drivers can develop a more nuanced understanding of how their own and surrounding vehicles move, leading to safer driving practices.

2.3.1. Core Geometric Concepts:

- **Vectors:** Vectors represent quantities with both magnitude (speed) and direction (movement towards a specific point on the road). Understanding vector relationships allows drivers to assess the relative motion of vehicles and determine appropriate following distances. For example, a car approaching at a high relative velocity (large vector magnitude) necessitates a greater following distance compared to a car with a slower relative velocity.
- **Cartesian Coordinate Systems:** This system provides a framework for locating oneself and other vehicles in traffic. The Euclidean distance d formula is the following:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2} \quad (5)$$

Formula (5) calculates the distance between vehicles based on their respective x , y , and z coordinates. This allows drivers to estimate safe following distances based on the spatial arrangement of vehicles on the road.

2.3.2. Geometric Transformations in Action:

Real-world driving scenarios involve continuous changes in position and orientation. Geometric transformations offer tools to analyse these dynamics:

- **Translations:** These describe the movement of objects from one position to another.

$$(x' = x + \Delta x; y' = y + \Delta y; z' = z + \Delta z) \quad (6)$$

Understanding translations (6) helps drivers anticipate the changing positions of vehicles ahead, allowing for timely adjustments to maintain a safe following distance.

- **Rotations:** Rotations involve objects turning around a fixed point. While not directly related to following distance, understanding rotations (using Euler angles or rotation matrices) equips drivers to anticipate how vehicles might change direction (e.g., turning signals) and adjust their own behaviour accordingly.

2.3.3. The Road Ahead: A More Nuanced Understanding

By integrating these geometric concepts, driver education can move beyond memorizing following distance rules. Novice drivers gain the ability to analyse traffic situations dynamically, considering factors like relative speed, spatial arrangements, and potential changes in vehicle orientation. This empowers them to make informed decisions and maintain a safe gap in real-time traffic flow, ultimately contributing to safer driving practices.

3. FORMULA SYNERGY: SAFE DISTANCE

The provided above formulas delve into the interplay between physics, geometry, and human perception in determining a safe following distance. While maintaining a safe gap between vehicles seems intuitive, the factors influencing it are multifaceted. Here's a closer look at how the presented formulas work together and how geometric concepts contribute to a nuanced understanding of safe following distance.

3.1 The Foundation: Stopping Distance and Following Distance (Formulas 2 & 3)

Formula (2) establishes the core concept of following distance. It calculates the minimum distance a driver should maintain based on their own vehicle's speed (S) and reaction time (RT). The product of S and RT represents the distance travelled before the driver even begins braking upon perceiving a hazard. This highlights the crucial role of reaction time – a split second can translate to significant additional distance covered before the car comes to a complete stop.

Formula (3) refines this concept by factoring in the presence of a leading vehicle. It introduces the concept of "dynamic" safe following distance ($DSFD$), which considers the speed of the lead vehicle ($SoVL$) and the speed differential (SD) between the driver's car and the vehicle in front. If the leading vehicle is traveling slower (positive SD), the required following distance can be reduced. This formula acknowledges that a slower lead vehicle creates a buffer zone, reducing the distance needed for the driver to react and come to a complete stop.

Formula (2) provides a basic calculation for following distance, but it treats speed as a scalar quantity (magnitude only). This approach has limitations. In reality, vehicles move in specific directions. Here's where vectors come in. Vectors represent both the magnitude (speed) and direction (movement towards a specific point on the road) of a vehicle.

Let's analyze two scenarios:

- **Scenario 1:** A vehicle travels at 60 km/h on a straight road. Another car approaches it from the

opposite direction at the same speed (relative velocity of 0).

- Scenario 2: A vehicle travels at 60 km/h and another car merges onto the highway from an on-ramp, approaching it at a 45-degree angle with a relative velocity of 40 km/h.

In both cases, Formula (2) might suggest the same following distance based on the initial vehicle's speed and reaction time. However, the vector approach reveals a crucial difference. In Scenario 1, the relative motion between the vehicles is minimal, reducing the risk of a collision even with a shorter following distance. In Scenario 2, the approaching car's direction (represented by the vector) poses a greater threat due to the combined speed and angle of approach. By understanding relative velocities through vectors, drivers can adjust their following distance accordingly, maintaining a larger gap for higher relative velocities.

3.2 Perception and the Role of Geometry

Formula (4) ventures into the realm of human perception and its impact on safe following distance. It calculates the perceived distance (PD) of a car ahead based on its actual size (S) and the angle (θ) it subtends at the driver's eye. This formula highlights a crucial point – our perception of distance is not always perfect. The angle under which we see an object influences how far away we believe it to be. The formula emphasizes the role of the tangent function (tan) in this calculation. By considering the angle and car size, the formula estimates how far away the driver perceives the car in front to be, potentially impacting their judgment of a safe following distance.

3.3 Analyzing Traffic Dynamics

While formulas provide a quantitative framework, next section of the text introduces geometric concepts that offer a broader perspective on understanding traffic flow. Here, the focus shifts beyond static calculations to analyzing the dynamic nature of traffic situations.

3.3.1. Vectors: Imagine vehicles as arrows with both speed (magnitude) and direction. By understanding these "motion vectors," drivers can assess the relative movement of vehicles around them. A car rapidly approaching (large vector magnitude) necessitates a greater following distance compared to a slow-moving vehicle.

3.3.2. Cartesian Coordinate System in Action

Formula (5) introduces the Cartesian Coordinate System, a powerful tool for pinpointing the location of vehicles in traffic. Imagine a giant grid laid over the road, with X representing the horizontal direction, Y representing the forward direction, and potentially Z for elevation (useful for bridges or overpasses). Each vehicle's position can be defined by its X, Y, and Z coordinates. Knowing these coordinates allows drivers to calculate the Euclidean distance (straight-line distance) between their vehicle and others using the distance formula.

This approach goes beyond simply knowing there's a car ahead. It allows drivers to calculate the exact distance to the leading vehicle based on its position in the grid. With this information, they can assess if their current following distance is safe or if adjustments are needed.

For example, if the calculated distance is less than the minimum safe distance based on Formula (2) or the relative velocity from the vector analysis, the driver can increase their following distance to ensure adequate time for reaction and braking.

This system provides a grid-like reference for locating vehicles on the road. The Euclidean distance formula allows drivers to estimate safe gaps based on the spatial arrangement of vehicles. Imagine drawing a box around each car based on its x, y, and z coordinates – the distance formula can then be used to calculate the distance between these "boxes," providing an estimate of the safe following distance.

3.4 Geometric Transformations

Real-world traffic is rarely static. Vehicles constantly change positions and orientations. Geometric transformations provide powerful tools to analyze these dynamics:

3.4.1. Translations: These describe the movement of vehicles from one position to another (Formula 6 for basic translation is provided). Understanding how the car in front is changing position allows drivers to anticipate potential braking and adjust their following distance accordingly.

Consider a scenario where a car in front applies its brakes and slows down. This can be described as a translation. During a translation, the car moves from its initial position to a new position further ahead without changing its direction. Formula (6) represents a basic translation, but more advanced concepts can account for acceleration or deceleration. By understanding translations, the analysis of traffic flow can anticipate the changing positions of vehicles ahead, allowing for timely adjustments to maintain safe following distances.

3.4.2. Rotations: Rotations involve objects turning around a fixed point. While not directly related to following distance, understanding rotations is crucial for anticipating maneuvers. Consider a car in front activates its turn signal. By understanding rotations (using concepts like Euler angles or rotation matrices), the analysis of traffic flow can interpret this action and adjust the behavior of surrounding vehicles accordingly. For instance, if the car's rotation indicates a lane change, an increase in the following distance by surrounding vehicles might be necessary to avoid a potential cut-off.

3.5 The Power of a Multifaceted Approach

By integrating these geometric concepts, driver education can move beyond rote memorization of following distance rules. Drivers gain the ability to analyze traffic situations dynamically, considering factors like:

3.5.1. Relative speed and direction (Vectors): Assessing the combined speed and direction (through vectors) of approaching vehicles to determine appropriate following distances.

3.5.2. Spatial arrangement (Cartesian Coordinate System): Using the Cartesian Coordinate System to calculate the exact distance to leading vehicles and compare it to the safe following distance based on speed and reaction time.

3.5.3 Potential changes in vehicle orientation (Geometric Transformations): Anticipating maneuvers like braking or turning.

3.6 A Geometrically Empowered Driver

Equipping drivers with a geometric understanding of traffic flow empowers them to make informed decisions in real-time, ultimately contributing to safer driving practices. Here's how this geometric approach translates to on-the-road benefits:

3.6.1. Improved hazard perception: By analyzing relative velocities through vectors, drivers can identify situations with a higher risk of collision, such as merging vehicles or cars approaching at an angle. This allows them to take proactive measures like increasing following distance or adjusting their own speed.

3.6.2. Enhanced spatial awareness: The Cartesian Coordinate System fosters a more precise understanding of the spatial arrangement of vehicles on the road. Drivers can not only detect the presence of a leading vehicle but also calculate the exact distance, enabling them to maintain a safe gap based on the factors outlined in Formula (2) and the relative velocity analysis.

3.6.3. Dynamic decision-making: Geometric transformations equip drivers to anticipate the movements of surrounding vehicles. Understanding translations (changes in position) allows for adjustments to following distance as cars slow down or accelerate. Similarly, interpreting rotations (changes in orientation) helps drivers predict lane changes or turning maneuvers, allowing them to react accordingly.

3.7 Traffic dynamics

The geometric concepts presented here serve as a foundation for a more nuanced understanding of traffic dynamics. Further exploration in driver education could incorporate: integration with advanced driver-assistance systems (ADAS), simulations and visualizations, incorporating weather conditions.

4. TEACHING SAFE FOLLOWING DISTANCE

4.1. Teaching Methodologies:

The teaching methodologies section discusses instructional approaches for imparting applied geometry concepts to novice drivers. It outlines strategies for incorporating critical thinking, psychomotor skills development, and adaptive behaviours into driver education programs. Additionally, it addresses the integration of theoretical knowledge with practical driving experiences, such as simulator-based training and on-road exercises.

How is the teaching of safe distance between vehicles conducted? Firstly, it begins at the theoretical level, in classes. Secondly, it extends to the road during novice driver tests, experiments, and practical learning sessions, where they practice maintaining a dynamically safe distance between two vehicles.

4.1.1. Using Thinking Abilities to Maintain a Safe Distance

Novice drivers can use their thinking abilities to maintain a safe distance in the following ways:

Estimate the safe following distance: Novice drivers can use a variety of cues to estimate the safe following

distance, such as the speed of the car in front of them and the road conditions. For example, on a dry road at highway speeds, the safe following distance is typically two seconds.

Scan the road ahead: Novice drivers should constantly scan the road ahead for potential hazards, such as stopped traffic or slowed vehicles. This will give them more time to react if they need to brake.

Be aware of the vehicle behind them: Novice drivers should also be aware of the vehicle behind them. If they see that the vehicle behind them is too close, they should increase their speed slightly or change lanes.

Driving in traffic: When driving in traffic, novice drivers should estimate the safe following distance to the car in front of them. They should also scan the road ahead for potential hazards. If they see that the traffic is slowing down, they should start to brake early.

Approaching a red light: When approaching a red light, novice drivers should estimate the safe following distance to the car in front of them. They should also scan the road ahead to see if the light is likely to change soon. If the light is likely to change soon, they should start to brake early.

Changing lanes: When changing lanes, novice drivers should check their blind spots and make sure that there is enough space in the next lane before changing lanes. They should also be aware of the vehicle behind them and make sure that they are not cutting someone off.

4.1.2. The laws of psychomotor abilities for maintaining a safe distance between vehicles

The laws of psychomotor abilities for maintaining a safe distance between one car and the car in front are based on the following principles:

Perception: Drivers must be able to perceive the distance between their vehicle and the vehicle in front of them. This requires visual acuity, depth perception, and attention to detail.

Reaction time: Drivers must have enough time to react to changes in the traffic situation in front of them. This includes braking time and thinking time.

Braking distance: The distance required for a vehicle to come to a complete stop from a given speed. This distance depends on the vehicle's speed, road conditions, and the condition of the brakes.

The following psychomotor abilities are essential for maintaining a safe following distance:

Eye-hand coordination: Drivers must be able to coordinate their eyes and hands to brake smoothly and gradually.

Spatial awareness: Drivers must be able to judge the distance between their vehicle and the vehicle in front of them, as well as the distance required to stop safely.

Fine motor control: Drivers must be able to apply the brakes with the proper amount of pressure to avoid skidding.

Maintain their attention: Drivers must be able to focus on the road ahead and avoid distractions.

Make good decisions: Drivers must be able to make quick and accurate decisions in response to changes in the traffic situation.

4.1.3. Using Driver's behavior to Maintain a Safe Distance between vehicles

This section provides specific instructional strategies for teaching safe distance maintenance to novice drivers. It covers techniques for estimating following distances, scanning the road ahead, and adapting driving behaviours to varying traffic conditions. The role of perception, reaction time, and braking distance in safe distance maintenance is also emphasized.

The speed adaptation rule: This rule states that novice drivers should adjust their speed to account for road conditions, weather conditions, and traffic conditions. For example, novice drivers should increase their following distance on wet or icy roads, in foggy or snowy weather, and in heavy traffic.

The anticipation rule: This rule states that novice drivers should anticipate the actions of other drivers and be prepared to react accordingly. For example, if a novice driver sees a driver braking suddenly, they should be prepared to slow down or stop as well.

Use mirrors regularly. Novice drivers should check their rear-view mirror and blind spots every few seconds to be aware of the traffic around them.

Signal intentions early and clearly. Novice drivers should use their turn signals to let other drivers know what they plan to do. This will help to avoid confusion and sudden lane changes.

Be predictable. Novice drivers should drive in a way that is easy for other drivers to predict. This means avoiding sudden braking, acceleration, or lane changes.

Increase following distance. On a slope, novice drivers should increase their following distance to allow for more reaction time and braking distance.

Be aware of reduced visibility. On a slope, novice drivers' visibility may be diminished by other vehicles, hills, or curves. Novice drivers should be extra cautious and prepared to react quickly to hazards.

Avoid braking suddenly. Slamming on the brakes on a slope can cause the vehicle to skid or lose control. Novice drivers should brake smoothly and gradually.

4.1.4. Future Directions

The future directions section outlines potential avenues for further research and exploration in the field of driver education and applied geometry. It suggests areas for refinement and expansion of instructional methodologies, as well as opportunities for interdisciplinary collaboration and technology integration in driver training programs.

5. CONCLUSIONS

Effective teaching methodologies integrating principles from physics, geometry, and psychomotor abilities are essential for instructing novice car drivers in maintaining dynamic safe following distances. By understanding the laws of physics and geometry governing safe distance maintenance, novice drivers can develop critical thinking skills and adaptive behaviours crucial for safe driving practices. Moving forward, continued research and exploration into innovative

instructional strategies and interdisciplinary collaboration will further enhance driver education programs, ultimately contributing to safer roads and reduced accidents.

By embracing geometry as a core element of driver education, we can move beyond simply memorizing following distance rules. Equipping drivers with the ability to analyse traffic situations through the lens of vectors, coordinate systems, and transformations empowers them to make informed, real-time decisions that contribute to safer roads for everyone.

REFERENCES

- [1] Edelmann, A., Stümper, S., Petzoldt, T. (2023) *The interaction between perceived safety and perceived usefulness in automated parking as a result of safety distance*, Applied Ergonomics, Volume 108, 2023, 103962, ISSN 0003-6870, <https://doi.org/10.1016/j.apergo.2022.103962>. Accessed: 2024.2.29.
- [2] Sohrabi, S., Lord, D., Dadashova, B., Mannering, F. (2024) *Assessing the collective safety of automated vehicle groups: A duration modeling approach of accumulated distances between crashes*, Accident Analysis & Prevention, Volume 198, 2024, 107454, ISSN 0001-4575, <https://doi.org/10.1016/j.aap.2023.107454>. Accessed: 2024.2.29.
- [3] Rasch, A., Tarakanov, Y., Tellwe, G., Dozza, M. (2023) *Drivers passing cyclists: How does sight distance affect safety? Results from a naturalistic study*, Journal of Safety Research, Volume 87, 2023, Pages 76-85, ISSN 0022-4375, <https://doi.org/10.1016/j.jsr.2023.09.006>. Accessed: 2024.2.29.
- [4] Godumula, D. T., Shankar, K.V.R. (2023) *Safety evaluation of horizontal curves on two lane rural highways using machine learning algorithms: A priority-based study for sight distance improvements*, Traffic Injury Prevention, Volume 24, Issue 4, 2023, Pages 331-337, ISSN 1538-9588, <https://doi.org/10.1080/15389588.2023.2184203>. Accessed: 2024.2.29.
- [5] Yang, Y., Liu, X., Easa, S. M., Feng, Y., Zheng, X. (2023) *Effect of distance information and number of warning signs on driving safety of young adults near road work zones in China*, Accident Analysis & Prevention, Volume 192, 2023, 107230, ISSN 0001-4575, <https://doi.org/10.1016/j.aap.2023.107230>. Accessed: 2024.2.29.

Authors:

Lecturer Ph.D. Eng. Vadim NANTOI, Technical University of Moldova, Faculty of Mechanical, Industrial Engineering and Transport, E-mail: vadim.nantoi@tran.utm.md
Master in Biomedical Engineering. Daria NANTOI, Master Data Analyst, E-mail: nantoi.daria@gmail.com