ABSTRACT

In the world of mobile robots, Simultaneous Localization and Mapping (SLAM) is a very relevant topic that has been investigated for many years due to its importance in several applications. This technique can be used to map and track a robot's location in the environment, allowing for robot autonomy (uncontrolled or remote robots). In a natural disaster, an earthquake often causes victims of the disaster to be buried in the rubble of buildings. From several incidents that have occurred so far, many victims would still be alive if they were evacuated quickly from the rubble. The main problem for the rescue team is finding the victim's location accurately and quickly. There are several methods used for this, for example with sniffer dogs. This method is a traditional method used so far which requires an expert handler. There is another method, namely using mobile robot technology which has the ability to target and detect these victims. This research aims to design or determine a SLAM algorithm that is suitable for the application case of searching for and detecting victims of natural disasters (outdoor domain). After that, determine the navigation architecture for the mobile robot. Then it is realized as a Proof of Concept (PoC) using ROS (Robotic Operating System) or other tools embedded in a raspi minicomputer installed on a simple model of a mobile robot. From the research that has been carried out by Raspycam, with the help of the ORB-SLAM algorithm, it can map the area being tested and also localize the movement of this tool. In detecting victims with the YOLOv8 algorithm, victims can be detected well. Navigation of this car robot uses 2 methods, namely autonomous and also manual using remote control. This will help users in using this tool. When this tool has difficulty searching for victims, the user will use manual control mode so that the movement of this tool is easier to control. The autonomous mode on this tool uses an object detection system from the JSN-SR04T ultrasonic sensor. When the sensor detects an obstacle around 40 cm in front of it, this tool will perform a maneuver to avoid the existing obstacle. However, in cases where the tool is trapped by an obstacle, it is very important to use manual control mode to get the tool out of the obstacle and start looking for earthquake victims again. After experimenting, manual navigation mode can work well. Communication used between systems is assisted by ROS Noetic. Communication between existing systems is considered successful because it can send and receive data well.

Keywords: Disaster, Earthquake, Mobile Robot, SLAM