General Information for This Template

- The Team Description Paper (TDP) is a document that describes the team's robot, software, and research. It is only required for teams participating in the following leagues/sub-leagues:
    - RoboCupJunior Leagues
        - RCJ Soccer Lightweight, Secondary
        - RCJ Soccer Open (Team aged 14 and above)
        - RCJ Rescue Line, Secondary
        - RCJ Rescue Maze (Team aged 14 and above)
        - RCJ OnStage Secondary
    - RCAP CoSpace Leagues
        - RCAP CoSpace Autonomous Driving, U19
        - RCAP CoSpace Autonomous Delivery, U19
        - RCAP CoSpace Autonomous Delivery, University
        - RCAP CoSpace Rescue, U19
        - RCAP CoSpace Rescue, University

- This template contains a suggested structure for your TDP. You may only use the parts which are suitable for your own league/sub-leagues instead of including all parts as stated in the TDP template.
- This document is supposed to be between **5 to 10 pages** long (from Abstract to Conclusion). Please **keep the formatting** (font size and type, margins, line spacing, etc).
- All figures and tables should be properly numbered.
- Use diagrams, flow charts, etc. throughout this document to better **illustrate your work.**
- Submit the TDP as a **PDF file**.

ROBOCUP ASIA-PACIFIC 2025

TEAM DESCRIPTION PAPER

(Cover Page)

League Name:	
Age Group:	
Team Name:	
Team Website:	
Participants and Technical Roles	
Team Photo	
Mentor Name:	
Institution:	
Region:	
Contact Person:	
Contact Email:	
Date:	

ROBOCUP ASIA-PACIFIC 2025

TEAM DESCRIPTION PAPER

League Name

Team Name

Student 1, Student 2, …

(Region)

Abstract

- Abstracts are typically 100–250 words and comprise one or two paragraphs.
- In the abstract, please discuss all the need-to-know details of your Team Description Paper (TDP): purpose (what problem it attempts to solve), method (the methodology of your research), results and discussion (conclusive outcome and significance).
- Please concentrate on your robot, their main capabilities, algorithms, strategies, and innovation. Do not describe your league/sub-league in detail.

1. Introduction

a. Team

- Team background, including website and video link (if you have).
- Provide a brief description of each team member's role, relevant past experiences, and their specific contributions to the team. Each description should be between 20 and 100 words.

2. Project Planning

Please highlight how AI tools were used during the project planning process.

Include specific applications such as task scheduling, resource allocation, risk assessment, or timeline optimization. Mention any tools or platforms used and explain how they supported decision-making, improved efficiency, or enhanced collaboration during the planning phase.

a. Overall project plan

- **Team Objective**

  Clearly articulate your team's primary goal for the competition.

  - Define the specific requirements the robot and team must meet, considering all relevant constraints (e.g., physical dimensions, time limitations, competition rules, available resources).

- **Project Plan**

  Outline the entire project timeline, emphasizing major phases and deadlines.
  - Identify key milestones with an associated project schedule or Gantt chart.
  - Provide a brief description of each milestone.
  - Assign responsibilities for each milestone to specific team members or functional roles.
  - Incorporate review gates to monitor progress and make adjustments if needed.

- **Planning and Scheduling Process**

  Explain how the team collaboratively developed the project schedule.
  - Analyze task dependencies and competition constraints that influenced your plan.
  - Justify the chosen sequence of milestones (e.g., mechanical assembly before software integration).
  - Detail what performance or conditions will be tested during each iteration.
  - Describe how results from earlier phases informed decisions and adjustments in later stages.

b. Integration plan

- **Integration Strategy**

  Describe how the team integrated individual components and subsystems to meet the competition objectives.
  - Include system-level diagrams or schematics to illustrate the overall design.
  - Explain how each component fulfils the defined requirements.
  - Clarify how various robot components (hardware and software) communicate and function together as a cohesive system.

- **Visual Support:**
  - Support your explanations with relevant diagrams, images, or flowcharts to enhance understanding of the integration process and system design.

3. Hardware

Please highlight how AI tools were utilized during the hardware design process.

Indicate which tools or platforms were used and how they contributed to improving efficiency, accuracy, or innovation in your hardware development.

a. High-Level Overview

- Provide a concise overview of the robot's hardware design, focusing on how the system is structured and how all components work together.
- Highlight key features and explain how the mechanical and electronic subsystems integrate to achieve the team's competition objectives.

b. Mechanical Design and Manufacturing

- Provide a detailed breakdown of the robot's mechanical design, including the following key components:
    - **Main Structure:** Describe the frame, materials used, and design rationale.
    - **Actuators and Power Train:** Explain the mechanisms for movement and power transmission.
    - **Subassemblies/Modules:** Detail any modular elements or independent mechanical units.
    - **Specialised Modules Deployment Mechanism:** Explain the design and function of these specialized components.
- Support your explanations with drawings, diagrams, or images, referencing the requirements defined during the project planning phase.
- Describe the testing procedures used to validate the mechanical design and include relevant data or results.
- Highlight any innovative or unconventional approaches, clearly linking them to project constraints and performance requirements.

c. Electronic Design and Manufacturing

- Provide a detailed description of the robot's electronic systems, including:
    - **Sensors Used:** Types, placement, and purpose.
    - **Main Controller:** Microcontroller or processor responsible for system control.
    - **Power Subsystem:** Power sources, voltage regulation, and power management.
    - **Actuators and Interfaces:** Integration of electronics with mechanical actuators.
- Include diagrams or schematics to visually support your design decisions.
- Reference the planning phase requirements and explain how each component meets those needs.
- Outline the testing procedures for the electronic systems and present any relevant data or findings.
- Highlight any innovative electronics solutions or adaptations made to meet specific constraints or challenges.

4. Software

Please highlight how AI tools were used during the software design process.

Include specific applications such as path planning, object detection, decision-making algorithms, or system optimization. Mention the tools, frameworks, or models used, and explain how they enhanced functionality, efficiency, or adaptability in your software development.

a. Overview

- Provide a summary of the software system used in your robot.
- Note: Do not include source code in this document.

b. General Software Architecture

- Describe the overall structure of your software system.
- Use diagrams and flowcharts to illustrate:
    - Data flow
    - Decision-making processes
    - Subsystem interaction
- Explain how the software addressed integration challenges.
- Detail the tools, libraries, algorithms, or AI models used or developed by the team.

c. Innovative Solutions

- Describe any innovative or unconventional software strategies your team employed to address the challenges of the competition.
- Outline the testing procedures used to verify the functionality and performance of your software, and present any relevant data or insights gained from those tests.

d. Source code

- If you wish to include part of your source code for explanation, please add it as an appendix.

5. Performance Evaluation

a. Evaluate the Robot's Performance:

- Assess how effectively the robot met the competition challenges and requirements. Discuss strengths, weaknesses, and overall functionality during testing and/or actual runs.

b. Testing Procedures:

- Describe the methods and procedures used to test the robot’s performance in various scenarios. Include conditions tested (e.g., obstacle navigation, object detection, rescue mechanism operation).

c. Analysis and Impact:

- Explain how the test results were analyzed (e.g., through data logging, observations, performance metrics) and how these insights influenced further development, adjustments, or redesigns of the robot.

8. Discussion and Conclusion

- Provide a brief summary of the project, highlighting key achievements, lessons learned, and the overall outcome.
- Reflect on how well the team met its objectives and outline potential areas for future improvement or exploration.

9. Acknowledgements

- We would like to express our sincere gratitude to those who supported us throughout the development of this project. This includes individuals from sponsoring institutions, funding agencies, academic mentors, fellow researchers, and family and friends who contributed their time, resources, or encouragement during the preparation and execution phases.

10. References

- List all external sources, materials, or publications that were consulted or referenced during major parts of the development process. Use a consistent citation format (e.g., APA, IEEE, or your institution's preferred style).

11. Appendix (Optional)

- The appendix is intended for supplementary information that supports the main report but is not essential to its core content. This may include technical data, expanded diagrams, charts, raw testing results, or detailed component specifications. Alternatively, teams may provide links to external documentation or repositories for readers seeking more in-depth information.