Technical Description Paper – Line & Maze 2024

- Additions compared to the 2023 version are highlighted in red
- ~~Crossed-out red~~ key elements are removed and will not be graded

Project Planning – from Design to Deployment				
Key Elements	0	1-2	3-4	5-6
Requirements definition		Little sign of a list of requirements to be achieved, without any justification related to the restrictions imposed by the challenges that must be overcome in the competition.	Shows an incomplete list of requirements that must be achieved to succeed in the competition. There is a lack of definitions of what needs to be done in terms of hardware or software design, or it disregards restrictions imposed by the challenges.	Clear definition of requirements on the robot design, algorithm design, and development schedule in order to achieve success in the competition, considering competition rules and challenges.
Overall Project Plan		Little sign of stages of milestones, vague planning. Most tasks are done at the moment of decision.	Show signs of stages with milestones, sort of a project planning, however, team members were not assigned to work or a timeline schedule was not presented.	Clear progressive milestones with member assignment and scheduled timeline. Checkpoints to review project progress were also included. It can be used as an overarching guide.
~~Research and Analysis~~				
~~Recognize Constraints~~				
Integration Plan / System Engineering		Lacks a well-defined integration plan. Communication between parts is unclear, and the connection between components is not apparent. Also specific requirements addressed by each component are not evident.	Shows informative and structured integration plan, however, there is a lack of clarity in the connection/ communication between the parts or in which requirements are being met by each developed component.	Clearly shows a well-illustrated integration plan. Connection/ communication between parts is clearly structured. Requirements to be achieved by each developed part are clearly defined.

Mechanical design and manufacturing (structural parts)				
Key Elements	0	1-2	3-4	5-6
mechanical design structure and diagrams		Only rudimentary explanation and shows some diagrams to illustrate the mechanical design. Diagrams are hard to follow.	Detailed explanation of the mechanical design with some good diagrams that are fairly easy to follow.	Excellent explanation of the mechanical design. Has clear, quality diagrams that are easy to understand.
sub-module design and workability		Includes some level of how the system is composed of interacting parts (sub-modules) but is confusing.	Give good amount of design proof to provide a view of the entire system and its interacting parts (modules). Describes the paths of interaction between parts, with diagrams.	Clearly identifies the major internal system interfaces and their interacting parts. Describes pathways with diagrams and design illustrations.
Maker and/or innovative solutions		Robot has non-essential mechanical elements designed by the team, built manually, cut by laser or 3D printed. Or, the robot features mechanical elements composed of the integration of parts from kits from different brands.	Robot has essential mechanical elements designed by the team, built manually, cut by laser or 3D printed. The proposed design is an adaptation of an existing solution, functional and gives the team some competitive advantage.	Robot has structure, chassis, wheels, claws, designed by the team, built manually, cut by laser or 3D printed. The proposed design is innovative, functional and gives the team a competitive advantage.
Reliability Tests and quality assurance		Shows some kind of tests, but only simple ones, and doesn't keep reliability in mind.	Shows more detailed test cases with some quality assurance and reliability tests.	Clearly shows thoughtful tests, quality assurance, and integration plans.

Electronic design and manufacturing (sensors, controller, power)				
Key Elements	0	1-2	3-4	5-6
Electronic design structure and diagrams		Only rudimentary explanation and some diagrams to illustrate the electronic design. Diagrams are hard to follow.	Detailed explanation of the electronic design with some good diagrams that are fairly easy to follow.	Excellent explanation of the electronic design. Has clear, quality diagrams that are easy to understand.

sub-module design and workability		Includes some level of how the system is composed of interacting parts (sub-modules) but is confusing.	Gives good amount of design proof to provide a view of the entire system and its interacting parts (modules). Describes the paths of interaction between parts, with diagrams.	Clearly identifies the major internal system interfaces and their interacting parts. Describes pathways with diagrams and design illustrations.
Maker and/or innovative solutions		Robot has non-essential electronic elements designed and integrated by the team. Or, the robot features electronic elements composed of the integration of parts from kits from different brands.	Robot has essential electronic elements designed by the team, integrated into a circuit board. The proposed design is an adaptation of an existing solution, functional and gives the team some competitive advantage.	Robot has the main controller integrated with sensors and actuators on an (or more) electronic circuit board(s) designed and assembled by the team. The proposed design is innovative, functional and gives the team a competitive advantage.
Reliability Tests and quality assurance		Shows some kind of tests, but only simple ones, and doesn't keep reliability in mind.	Shows more detailed test cases with some quality assurance and reliability tests.	Clearly shows thoughtful tests, quality assurance, and integration plans.

Software				
Key Elements	0	1-2	3-4	5-6
Architecture design with diagrams such as flowchart, UML, pseudocode		Only rudimentary explanation and shows some diagrams to visualize the structure and function of the code. Diagrams may be hard to follow.	Detailed explanation of the software design with some good diagrams that are fairly easy to follow.	Excellent explanation of the software architecture. Has clear, quality diagrams that are easy to understand.
~~Modularization and Integration~~				

Innovative solutions		Software has non-essential elements developed in an innovative way. The proposed procedure is an adaptation of an existing solution, functional, but gives the team no or very little competitive advantage.	Software has one or more essential elements developed in an innovative way. The proposed procedure is an adaptation of an existing solution, functional and gives the team some competitive advantage.	Software has its main structure and one or more essential elements developed in an innovative way. The proposed design is innovative, functional and gives the team a great competitive advantage.
Reliability Tests and quality assurance		Shows some kind of tests, but only simple ones, and doesn't keep reliability in mind.	Shows more detailed test cases with some quality assurance and reliability tests	Clearly shows thoughtful tests, quality assurance, and integration plans

Performance Evaluation (competition challenges)				
Key Elements	0	1-2	3-4	5-6
Reliability Testing and Quality Assurance		Shows some kind of test cases but only simple ones, and lacking keeping reliability in mind. Shows little understanding of what the problem is and how to improve on it.	Shows detailed reliability tests and quality assurance. Includes somewhat insightful evaluation of the problem, but no plans on how to improve on it.	Clearly shows detailed reliability tests and quality assurance. Includes very insightful evaluation of the problem, e.g., which module causes difficulties and shows how it was fixed.

Document				
Key Elements	0	1-2	3-4	5-6
Contents, Conciseness and Clarity		Documentation does not cover all aspects of the TDP, sometimes lacks clarity, and is too lenghtly in some parts.	Documentation covers most aspects of the TDP, is fairly easy to follow and concise.	Documentation includes all parts of the TDP, has a very clear structure, that is easy to follow and concise.
Formatting		Documentation does not follow the intended formatting and is hard to read.	Documentation is formatted well and is easy to read.	Excels at good formatting, and makes the information more accessible for the reader, e.g. highlighting, labeling, etc.