An educationnal HBRIDGE board

Fabien Le Mentec
texane@gmail.com

Abstract

This document describes an educationnal HBRIDGE board whose prime goal is to learn more about alectronics.

1 Introduction

1.1 Purpose

I wanted a small project to learn more about electronics basics. Since I regularly need to drive a DC motors, I chose to work on a home made HBRIDGE board described in this document. Note that the circuit uses off the shelf parts and can be more complicated than needed and not efficient. A real application should use packaged HBRIDGE circuits.

2 Features

The board features:

- safe H signalling interface avoid conflicting states
  - PWM,
  - FORWARD,
  - BRAKE.
- controlling software
  - coding done by XXX
- power stage driving up to XXX motors.

3 HBRIDGE theory of operation

An HBRIDGE is a circuit allowing to drive DC motors in both direction. The name comes from the circuit routing which looks like the 'H' alphabet letter.

4 Safe H signalling interface

Since I have a software background it is easier for me to think in terms of C programming control structures. I thus expressed the H state machine in a C code which I translated into logical statement. I used this statement set to design the H state circuit using electronic gates.

```
if (BRAKE == 0)
{
  if (FWD == 1)
  {
    Q01 = 0;
    Q10 = 0;
    Q11 = 1;

    Q00 = PWM;
  }
  else /* REVERSE */
  {
    Q00 = 0;
    Q01 = 1;
    Q11 = 0;

    Q10 = PWM;
  }
}
else /* (BRAKE == 1) */
{
  Q00 = 1;
  Q01 = 1;
  Q10 = 1;
  Q11 = 1;
}
```

The set of logical statments reduces to:

```
Q00 = (FWD & PWM)       | BRAKE;
Q01 = (!FWD)            | BRAKE;
Q10 = ((!FWD) & PWM)    | BRAKE;
Q11 = FWD               | BRAKE;
```

5 Bill of materials

TODO

6 Status

- PWM / FORWARD / BRAKE signaling interface: PROTOTYPED
- control software: TODO
- power stage: TODO
- documentation: STARTED

7 Conclusion

TODO

8 Further readings

8.1 HBRIDGE projects

- http://embedded-lab.com/blog/?p=1159
- http://www.mcmanis.com/chuck/robotics/tutorial/h-bridge
- http://www.modularcircuits.com/h-bridge_secrets1.htm
- http://www.solarbotics.net/library/circuits/driver_4varHbridge.html
- http://www.solarbotics.net/library/circuits/driver_buf_h.html
- http://www.robotroom.com/HBridge.html
- http://www.robotroom.com/BipolarHBridge.html

8.2 Controlling software

- http://www.seattlerobotics.org/encoder/200001/simplemotor.htm