1 Autonomous Landing System

Draven software enables it to land to specsifiied spot autonomously through the utilization of advanced image processing techniques and ROV control. Using the **Motion Decision Block** the system processes the input frame came from the camera to detect the designated landing spot, then fed the processed frame to Decision Making Algorithm which estimate the relative distance to this spot from the camera's position. Based on the estimated distance the Decision Making Algorithm outputs a (X, Y, Z) coordinates indicates direction to move. This Coordinates then serves as input for a closed-loop control system, which calculates and directs the appropriate movements for the ROV by the **Control Block** using the PID Controller which stabalizes and smoothes the motion to overcome the effect of the surrounding enviroment.
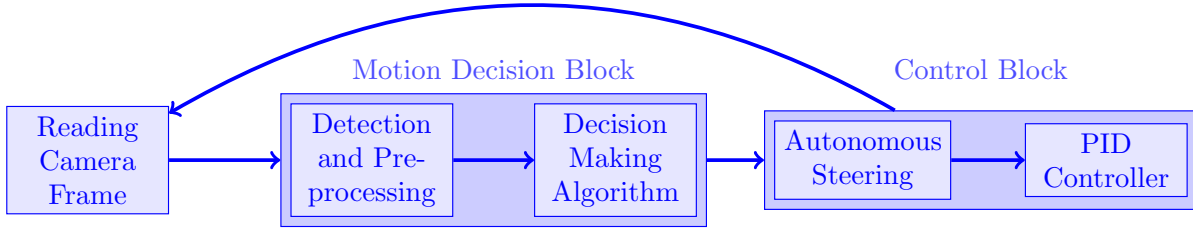

Figure 1: Autonomous system flow chart

1.1 Motion Decision Block

The Motion Decision Block software consists of multiple sequential stages.
The First is to process the input frame through Color Detection and Noise reduction Algorithm which isolates the Region Of Interest (in this case is the landing spot) from the surrounding enviroment.
Secondly is thresholding the ROI to be further processed by the Bounding Box Coordinates node which allocates the ROI in the frame in terms of (X_1, Y_1, X_2, Y_2) coordinates.
This Coordinates fed to Decision Making Algorithm which estimates the relative distance from the ROV to the Landing Spot, which be further used to outputs the ROV motion pesents in (X, Y, Z) coordinates as shown in Figure 2
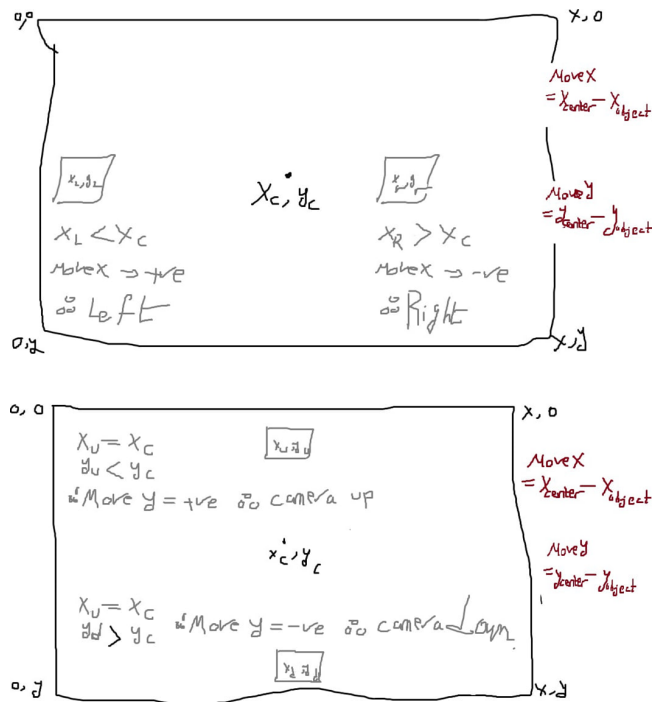
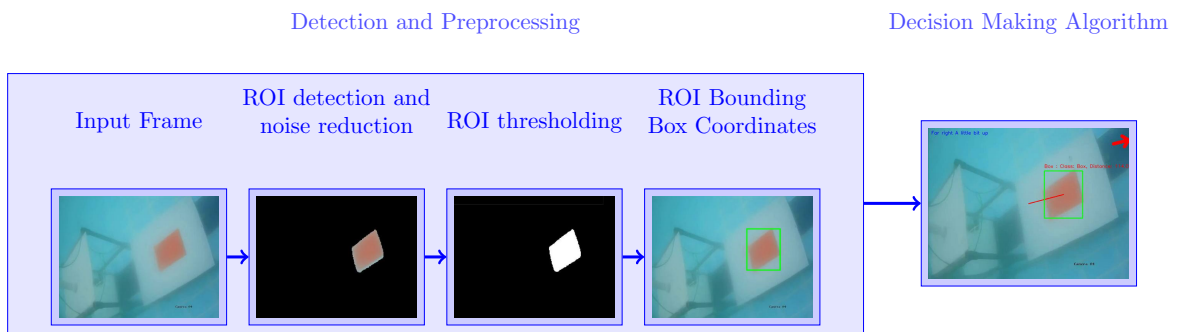Figure 2: Figure illustrates how the Decision Making Algorithm works with respect to the presence of the ROI in the frame.

Figure 3: Motion Decision Block