Background and Motivation

Document status	RELEASED

| Version	Description	Author	Date (DD/MM/YYYY)
0.0	First version of the Background.	Isaac Pedroza Aguirre	26/08/2020
0.1	Completion of the background and motivation.	Jia Yin	27/08/2020
0.2	Some rephrasing.	Isaac Pedroza Aguirre	28/08/2020

Our client, Guang Hu, is a PhD student at the University of Melbourne supervised by A/Prof Tim Miller and Dr Nir Lipovetzky. His research topic is Epistemic Planning in Explainable AI. He is also the president of the Ausdroid graduate student group (built for robotic and AI study, affiliated with GSA), and the team leader of Team Ausdroid (built for ICRA AI Challenge).

Guang's aim is to adequate a robot to be competitive in the RoboMaster AI Challenge (https://www.robomaster.com/en-US/robo/icra). On behalf of the Ausdroid team, Guang proposed a list of projects to make the robot more competent. These projects are listed on the Ausdroid website: http://ausdroid.co /projects/ and on the material provided by Guang: Project-Launch-Software.pptx. All the projects are proposed based on the gap between the current capability of the robot (https://youtu.be/sqlIRbhKSns) and the desired capability in the coming competition. The latest rule books of the competition can be found at the button of this page: https://www.robomaster.com/en-US/resource/pages/announcement/1039. Despite the proposed list of projects, Guang is open to suggestions for new projects or ideas to make the robot more competitive.

Guang requires solutions for the projects: Armour Location and Armour Identification. The goals are to make the robot able to locate and identify the enemy robot's armour in the images captured by the robot's camera and the outpost camera. According to the rules of the competition, robots shoot at enemy robots' armour to score points. The robots score different points depending on which enemy robots' armour they hit: front, side or back. Therefore, granting our robots the capabilities of locating and identifying enemies' armour automatically will significantly increase the chance of winning in the competition. After implementing the two algorithms, it is desirable to implement a user interface for testing purposes.

Guang encourages our team to choose one of the two approaches his team has identified to achieve the armour location task: a basic analysis of the images from the robot's camera using a traditional computer vision algorithm or by using the You Only Look Once (YOLO) algorithm, a real-time object detection system (machine learning approach). Details of YOLO can be found on the official website: https://pjreddie.com/darknet/yolo/. One of these approaches could be also used to solve the armour identification task. However, Guang is open to new solutions.

Motivational Model
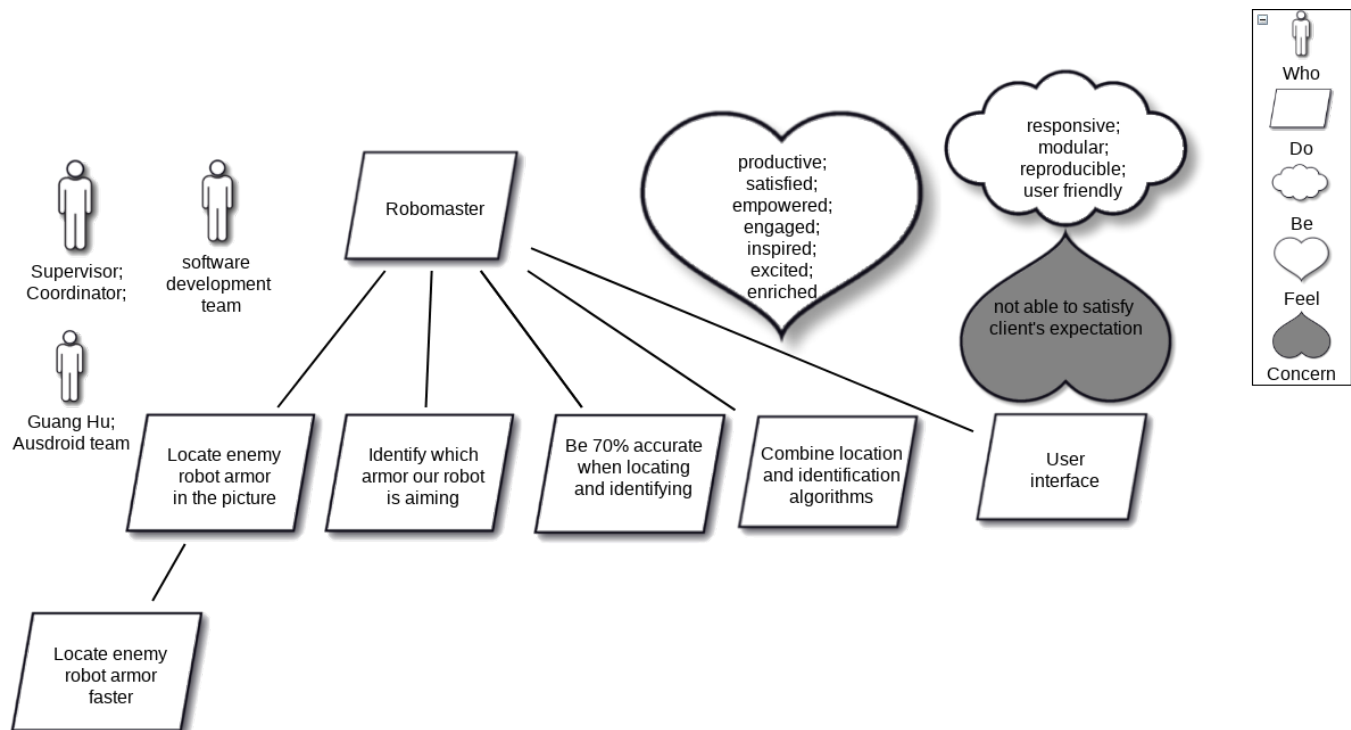
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