

Yıldız Rescue Simulation League Virtual Robot Team

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Introduction

Team Yildiz consists of members that are mainly working on Machine Learning, Computer Vision and Robotics, especially Simultaneous Localization and Mapping (SLAM) algorithms. Autonomous exploration, simultaneous localization and mapping, image enhancement, victim detection, and communication are the problems that we dealt in this project.

User Interface

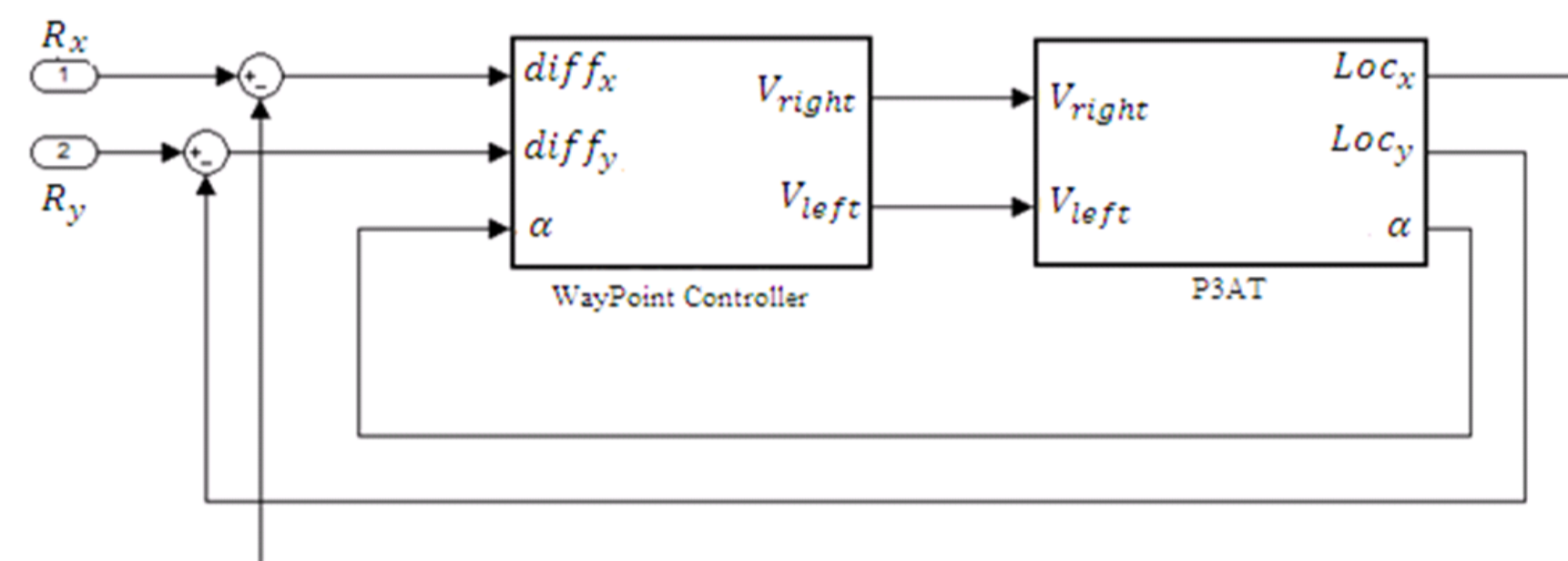


Communication Protocol

SZ	ID	TYP	TRG	SRC	HOP1	HOPn	*	MSG	MSG
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- SZ : Message size consists of 3 byte.
- ID : Message ID consists of 2 byte.
- TYP : Message type consists of 1 byte. 1 stands for routing only receivers, 2 stands for blind flooding, 3 stands for dynamic routing table.
- TRG : Target node ID consists of 1 byte.
- SRC : Source node ID consists of 1 byte.
- HOPn : Message packets are transferred by the way of hops. This field refers to internal hops ID.
- *
- beginning. It consists of 1 byte.
- MSG : Contents of the message.

Way Point Control



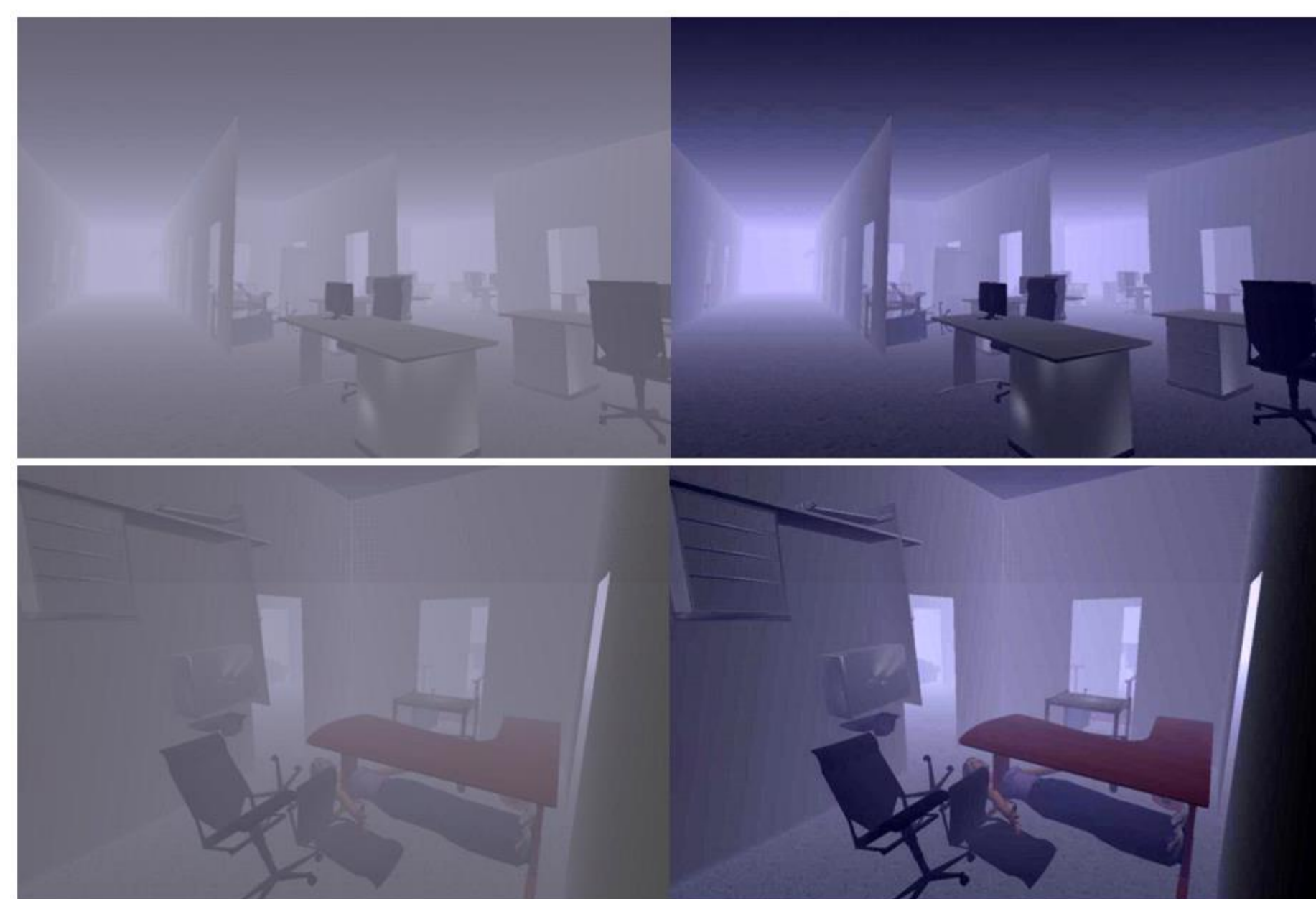
Waypoint Controller is a function that has 3 inputs and 2 outputs. The relationship between inputs outputs are given by the following Equations.

$$V_{left} = v + K_p \cdot (\alpha - \tan^{-1}(diff_y / diff_x))$$

$$V_{right} = v - K_p \cdot (\alpha - \tan^{-1}(diff_y / diff_x))$$

α, Loc_x, Loc_y are the values of P3AT's direction angle, x location and y location respectively. R_x, R_y are the locations of the WayPoint. $Diff_x, Diff_y$ are the differences of robot location with respect to the waypoint location. v is the function of Euclid distance of robot and waypoint which called base velocity. K_p is the coefficient of proportional control. Both function v and scalar K_p are determined empirically.

Image Enhancement Experiments



$$newP = \frac{currP - \min P}{\max P - \min P} * 255$$

newP is the new value of pixel, currP is the current value of pixel, maxP and minP are the maximum and minimum values of all pixels respectively.