

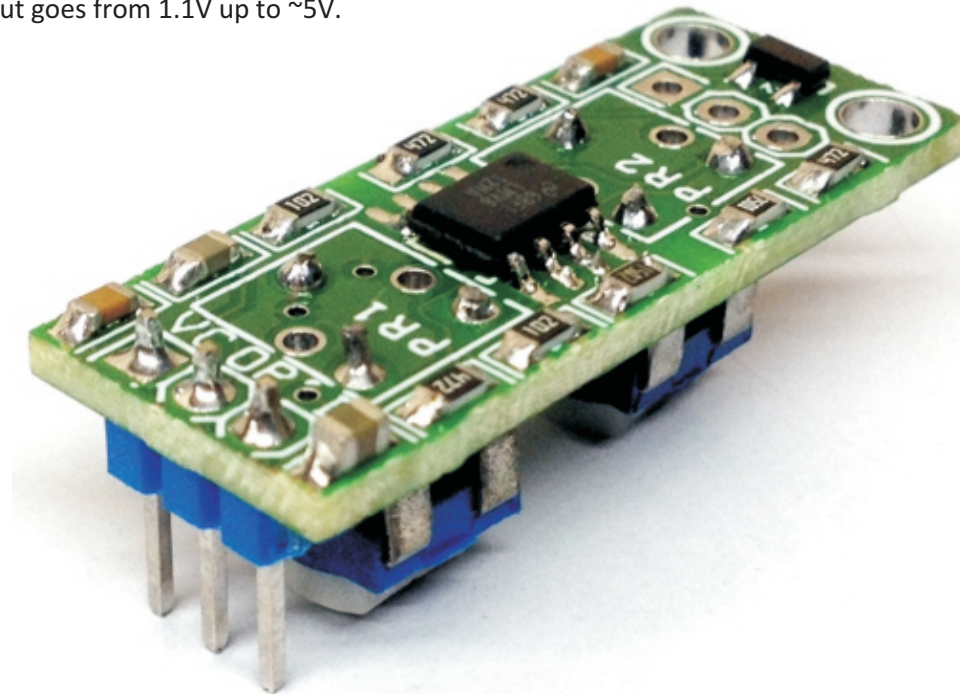
Foot Controller Using Analog Hall Sensor 0 To 5V Output

This Project includes an analog Hall sensor and an Op-Amp circuit which can be used as position or angular sensing with the benefits of no contact and wearing, high stability and wide sensing range. Two configurations of magnet and Hall sensor are analysed. Trimmer Potentiometer PR2 provided to adjust the offset and PR1 helps to set the system gain. The Op-Amp circuit helps to achieve desired output bias and range. The sensor provides approximate linear response, adapt wide magnet types and field range. DRV5053 Sensor is heart of the project, The DRV5053 device is a chopper-stabilized Hall IC that offers a magnetic sensing solution with superior sensitivity stability over temperature and integrated protection features. Useful project for application like Foot Controller, Industrial control stick, Industrial foot pedal, General position or angular sensing

The output of DRV5053 is about 0.2V to 1.8V with the quiescent 1V at zero field or no perpendicular flux to the sensing surface. In non-linear configuration, the output range is limited either from 0.2V to 1V or from 1V to 1.8V. An Op-Amp stage is introduced in this design. It deals with the raw Hall sensor output signal with adjustable offset and scaling range. LMV612 op-amp used for signal conditioning. Actually any fixed position along the full stroke of the magnet can be set as offset point mechanically. When the relative position of the magnet and Hall sensor is fixed at the designed offset point, the final output voltage can be adjustment by PR2. U1B is used as the amplitude amplifier stage with adjustable gain tuning by PR1. Also there is a RC filter at the final output with R3 and C4. The actuator is fixed at a mid-point between the two ends of the stroke by a dual-spring system. Controlling by the foot, the actuator can go two sides of the stroke direction. The application requires the output stay at about 1.1V when the actuator is at the balanced point (fixed offset point). When the foot strokes downside, the output goes from 1.1V down to ~0V. When the foot strokes upside, the output goes from 1.1V up to ~5V.

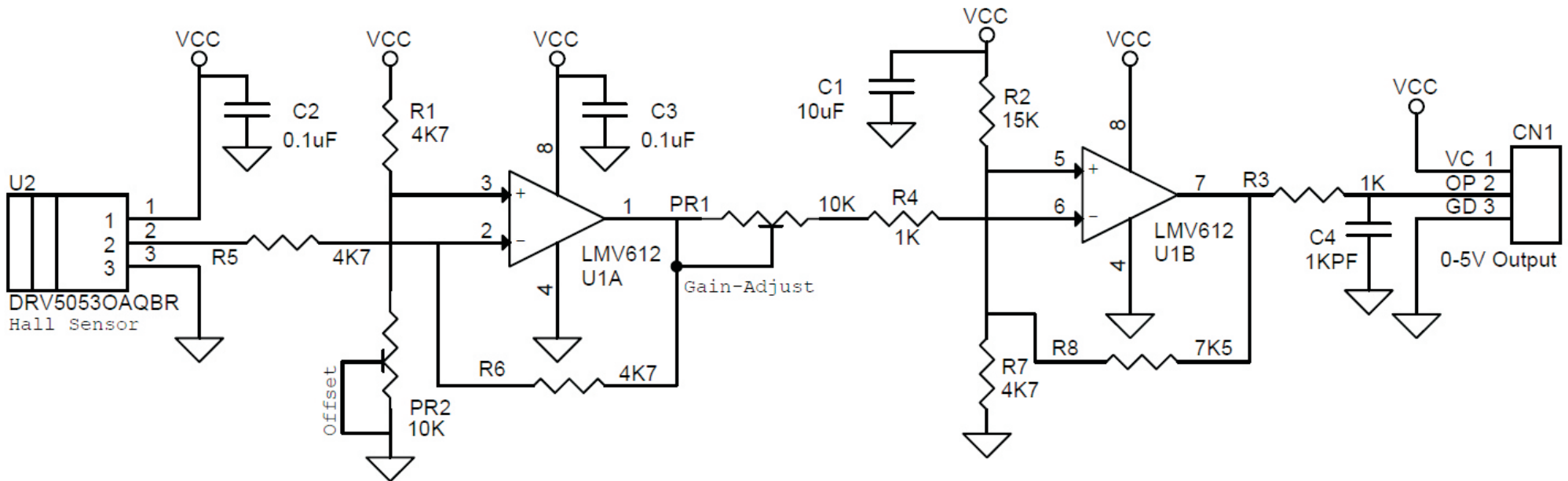
Features

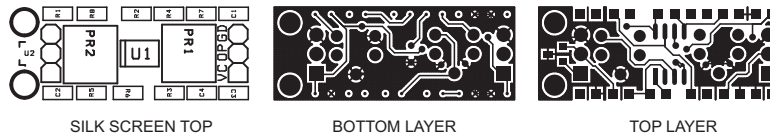
- Supply 5V DC
- Approximate linear response
- Adapt to wide magnet types and field range
- 0 to 5V full scale output ability
- Adjustable quiescent offset and gain
- Low power RRIO amplifier stage
- Cost-effective
- PCB Dimensions 32.09mm X 12.70MM



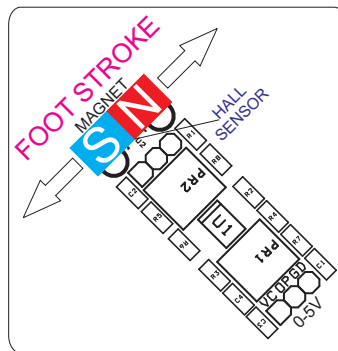
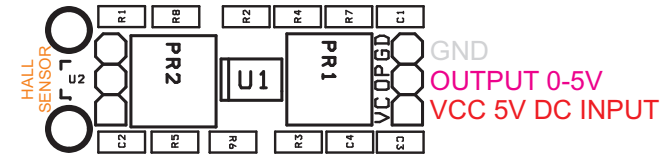
Tuning Guide

1. Tuning PR2 for the designed fixed offset output
2. Place the magnet to its MIN MAX stroke and tuning PR1 to get designed output range
3. Release or return the fixed offset point, back to step 1 readjustment the offset point
4. Back to step 2 to readjustment the offset output
5. Repeat 1 to 4 steps to get both the designed offset the scaled output range.
6. Note that the adjustment range of offset and scaling is also related to the mechanical magnet Configuration and the magnetic field. Do possible adjustment of the mechanical configuration if needed.
7. The OpAmp parameters are also adjustable for special sensing range and output coverage. It is recommend to change R1 for extend offset adjustment ability and R8 for extend gain range.





PCB DIMENSIONS 32.09MM X 12.70MM



When Magnet at (Balanced Point) center output = 1.1V
 Foot stroke down side output goes 1.1V down to 0V
 Foot stroke upside , output goes from 1.1 to 5V

BOM			
SR.	QNTY.	REF.	DESC.
1	1	CN1	3 Pin Header Connector
2	1	C1	10uF SMD 0805
3	2	C2,C3	0.1uF SMD 0805
4	1	C4	1KPF SMD 0805
5	2	PR1,PR2	10K SMD 0805
6	4	R1,R5,R6,R7	4K7 SMD 0805
7	1	R2	15K SMD 0805
8	2	R3,R4	1K SMD 0805
9	1	R8	7K5 SMD 0805
10	1	U1	LMV612 SO8
11	1	U2	DRV50530AQBR