Driving the BeyerBot

1   Objectives.

1. Become familiar with the DFECBot driving functions.

2. Utilize the Arduino to drive the robot in multiple patterns.

2   Materials.

1. DFECBot

2. USB Programming Cable

3 Introduction.

3.1 Source Files

Browse to `K:\DF\DFEC\ECE210\Labs\Lab 9 - Driving the Robot` and copy the `robot_drive` folder to your computer. Open `robot_drive.ino`.

Use Notepad++ to open the *Motor.h* file that you previously saved here: `Program Files (x86)/Arduino/libraries/Motor/Motor.h`. The *.h* file is a header file used within the *.ino* Arduino sketch. Take a look at `Motor.h` first.

3.1.1 Motor.h

This file uses four pins on the Arduino to communicate with the TB6612FNG Motor Driver chip on your PCB board. These pins are used as follows:

Pin 4 (L_DIR)– Connects to the *APS_CTRL* pin on the PCB board. This pin sends a signal to the motor driver to control the direction of the left motor.

Pin 5 (L_PWM) – Connects to the *APS_MA* pin on the PCB board. This pin sends a Pulse Width Modulation (PWM) signal to the motor driver to control the speed of left motor.

Pin 6 (R_PWM)– Connects to the *BPS_MB* pin on the PCB board. This pin sends a Pulse Width Modulation (PWM) signal to the motor driver to control the speed of right motor.

Pin 7 (R_DIR)– Connects to the *BPS_CTRL* pin on the PCB board. This pin sends a signal to the motor driver to control the direction of the right motor.

In the *Motor_Init* function, all four of these pins are set to *OUTPUT* pins.

The `Motor.h` file provides basic drive functions like *Motor_Forward(leftDuty, rightDuty)* and *Motor_Stop()*. All movement functions (*Motor_Forward*, *Motor_Left*, etc) will run until the next movement function is provided. For example, to get the robot to move forward for 5 seconds then stop, the *Motor_Forward(leftDuty, rightDuty)* function should be called followed by a 5 second delay and the *Moto_Stop()* function.

3.1.2 robot_drive.ino

This is the main file to place drive code. This file is reliant on the `Motor.h` header file. The `robot\_drive.ino` file provides an example to move the robot forward, turn left, turn right, drive backwards, and then stop. This code will repeat continuously until the DFECBot is powered off (See below code). Delete this example code before submission.

```
1   /*
2    *   Code to make the DFECBot go forward, turn left, turn right, go
3    *   backward and stop. This code will repeat continuously
4    *   until the DFECBot is powered off
5    */
6   Motor_Forward(leftDuty, rightDuty);
7   delay(2000);
8   Motor_Left(leftDuty, rightDuty);
9   delay(2000);
10  Motor_Right(leftDuty, rightDuty);
11  delay(2000);
12  Motor_Backward(leftDuty, rightDuty);
13  delay(2000);
14  Motor_Stop();
15  delay(2000);
```

4   Procedure

Use the example code provided and the `Motor.h` to code the DFECBot to drive the following patterns. The DFECBot should pause for 2 seconds between each pattern.

1. Drive the DFECBot forward.

    (a) Drive forward for 5 seconds.

2. Drive the DFECBot forward and reverse.

    (a) Drive forward for 5 seconds.
    (b) Pause for 1 second.
    (c) Drive in reverse for 5 seconds to return to the starting position.

3. Drive the DFECBot forward, turn around, and return to start.

    (a) Drive forward for 5 seconds.
    (b) Pause for 1 second.
    (c) Turn around.
    (d) Drive back to start and original orientation.

4. Drive the DFECBot in a square.

    (a) Drive in a square making right turns.
    (b) Return to the starting location and position.
    (c) Drive in a square making left turns.
    (d) Return to the starting location and position.

5. Drive the DFECBot in a small circle.

    (a) Drive in a clockwise circle keeping one wheel fixed.
    (b) Drive in a counter clockwise circle keeping one wheel fixed.

6. Drive the DFECBot in a large circle.

    (a) Drive in a clockwise circle with an approximate diameter of 2 feet.
    (b) Drive in a counter clockwise circle with an approximate diameter of 2 feet.

7. Drive the DFECBot in a pattern of choice.

    (a) Drive in a pattern of your choosing.