

1 Autonomous Landing System

Draven's software autonomously guides the ROV to a specified location using advanced image processing and ROV control. The Motion Decision Block processes camera input to identify the landing spot, which is then evaluated by the Decision Making Algorithm to estimate the distance to the spot. The algorithm generates coordinates for movement direction, which are utilized by a closed-loop control system. Equipped with a PID Controller, the Control Block computes and smoothens the ROV's movements, allowing it to navigate effectively within the environment and counteract external effects on its motion.

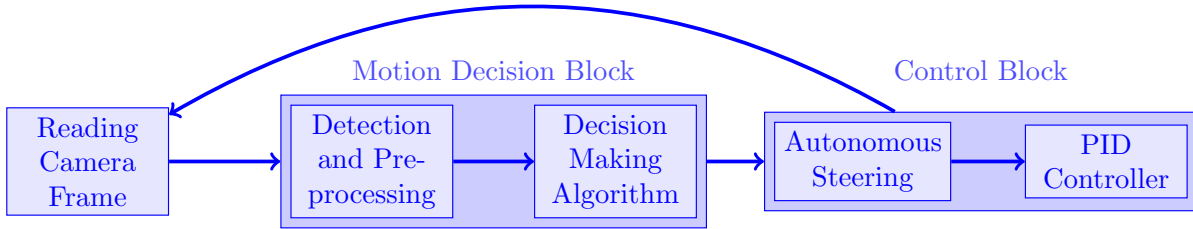


Figure 1: Autonomous system flow chart

1.1 Motion Decision Block

The Motion Decision Block software consists of multiple sequential stages. The first stage involves processing the input frame through a Color Detection and Noise Reduction Algorithm, which serves to isolate the Region Of Interest (in this case, the landing spot) from the surrounding environment. Following this, the ROI is thresholded to be further processed by the Bounding Box Coordinates node, which allocates the ROI in the frame using the $(X1, Y1, X2, Y2)$ coordinates. These coordinates are then fed to the Decision Making Algorithm, which estimates the relative distance from the ROV to the Landing Spot and further produces the ROV motion presented in (X, Y, Z) coordinates, as shown in Figure 2

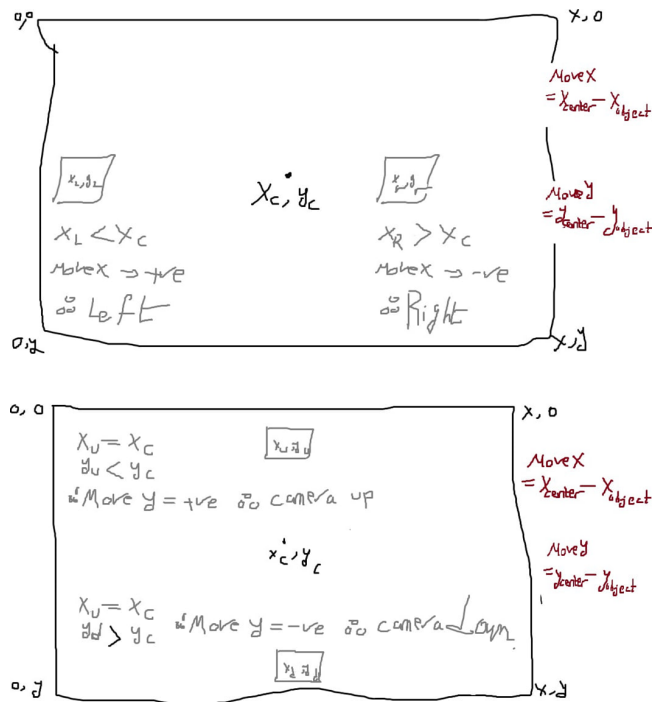


Figure 2: Figure illustrates how the Decision Making Algorithm works with respect to the presence of the ROI in the frame.

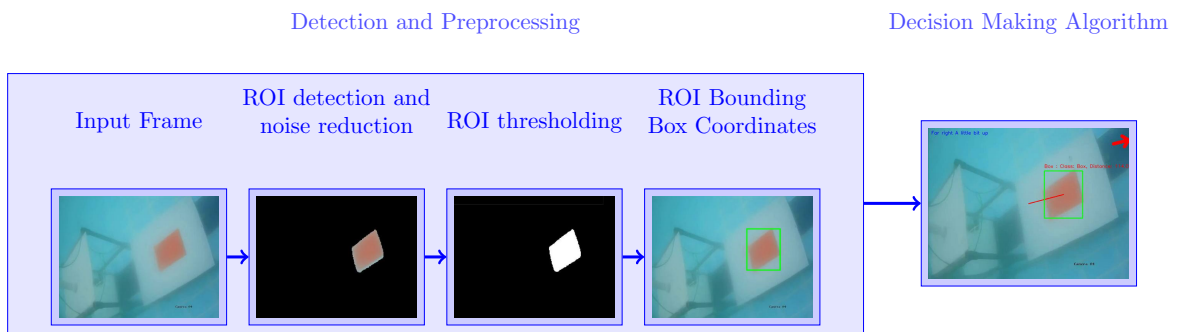


Figure 3: Motion Decision Block