

Assignment 3 – Motors & Motor Shield - Zoom

Description: In this assignment I created a circuit that controls a DC motor. Using a motor driver HAT , raspberry pi, and a push button, I created a circuit that controls how fast and in which direction a DC motor rotates. The DC motor starts to rotate as soon as the tactile push button is pressed.

Approach / What I Did:

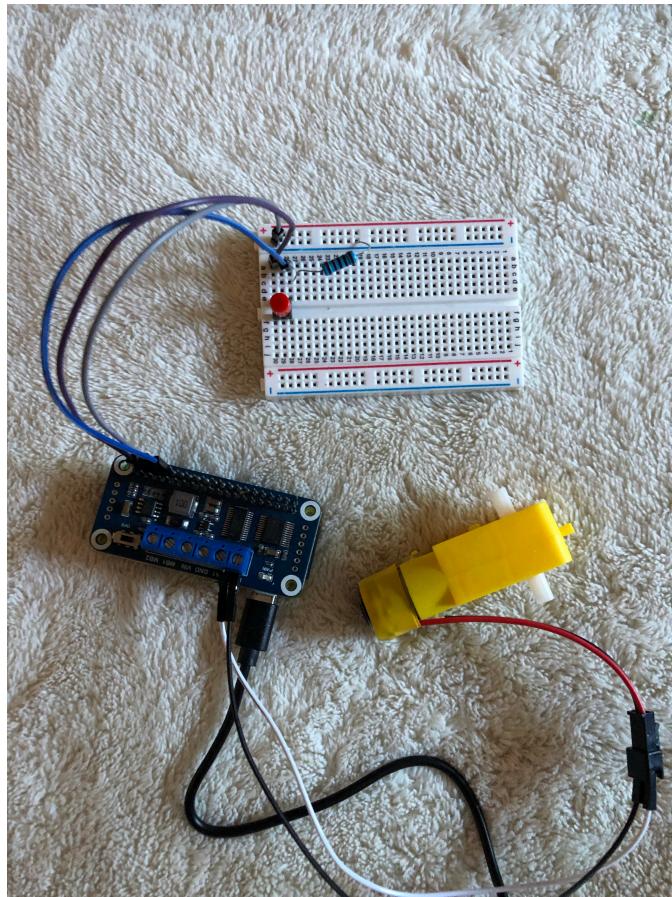
Before wiring the C program for my circuit, I built the circuit. For the circuit I used a raspberry pi, motor driver HAT, 1k ohm resistor, DC motor, and wires. I first placed the motor driver HAT on top of the raspberry pi and made sure they were connected through the raspberry pi's pins. After I connected the positive wire of the Dc motor to the MA1 port on the motor driver HAT and the negative wire of the DC motor to the MA2 port. I then connected a pin from the tactile push button to gpio pin 14 and another pin on the same side of that pin to a 5v pin on the motor driver HAT. Since I had the tactile push button on a breadboard, I placed one side of a 1k ohm resistor on the same row the pin connected to the gpio pin was on and the other end to the negative row on the breadboard. I placed a wire on the negative row and connected it to a ground pin on the motor driver. When writing the code portion of this assignment, I used function from the wiringpi library and from the PCA9685.h file and Config folder. I mostly used functions from the Wiringpi library to create the code that would allow the program for the motor to start when the button is pushed. I used the function wiringPiSetup() to tell my program that I will be using the wipi numbers for the pi pins. For the push button I decided to use wiring pi pin 15. I set the pin to receive input with pinMode(). Inside a while loop, if a voltage is read from the pin, then the push button was pressed. If digitalRead() reads high, then it allows for the program for the DC driver to start. When the program starts it starts at a duty cycle of 100% . Using the function MotorForward(), the motor turns forward at a duty cycle of 100 for about two seconds and every time after that the for loop loops again, the duty cycle decreases by a value of 10 and the motor turns forward for about three seconds before the loop loops again. The motor is stopped after a duty cycle of 15% by setting the speed to zero, or 0% duty cycle. After this, the motor turns backward with the function MotorBackward(). The motor starts at a duty cycle of 15% and after at a duty cycle of 20%. Every time the for loop loops, the duty cycle is increased by 10 and the DC motor runs for about 3 seconds at every duty cycle.

Issues and Resolutions:

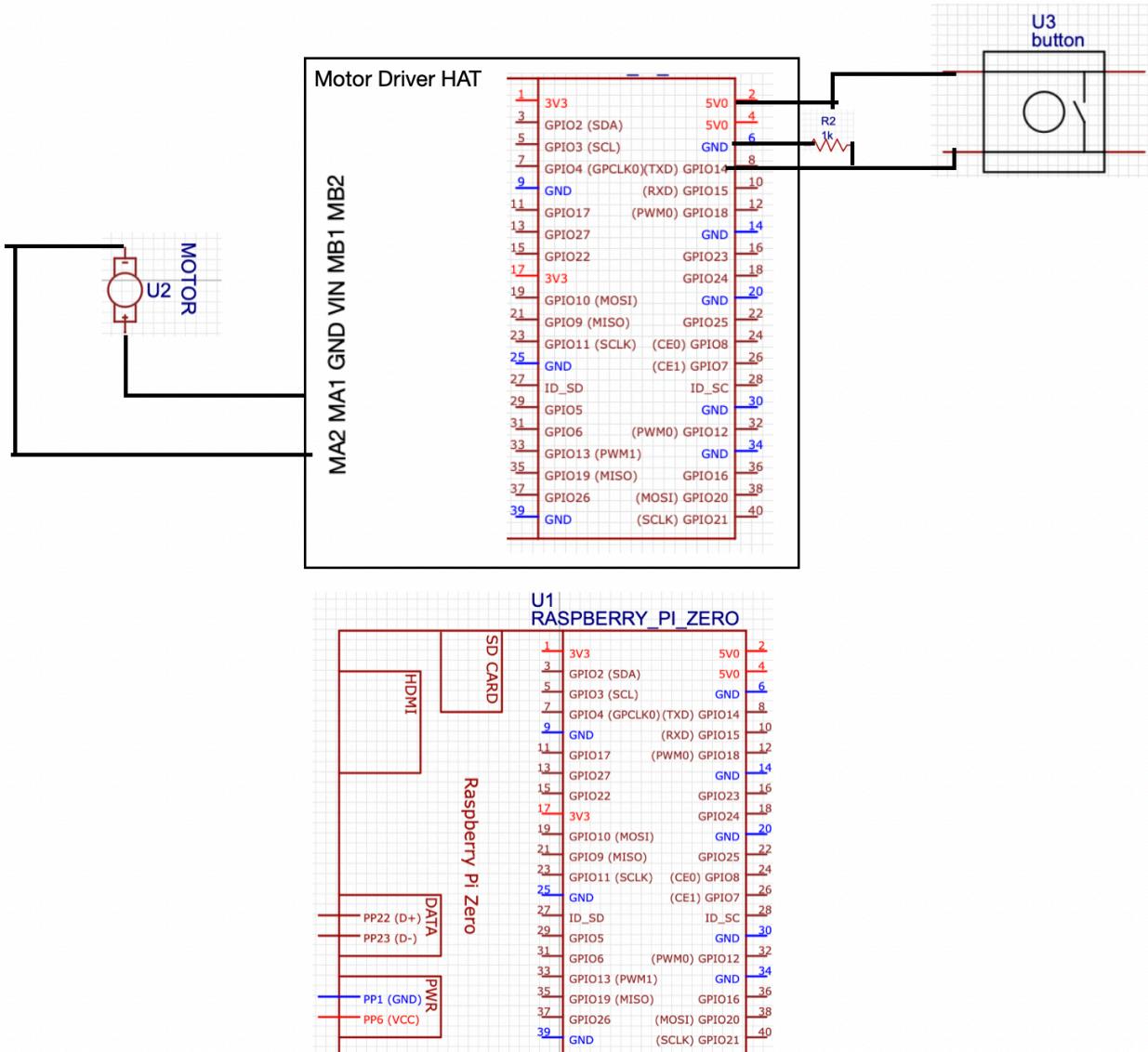
While working on this project I had several issues. The first issue I had was about building the circuit. I managed to wire the DC motor to the motor driver HAT easily . The only issue I had was wiring the tactile push button correctly . At first I had wired one pin from the tactile push

button to ground and the other pin that was on the same side to a GPIO pin. When I had tried to see if the program for the motor started after the button was pushed, I observed that the program would run before the button was pushed. I changed my code several times but every time I would try a new version of my code the program for the DC motor would still run before the button was pushed. I solved my issue by including a resistor into my circuit and connecting one of the pins to a power pin instead of the ground pin. After I ran my original program , The DC motor would only run after the button was pushed. Another issue I had was creating the code for my circuit. I had no idea how to create the code that would make the motor move. I only knew how to create the code for the push button but not for the dc motor. I solved this issue by using the files suggested should be used on the assignment 3 description.

Photo of completed circuit:



Hardware Diagram:



compilation:

```
[celiaramirez@raspberrypi:~/Desktop/610Work/csc615-startyourmotors-celiarr]$ make
gcc -D USE_DEV_LIB -c examples/assignment3.c -o bin/assignment3.o -I ./lib -I .
./lib/Config -I ./lib/MotorDriver -I ./lib/PCA9685
gcc -D USE_DEV_LIB -c lib/Config/sysfs_gpio.c -o bin/sysfs_gpio.o
gcc -D USE_DEV_LIB -c lib/Config/dev_hardware_i2c.c -o bin/dev_hardware_i2c.o
gcc -D USE_DEV_LIB -c lib/Config/DEV_Config.c -o bin/DEV_Config.o
gcc -D USE_DEV_LIB -c lib/Config/dev_hardware_SPI.c -o bin/dev_hardware_SPI.o
gcc -D USE_DEV_LIB -c lib/MotorDriver/MotorDriver.c -o bin/MotorDriver.o -I ./lib/Config -I ./lib/PCA9685
gcc -D USE_DEV_LIB -c lib/PCA9685/PCA9685.c -o bin/PCA9685.o -I ./lib/Config
gcc -D USE_DEV_LIB ./bin/assignment3.o ./bin/sysfs_gpio.o ./bin/dev_hardware_i2c.o ./bin/DEV_Config.o ./bin/dev_hardware_SPI.o ./bin/MotorDriver.o ./bin/PCA9685.o -o assignment3 -lwiringPi -lm
```

Screen shot(s) of the execution of the program:

```
[celiaramirez@raspberrypi:~/Desktop/610Work/csc615-startyourmotors-celiarr]$ sudo ./assignment3
Button pressed!
USE_DEV_LIB
Current environment: Raspbian
Debug : prescaleval = 66.816840
Debug : prescaleval = 66.816840
Debug : forward...
Debug : backward
Debug : Motor stop
```

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CSC615 Embedded Linux