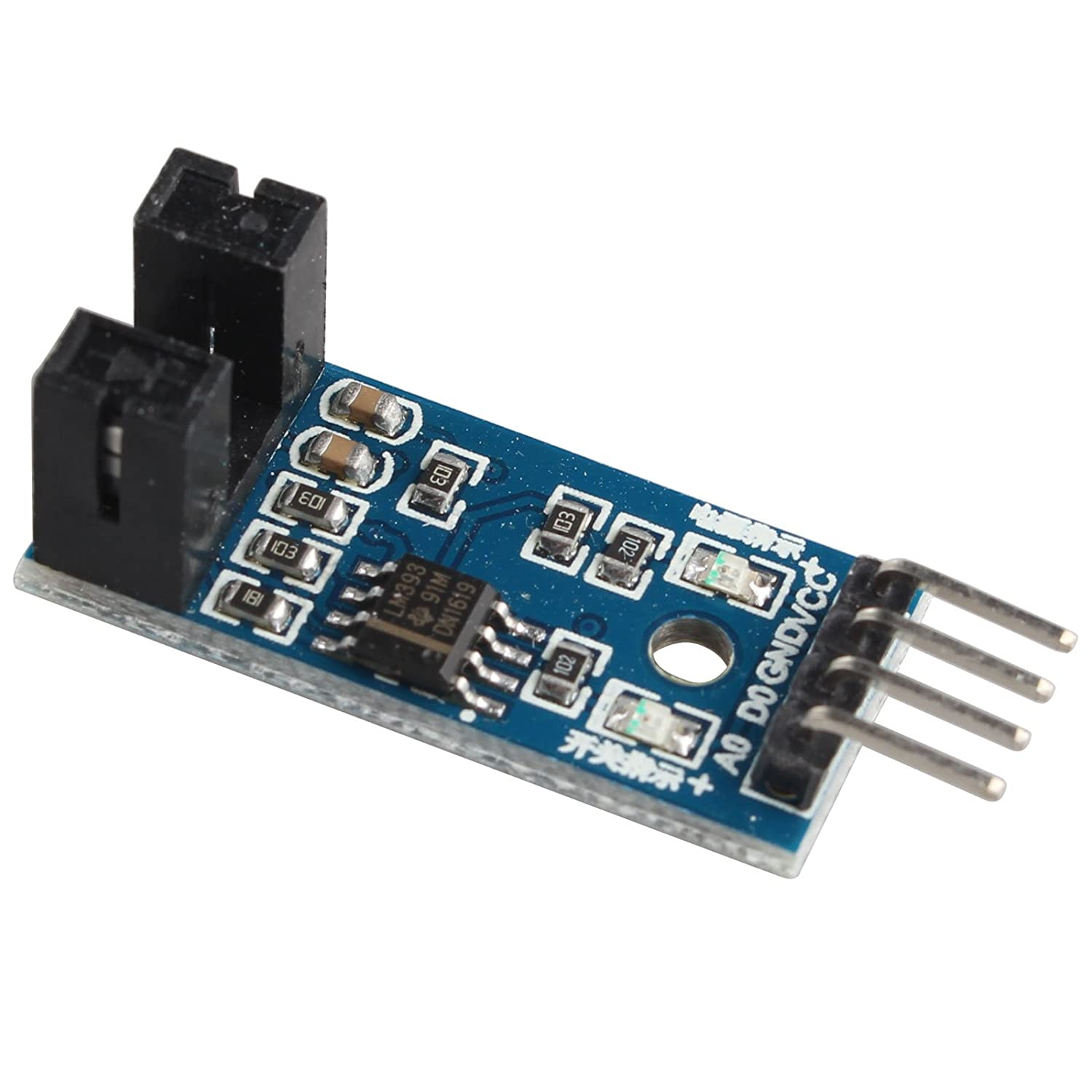


**MISURA NUNERO GIRI ALBERI**

32x14mm

Cuscinetto 693ZZ  
8x3x4 mm



**Project#11 Infrared speed sensor module (applied on DIY anemometer)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Mini Motor Speed Sensor -A from [Amazon](http://www.amazon.com/Arduino-compatible-Motor-Speed-Sensor/dp/B00AFRYTJ6)  [https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/mini.jpg](https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/mini.jpg?attredirects=0)  Mini Motor Speed Sensor -B from [Amazon](http://www.amazon.com/Arduino-compatible-Speed-Sensor-B/dp/B00AFS19FW) [https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/IR%20Speed%20.jpg](https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/IR%20Speed%20.jpg?attredirects=0)   1. Motor speed sensor or work piece counting 2. Using infrared detection, strong anti-jamming capability 3. Schmidt trigger, high sensitivity, stable performance 4. 5V Working voltage, black line output low level and white lines output high level 5. 74HC14 Hex inverting high performance Schmitt trigger chip 6. Photo interrupter: MOCH25A; slotted width : 1 cm   [https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/IR%20Speed%20Sch%20.jpg](http://vic-cont.ru/robototehnika/kolesnyiy-enkoder-chast-1)  LED-D2 indicates the presence of voltage applied; the LED-D1 monitors operation of the phototransistor.  Optocoupler, U1 - MOCH25A, where the wheel encoder disc is placed. One side was an infrared led, and the other was a phototransistor. If no object block, the phototransistor would conduct; when something blocked the light falling on the transistor it wouldn’t conduct.  Chip U2 - 74HC14 Hex inverting.  When there is no object between the photo interrupter will be logical “0”, U2 generates a logical "1" and the LED-D1 is off. During the rotation, the object will block light output from optocoupler will be a logical "1" and U2 is logical  “0”, simultaneously, the LED-D1  is on .  **Wheel Encoder Disc (Encoder resolution: 20 holes / disc):**  **[https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/encoder%20dsic.jpg](https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/encoder%20dsic.jpg?attredirects=0)**  **Code:**   |  |  | | --- | --- | | 1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16  17  18  19  20  21  22  23  24  25  26  27  28  29  30  31  32  33  34  35  36  37  38  39  40  41  42  43  44  45  46  47  48  49 | int encoder\_pin = 2; *// The pin the encoder is connected*  unsigned int rpm; *// rpm reading*  **volatile** byte pulses; *// number of pulses*  unsigned long timeold;  *// The number of pulses per revolution*  *// depends on your index disc!!*  unsigned int pulsesperturn = 20;  void counter()  {  *//Update count*  pulses++;  }  void setup()  {  Serial.begin(9600);  *//Use statusPin to flash along with interrupts*  pinMode(encoder\_pin, INPUT);    *//Interrupt 0 is digital pin 2, so that is where the IR detector is connected*  *//Triggers on FALLING (change from HIGH to LOW)*  attachInterrupt(0, counter, FALLING);  *// Initialize*  pulses = 0;  rpm = 0;  timeold = 0;  }  void loop()  {  **if** (millis() - timeold >= 1000){ */\*Uptade every one second, this will be equal to reading frecuency (Hz).\*/*    *//Don't process interrupts during calculations*  detachInterrupt(0);  *//Note that this would be 60\*1000/(millis() - timeold)\*pulses if the interrupt*  *//happened once per revolution*  rpm = (60 \* 1000 / pulsesperturn )/ (millis() - timeold)\* pulses;  timeold = millis();  pulses = 0;    *//Write it out to serial port*  Serial.print("RPM = ");  Serial.println(rpm,DEC);  *//Restart the interrupt processing*  attachInterrupt(0, counter, FALLING);  }  } |   Output result  as below; it's close to the spec of motor's RPM value =240 @6V  [https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/output2.jpg](https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/output2.jpg?attredirects=0)  **NOTE: Consider Bad Pulses described [here](https://androminarobot.blogspot.com/2016/04/tutorial-sobre-el-encoder-fotoelectrico.html" \t "_blank)**  **Add 100nF (104) metallized polyester Capacitor to the encoder,**  **<https://3.bp.blogspot.com/-kR9UK8v1R3k/Vwg3LHCpfTI/AAAAAAAABdQ/D2ekhszyZOQGENhMMZQ8fH6ulZWFlZVZA/s1600/01-Arduino_encoder_HC-020K.jpg>**  **Code:**   |  |  | | --- | --- | | 1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16  17  18  19  20  21  22  23  24  25  26  27  28  29  30  31  32  33  34 | *// https://www.youtube.com/watch?v=9848QETGd\_k*  *// Using HC-020K Photoelectric encoder on the Dual Axis Reducer Motor*  *// with 100nF capacitor on the encoder*  #include <TimerOne.h> *// library: https://code.google.com/archive/p/arduino-timerone/downloads*  int encoder\_pin = 2;  unsigned int counter=0;  void setup() {  Serial.begin(9600);  pinMode(encoder\_pin, INPUT);  Timer1.initialize(1000000); *// set for 1 sec*  attachInterrupt(0,do\_count,RISING);  Timer1.attachInterrupt(timerIsr);  }  void loop() {  *// put your main code here, to run repeatedly:*  }  void do\_count() {  counter++;  }  void timerIsr() {  Timer1.detachInterrupt();  Serial.print("Motor Speed: ");  int rotation = (counter/20)\*60;  Serial.print(rotation, DEC);  Serial.println(" RPM");  counter=0;  Timer1.attachInterrupt(timerIsr);  } |   **Result:**  **[https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/rpm.jpg](https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/rpm.jpg?attredirects=0)**  **LM393 Comparator IR Speed Sensor Module** (FC-03)  [https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/FC-03.jpg](https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/FC-03.jpg?attredirects=0)  from [Amazon](http://www.amazon.com/LM393-Measuring-Comparator-Sensor-Module/dp/B00GYV11U2)  Working Voltage : DC 3.3-5V Main Chip : LM393 Slotted Width : 5mm ITR9608 photoelectric switch (not sure, I guessed)  **Pins Connection:** VCC: positive power supply 3.3-5V; GND: Ground; DO:  Output frequency pulses; AO:  analog output, real-time output voltage signal. (not useful)  <http://aitendo3.sakura.ne.jp/aitendo_data/product_img/sensor/infrared/PIR393-5V/ir_sensor_sch.jpg>  The LED (left) indicates the presence of voltage applied. When there is no object between the photo interrupter, the LED (right) is ON; otherwise is OFF. If slot unobstructed, DO output low; otherwise, DO output high.   Using the same code above, output as below:  **Note: I use 3.3V as VCC to get below result; if 5V is used, only get half RPM readings.**  [https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/output.jpg](https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/output.jpg?attredirects=0)  **HC-020K Double Speed Measuring Module with Photoelectric Encoders**  [https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/HC-020kjpg.jpg](https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/HC-020kjpg.jpg?attredirects=0)  from [DX.com](http://www.dx.com/p/hc-020k-double-speed-measuring-module-w-photoelectric-encoders-black-green-2-pcs-219416) or [Amazon](http://www.amazon.com/HC-020K-Measuring-Photoelectric-Encoders-Experiment/dp/B00EERJDY4/ref=sr_1_1?ie=UTF8&qid=1420951152&sr=8-1&keywords=HC-020K)  [https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/HC-020k2.jpg](https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/HC-020k2.jpg?attredirects=0)   * Module Working Voltage: 4.5-5.5V * Launch Tube Pressure Drop: Vf=1.6V * Launch Tube Current: If<20mA * Signal output: ONE line; TT power level; * Slotted Width : 6mm * Chip: LM393   **Slotted LM393 Beam Infrared Light Counter Photoelectric Sensor Module**  [https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/61nwYSL-auL._SL1100_.jpg](https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/61nwYSL-auL._SL1100_.jpg?attredirects=0)  from[Amazon](http://www.amazon.com/Slotted-Infrared-Counter-Photoelectric-Sensor/dp/B00FGVAECC" \t "_blank)  Chip: LM393 Power : DC5V; Slotted Width : 10mm  [https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/lm393.jpg](https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/lm393.jpg?attredirects=0)  **FC-33 Electric Motor Speed Sensor Module**  [https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/sku_193010_1.jpg](https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/sku_193010_1.jpg?attredirects=0)  from [DX.com](http://www.dx.com/p/fc-33-electric-motor-speed-sensor-module-black-silver-193010)  Working voltage: 3.3~5V Chip: LM393  Slotted Width : 10mm  [https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/FC-33.jpg](https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/FC-33.jpg?attredirects=0)  [https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/FC-33a.jpg](https://sites.google.com/site/myscratchbooks/home/projects/project-11-infrared-speed-sensing-module/FC-33a.jpg?attredirects=0)  The module can apply to DIY anemometer, it measures the wind flow velocity.  construction detail as https://www.instructables.com/id/DIY-Anemometer-and-Windvane-for-Standalone-Weather/  <https://cdn.instructables.com/FYK/2KH8/IPH0JRSE/FYK2KH8IPH0JRSE.LARGE.jpg> |