PRINCIPLES AND APPLICATION OF MICROCONTROLLERS
AVR C Lab8: Wheel Robot

Introduction

In this lab, you are required to design and build a wheel robot. You are also asked to navigate the wheel robot to circle around a field (Fig. 1). To complete this task, you will need to learn how to control two direct current (DC) motors, moving the wheel robot forward and making right and left turns. After completing this lab you should be able to:

- Perform DC motor control
- Design robot navigation logic

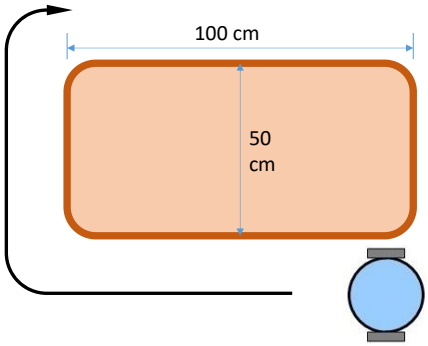

Figure 1: Task of the wheel robot

Parts List

- A wheel robot set
- An AVR ATmega328P MCU
- An H-bridge board

Procedure

Use Timer0 and Timer2 to generate the PWM signals. Connect OC0A and OC0B (PD6 and PD5) to IN1 and IN2 as shown in Fig. 2. These two output signals control a DC motor. Connect OC2A and OC2B (PB3 and PD3) to IN3 and IN4 as shown in Fig. 2. These two output signals control the other DC motor. Write a C program that navigates the wheel robot to circle around the field (Fig. 1).

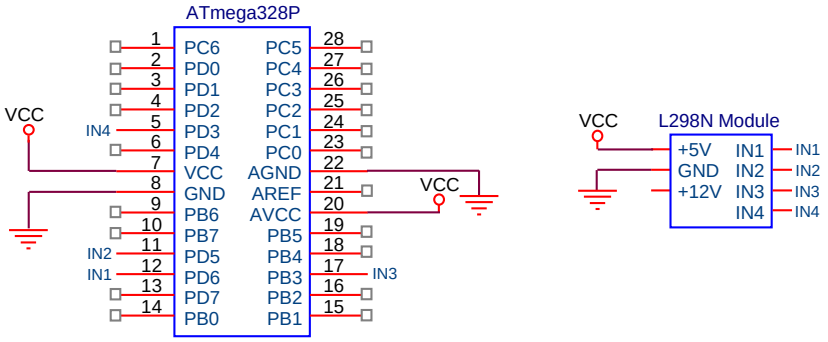

Figure 2: Circuit diagram of wheel robot

Deliverables

Basic points (90%):

Demo the result to the TAs, or record it in a video. Upload the followings to ceiba: 1) your C program source code, 2) a photo of your physical circuit, and 3) contributions from each teammate to the lab. The contributions must include the information of the tasks each teammate has done and the

contributions in percentage. The total percentage should be 100%. All the teammates have to agree with the contributions before they are uploaded.

Advanced points (10%):

Program your robot to walk a triangle.