

## **Angle Tracking Unit Documentation**

### **Description of module**

This module is a System Verilog document which continuously monitors the current angle of a DC motor shaft via two hall effect sensors. It is capable of tracking the angle accurately to  $<1^\circ$ .

---

### **Requirements**

1. Must be possible to continuously monitor all hall effect pulses in real time without missing any pulses
  2. Hall effect inputs must be debounced
  3. The module must output a 12-bit unsigned binary encoding of the motor shaft angle
  4. It must be possible to reset the device
  5. It must be possible to turn the pulse monitoring on and off
  6. The module must be able to track the motor both clockwise and anticlockwise
- 

### **How Requirements were met**

1. This can be seen in the always\_latch under the title comment "DIRECTION FUNCTION AND ANGLE TRACKING"
  2. Currently a work in progress
  3. This can be seen in the always\_latch under the title comment "DIRECTION FUNCTION AND ANGLE TRACKING"
  4. This can be seen in the always\_latch under the title comment "RESET FUNCTION"
  5. This can be seen in the always\_latch under the title comment "PULSE MONITORING TOGGLE"
  6. This can be seen in the always\_latch under the title comment "DIRECTION FUNCTION AND ANGLE TRACKING"
- 

### **Inputs**

- RESET – when reset is pulled high the output Q is set to  $0^\circ$  and angle tracking only resumes when RESET is pulled low
  - PM – when PM is high pulse monitoring is enabled, when PM is low pulse monitoring is disabled
  - DIRECTION – when DIRECTION is high the angle tracking is set to clockwise mode, when DIRECTION is low the angle tracing is set to anticlockwise mode
  - OPTOA – Input from hall effect sensor A
  - OPTOB – Input from hall effect sensor B
-

**Outputs**

- Q – unsigned 12-bit output of binary encoded angle [Encoding is described in Additional Information section]
- 

**Additional Information**

Binary encoding of angle:

$$\text{Angle[Degrees]} = Q * \frac{360}{1006}$$