CHAPTER 1

INTRODUCTION

1.1   Background

Automatic Guide Vehicle or can be called Mobile Robot, Mobile Robot System is made in order to facilitate a job or task in order to make it easier for humans to complete work. The use of this mobile robot system is commonly applied to industries to simplify and speed up the production process. In a mobile robot system, of course, a navigation system is needed so that orders or work can be carried out properly and in accordance with their goals. The navigation system applied to the mobile robot is to go to a certain destination. But of course the mobile robot must be able to recognize its working environment. this is because in order for the navigation system to run properly, it is necessary to have a reading of the work environment using certain sensors.

The introduction of a mobile robot work environment is very necessary, because to complete a job or get to a certain destination Mobile Robot must choose a safe path. Path Planning is one of the navigation systems on Mobile Robot to be able to find a safe and proper path to a certain destination. Path Planning is a common ability instilled in all types of robots, which is related to determining how the robot will move and maneuver in the [9] environment. The implementation of Path Planning on Mobile Robot is done so that Mobile Robot can move dynamically without having to hit obstacles in the robot's environment. However, the implementation of Mobile Robot navigation is often done using a lot of sensors to recognize the work environment, this results in long computations on Mobile Robot in determining a safe path to traverse.

The use of multiple sensors in Mobile Robot is still often applied, Mobile Robot is installed on the right and left to read obstacles around the robot[10]. The use of many sensors results in a long computation time and inaccurate data accuracy due to the delay. The implementation of Path Planning uses many methods, such as in several studies using the Fuzzy [11] [12], Genetic Algorithm [13] [14] [15] [16] and Particle Swarm Optimization [17]. This is done to achieve maximum results in generating a path that is safe for mobile robot. From several studies with different methods, of course, each has its advantages and disadvantages, depending on the concept applied to find a safe path for Mobile Robot.

This thesis is conducted to find a solution for navigating the Mobile Robot using a camera and the Fuzzy Logic method by utilizing the image detection process. The camera is used to reduce computation on Mobile Robot and for environmental recognition to get the coordinates of Mobile Robot and Obstacle. Computing is done centrally, so that Mobile

Robot only receives information on the speed of the right and left wheels.

1.2   Research Purpose

Based on the background that has been described, this study aims to find a solution for the navigation system on the Mobile Robot by using a Single Camera with Obstacle readings. With the aim of streamlining the travel time of the Mobile Robot from the starting point of the robot's appearance to its destination point. By using the camera for recognition of the work environment, as well as centralized computing. Computing will be carried out by the Personal Computer to process the data information that has been obtained, namely in the form of coordinates for the position of the Mobile Robot, Obstacle and destination point to obtain a safe path for the robot to traverse. Mobile Robot only receives right wheel and left wheel speed information.

1.3   Identification of Problems

In a mobile robot navigation system, one or more sensors are needed to identify the state of the Mobile Robot's working environment. The use of sensors embedded in the Mobile Robot is widely implemented, but this is of course not effective because there will be a lot of computing done by the Mobile Robot. That's because it will require more than one sensor that must be on the Mobile Robot. And the direction or navigation of the robot will be wider and it will take longer to reach the destination, because the reading of obstacles or obstacles is done randomly.

So we need a system that has effective computing using a vision sensor, namely a camera. Vision sensors are used to identify the mobile robot's environment, determine the position of the mobile robot and obstacles. Computing is done by using a personal computer that has been connected to the camera and using the Fuzzy Logic Control method. The mobile robot will only receive right and left wheel speed information.

1.4   Scope of Problems

In this study, the limits determined are as follows:

1. Using a single camera for robot environment recognition;

2. The camera is placed on an object with a height of 150 cm;

3. Camera position is placed in the middle and facing down;

4. Dimensions of robot environment in 2 Dimensional area;

5. The Mobile Robot used is Two-Wheel Drive Robot;

6. Navigation System built using Fuzzy Logic Control

1.5   Hypothesis

The hypothesis in this thesis can be stated that; navigation system of a Mobile Robot can be done using Sensor Vision. All computational processes to build a navigation system with obstacle readings are carried out centrally on a Personal Computer, so that the Mobile Robot only receives information on the speed of the right and left wheels. The use of the Fuzzy Logic Control[10] method, shows that the simulation results using the Fuzzy Logic Control method obtain high efficiency than the results obtained by other algorithms used for robot path planning.

1.6   Research Methodology

In this thesis, the following techniques and methods will be carried out:

1. The reading of the Mobile Robot environment is done by reading the position or coordinates of obstacle, the mobile robot, and the destination point;

2. Detects the occurrence of Mobile Robot by reading its coordinates using the camera;

3. To navigate mobile robot is done by specifying path or a safe path to be traversed by mobile robot by using the Fuzzy Logic Control method using the coordinates of obstacle, Mobile Robot and goal or destination;

4. All computing is done centrally on Personal Computer and mobile robot will only receive information about left and right wheel speed;

5. data will be sent from the personal computer to the mobile robot using a communication module, namely bluetooth.