2021 Rubrics for Rescue Line and Maze

Overall Scoring

Weighting of different parts of the competition

The overall score will be composed of:
- 30 % for the video
- 20 % for the documentation
- 50 % for the presentation and interview

N.B. The presentation and interview will be combined into ONE score

Video

Requirements

To submit:
- Teams must submit the videos as .mp4 files to the competition submission system by June 15th (UTC: 23:59:59)

What is in the video?

Pre-defined arenas no bigger than 4 tiles x 6 tiles (approximately 4ft x 6ft or 120cm x 180cm) will be released in the middle of May. There will be 3 difficulty levels with 3 arenas each. Teams must choose 1 arena per difficulty level for the video. Teams will be required to:

1) Replicate the arena configuration. (Do note: you may utilize a range of materials to make this happen. Be creative! Field quality just needs to be good enough for you to demonstrate the robot's performance. The field quality itself will not be scored, but must be reasonably reproduced.)
2) Record the robot execution as it would have been under the Official Rules. For example you will have to execute your robot run as if you were the referee, e.g. call Lack of Progress and points scored.
3) For each field, record a sequence of 3 consecutive runs in one continuous video (i.e.: you will have three videos, each corresponding to one field). The goal is to see the reliability of your robot's performance. To make sure that the runs are consecutive, you need to provide a visible clock in the frame. The three videos should not be edited when uploading. A guideline on how to record the video will be released until the end of May.

* **The time limit for each run of every field is 4 min**
** Any video with clear sign of modification will be disregarded.

Documentation

Mechanical design and manufacturing

Key Elements	0	1-2	3-4	5-6	7-8
non-commercial-kit		Commercial kit with 1 component from another manufacturer (e.g. all LEGO, or all MakeBlock)	Commercial kit with 2+ functional components from another manufacturer	Commercial Controller, and sensors devices are selected individually. Not coming from a commercial kit. Somewhat work well together	Prev + work well together.

informative diagrams		Very little images/diagrams to illustrate the mechanical design and structure	Demonstrate good effort in having some diagrams to show mechanical design and structure, and provide somewhat quantitative data.	Had clear diagrams to Show sound design and structure, with illustration including flowchart, diagram, sample data, etc. Presented thorough analysis with quantifiable data	Prev + replicable model for others to learn from
quantitative data support		Very little illustration quantitative data to support how well the robot mechanics work.	Demonstrate some effort in illustrating quantitative data to support how well the robot mechanics work.	Give viewers clear illustration on quantitative data to support how well the robot mechanics work.	Prev + replicable model for others to learn from
sub-module design and workability		Includes some level of how the system is composed of interacting parts (sub-modules), but confusing, i.e. some sign of modularization.	Give good amount of design proof to provide the view of the entire system and its interacting parts (modules). Had somewhat like pathways of interaction among the parts with diagrams.	Clearly identifying the major internal system interfaces and their interacting parts, and pathways with diagrams and design illustration.	Prev + replicable model for others to learn from
Electronic design and manufacturing					
Key Elements	0	1-2	3-4	5-6	7-8
non-commercial-kit		Commercial kit with 0-1 outside the box mechatronic contraptions.	Commercial kit with 2 or more functional outside the box devices.	Commercial Controller, and sensors devices are selected individually. Not coming from a kit. Somewhat work well together	Innovative design with working solution
Design and implementation		Customized circuit board, but lack of explanation	Custom circuit board, but show some understanding	Innovative design but just somewhat working	Prev + Innovative design as working solution
with images/schematics		Very little images/diagrams to illustrate the electronic design, schematics.	Demonstrate good effort in having some diagrams to show the electronic design, schematics. Give viewers a somewhat understanding, but materials are confusing.	Prev + materials are clear to understand.	Prev + replicable model for others to learn from
with quantitative support		Very little illustration quantitative data to support how well the electronic design work	Demonstrate some effort in illustrating quantitative data to support how well the electronic design work.	Prev + explain results and observations from the data.	Prev + replicable model for others to learn from
Software					
Key Elements	0	1-2	3-4	5-6	7-8
Architecture design with diagrams such as flowchart, UML, pseudo-code		Some good diagrams, and somewhat well thought out, but difficult to follow.	Show good amount of diagrams to illustrating the algorithms	Good *quality* diagrams to illustrate the software architecture.	Prev + illustration allows others to learn and replicate
Modularization and Integration		Identify some levels of modularization, but confusing.	Give good amount of design proof to provide the view of the entire system and its interacting parts (modules).	Prev + Clearly identifying the major internal system interfaces and their interacting parts.	Prev + method allows others to learn and replicate
Innovative algorithmic implementations		Standard algorithmic implemetations.	Some differences from standard algorithmic implementations. The implementation works in some cases.	Notable differeces from standard algorithmic implementations. The implementation works in most cases.	Innovative implementations worth sharing with the whole community. The implementation efficiently solve a particular section of the challenge.
Projects Planning - from Design, to Deployment					

Key Elements	0	1-2	3-4	5-6	7-8
Milestones /Project plan		Little sign of stages of milestones, vague planning. Most tasks are done at moment decision.	Show signs of stages with milestones, project planning, but lack of sign for used as a guide	Show signs of stages with milestones, project planning, and used somewhat as a guide.	Clear progressive milestones with teams assignment, and used as an overarching guide.
logical organization of materials		Attempt to have a good flow of information, but lack a logical progression. Confusing.	Major aspects of the analysis or recommendations are present, but lack of Diagrams or graphics	The underlying logic is clearly articulated and easy to follow. Content are concise but informative for reader's comprehension. Diagrams or analyses enhance and clarify presentation of ideas	So well done that it can be used as learning model materials for others.
Reliability Test Plan and Quality Assurance		Show some kind of test cases planning, but only simple ones, and lacking of keeping reliability in mind	Shows detailed reliability tests cases in mind.	Clearly Shows thoughtful Tests Plans and quality assurance, and integration plan.	Prev + optimization plan.
Data Collection, Prototyping and analysis		Little sign of prototyping design ideas. Lack of illustration on systematic data collection methods and analysis	Good attempt to show prototyping on intended ideas. Attempted to show illustration of systematic data collection methods and analysis, but vague.	Clear attempt on Prototyping and even tested in multiple conditions/trials.	Prev + Innovative systemic and computational methods. Role model engineering skill.
Integration Plan		Little sign of integration plan	Show good effort in integration plan, but not executed well.	Clearly shows well-illustrated integration plan, but not executed well.	Prev + clearly executed well.
Recognize Constraints		Talk about interesting constraints, but does not how further insight as how that influence your project.	Clearly show how the constraints influence the success or failure of your project	Prev + show vision as how to work around the constraints IF resources are available.	Innovative way to get around the constraints.
Engineering Journal					
Key Elements	0	1-2	3-4	5-6	7-8
Daily logs showing Project progress, experiments, etc.		Show sign of work progression, such as little daily log information on experiments. Lacking useful links to details. Most likely it is after-thought work.	Demonstrate attempt on making daily logs with just few statements, but not informative.	Prev + some illustration to help convey ideas for future reference, such as prototype images, CAD, flowchat/UML for algorithms design.	Creative way to log information to help communicate ideas among members, and stimulate further thinking
Record for easy lookup and reference		Show little attempt to organize the content to allow team for easy lookup of needed information.	Show attempt to organize the content to allow team for easy lookup of needed information, but content is unorganized.	Show good attempt to organize the content to allow team for easy lookup of needed information, and content is somewhat organized.	Very well -organized, and creative ways for easy lookup, such as important glossary of ideas/issues/etc.
Usefulness and repeatability		Provide Engineering Journal, but little meaningful illustration of progress such as troubleshooting, problems, solutions.	Provide Engineering Journal, with meaningful illustration of progress, including some trouble shooting, issues and solutions.	Prev + Concise but also informative - with proper reference	Prev + with great clarity, including reference links to further details and experiments, etc., that allowing team members to verify each other's work, and reproduce design work.

Presentation

Mechanical design and manufacturing					
Key Elements	0	1-2	3-4	5-6	7-8

Presentation of the design		Only few unclear pictures or drawings with no additional value through the explanation	Some pictures and/or drawings of the current design with some effort in explaining the functionality	Pictures and drawings of the current design of the robot and explanation of the functionality	Pictures and drawings of the current design of the robot and an easy to follow and insightful explanation of the mechanical functionality
Optimisation Process (roughly within two years)		Only incomplete, sporadic updates on the steps in the design process with no clear method recognizable	Some meaningful updates on the steps in their design process with some hints to a methodical approach	Pictures and drawings from multiple steps in the design process and some explanation of their method to improve the robots mechanical design	Pictures and drawings from different steps in the design process and explanation of highlights in the process and their method used to improve the robots mechanical design
non-commercial-kit		Commercial kit with 1 component from another manufacturer (e.g. all LEGO, or all MakeBlock)	Commercial kit with 2+ functional components from another manufacturer	Commercial Controller, and sensors devices are selected individually. Not coming from a commercial kit. Somewhat work well together	Prev+ work well together.
Electronic design and manufacturing					
Key Elements	0	1-2	3-4	5-6	7-8
Presentation of the design		Only few unclear pictures or drawings with no additional value through the explanation	Some pictures and/or drawings of the current design with some effort in explaining the functionality	Pictures and drawings of the current design of the electronics and explanation of the functionality	Detailed drawings of custom electronic hardware and explanation of its functionality
Optimisation Process (roughly within two years)		Only incomplete, sporadic updates on the steps in the design process with no clear method recognizable	Some meaningful updates on the steps in their design process with some hints to a methodical approach	Documentation from multiple steps in the design process and some explanation of their method to improve the robot's electronics	Documentation from different steps in the design process of the electronics and explanation of their method used to improve the electronics on the robot
non-commercial-kit		Commercial kit with 0-1 outside the box mechatronic contraptions.	Commercial kit with 2+ functional outside the box devices.	Commercial Controller, and sensors devices are selected individually. Not coming from a kit. Somewhat work well together	Innovative design with working solution
Strategy and Planning					
Key Elements	0	1-2	3-4	5-6	7-8
Plan for main task (following the line/navigating the maze)		Some plan to tackle the main task with no optimization process recognizable	Conventional approach to the main task and some test data with no clear optimization process recognizable	Robust plan for the main task with somewhat quantifiable data from tests and a rough optimization method	Robust and sophisticated plan for main task with quantifiable data form tests and a clear optimization method which led to the plan
Plan for uncommon scenarios		Only few uncommon scenarios have been tested and encountered problems were solved with conventional approaches	Testing procedures include some uncommon scenarios and most of them have been solved with conventional approaches	Testing procedures include plan for uncommon scenarios in the arena and most of the problems have been solved with conventional approaches	Testing procedures include comprehensive plan for uncommon scenarios in the arena and some encountered problems have been solved with innovative ideas
Workflow and Teamwork					
Key Elements	0	1-2	3-4	5-6	7-8
Allocation of tasks in the team, and team cohesiveness		No clear structure in the team but every team member has contributed to the result	Some specialization within the team but no clear structure and responsibilities	Structure in the team with a role for every member and some measures to reach the design goal	Clear structure within the team with roles for every member and processes to collaborate towards a common design goal. Each member contributes in a valuable way to the project. All members always attended meetings and met deadlines for deliverables.
Reliability					

Key Elements	0	1-2	3-4	5-6	7-8
Optimisation Process		Rough idea of a method to improve the robots weaknesses with no quantifiable data	Testing method with a clear goal but only attempts at producing meaningful testing data	Implementation of a testing method with somewhat quantifiable data	Implementation of a clear testing methodology with problem identification and solutions with quantifiable data
Innovations					
Key Elements	0	1-2	3-4	5-6	7-8
Learnings from previous competitions (for previous participants)		Only vague analysis of previous performances and no real conclusions for this year's competition	Some analysis of previous performance with some ideas to improve their preparation	Analysis of their performance at previous competitions and multiple ideas to improve their performance and preparation	Analysis of their performance at previous competitions and application of their experience to this year's competition
Overall approach to the problem (for new participants)		Show little analysis of the task and no meaningful preparation method is derived	Superficial analysis of the task and some ideas for preparing for the competition	Analysis of the task and a somewhat methodical approach to the preparation	Analysis of the task and methodical approach to the preparation for the competition
Technological Innovations		Slight improvement of the robots performance under specific circumstances due to some innovative ideas	Multiple innovative ideas in multiple areas of the robot lead to some improvement in performance	Meaningful innovation in one area or multiple smaller innovations that improve the robots performance	Meaningful innovations in multiple areas of the robot that work together and contribute significantly to the team's performance
Sharing					
Key Elements	0	1-2	3-4	5-6	7-8
Sharing their knowledge with the community		Documentation of their engineering process online	Documentation of their engineering process online and sharing some ideas of their code and hardware design	Open sourcing of code or hardware design with some effort in publishing meaningful documentation	Open sourcing of their code and hardware design and providing comprehensive public documentation that allows others to replicate their work

Interview

Requirements:	
Live Presentation	This will be similar to a Technical Talk where you will do an oral presentation of your robot with a slideshow. The presentation will be **10 minutes**. If you will not be able to present it in English, please make sure to specify that at the time of registration! Be creative! Best opportunity to showcase your innovation.

Interview	**Questions may include:**
	- Anything pertaining to all materials that you have submitted.
	- May be asked to demonstrate how well your robot works in some subsets of challenges.
	- Please prepare any special test cases you used to verify your robots performance in special situations.
	
	There will be a few small surprise challenges. Make sure you will attend the interview with:
	- Your fully functional robot
	- Materials that you use for creating the fields such as:
	  - For Rescue line: green squares (for intersection), black tape, obstacle, one evac zone etc.
	  - For Rescue maze: Common elements such as wall panels, various victims elements that can be moved around and black & silver tiles.
	- The final design of the field used for the interview will be provided prior to the interview
	
	Additional Remark about Live Presentation / Interview:
	- Non-team members (mentors, teachers, parents and other family, chaperones, translators and other adult team members) are not allowed to interfere at any time during the entire live presentation and interview.
	- For every single clear sign of interference, the team will risk a score reduction. In serious condition, the team could be disqualified from the tournament at the discretion of the panel of judges.
	NOTE: Teams may be subject to additional interviews at judges' discretion.