Executive summary

2021 MSD Autonomous Referee System

TU/e

The Autonomous Referee (Autoref) is an in-house project part of the PDEng program in Mechatronic Systems Design which aims to develop an autonomous referee to assist the human referee in a robot soccer game. From 2016 to 2020 Autoref was based on cameras equipped with autonomous drones to use as referees in the RoboCup Middle Size League (MSL). The 2021 MSD team decided to use the robot players as “referee” to collect data for the decision-making algorithm. The detailed process to create the algorithm is presented in the architecture description document.

The goal of the project is to design an autonomous refereeing system for the Robocup middle size league (MSL) with specifically ensuring continuity for future work. The deliverables are: system functional specification, 2 tasks implementation algorithm, project management plan, and architecture description.

Two sub-teams were created as system architecture and implementation team. System architecture mainly focused on specifying the functions of the autonomous referee for Robocup MSL as derived from the MSL rulebook and summarized by the 2020 MSD team.

The 2021 MSD implementation team has designed, implemented, and tested the "ball rolling for a distance greater than 0.5 m" and the “ball IN/OUT of play” tasks. These tasks are applicable (in part) to eight laws from the MSL rulebook. During the project, the following activities have been carried out by the team: project management, feasibility analysis, requirements engineering, system architecture, algorithm design and implementation, and testing. After the feasibility analysis, the team created a design-decision matrix to decide which technology would be better to use according to defined criteria. The technologies options would be used to gather the data for the decision-making algorithm. Moreover, the team recorded a real game of two against two robots to validate the algorithm created in Matlab.

Finally, a “Readme” file in GitHub was created to explain about the project and containing links to access all 2021 MSD deliverables.