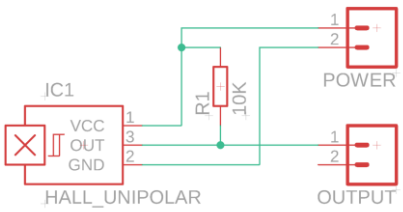
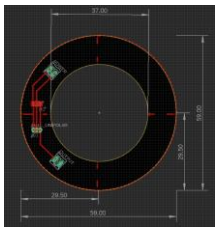
Circuit board pictures and code

Speed sensor

in the speed sensor the magnet activates the Hall-sensor when the last one is bypassed. The sensor must be of unipolar type and the magnet has to be correctly assembled. 34-40 cm long wires are soldered to the circuit board.

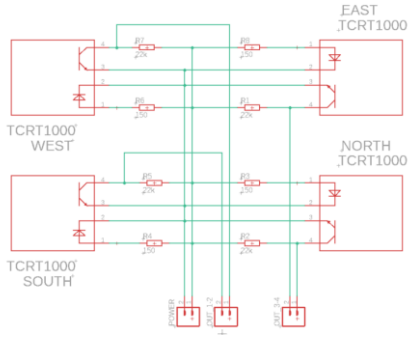


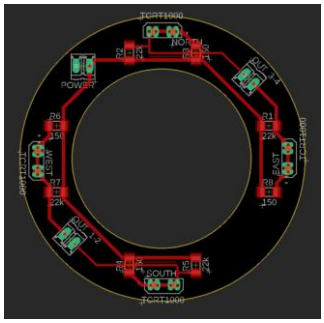


Sensor's circuit board and bearing are placed lower 3D-printed part. Magnet and windmeter spoons are attached to the upper 3D-printed part. Lower part is connected to the Arduino's case by a 3D-printed pipe.

Direction sensor

IR-receptors react to the 3D-printed top part's reflected light. There is a IR-Led and a IR-transistor in the sensor. 30-40 cm long wires are soldered to the circuit board.

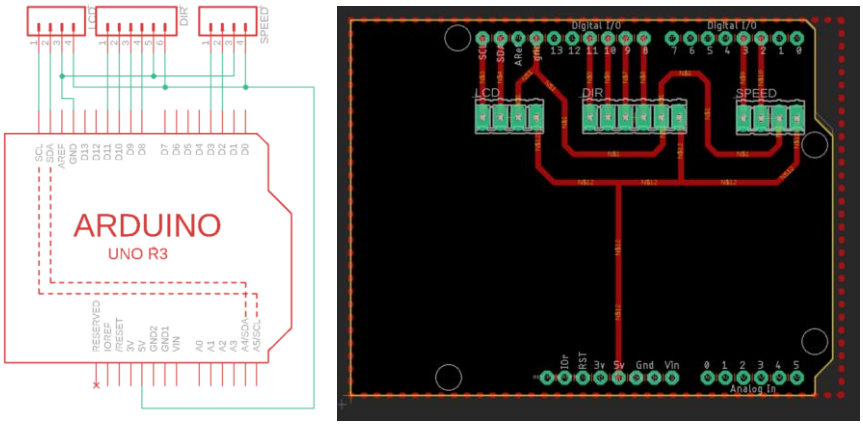




Sensor's circuit board and bearing are placed in the 3D-printed lower part. Upper part is non-reflective material and a 140 ° wide surface is fixed to it. The 3D-printed direction arrow is attached to the upper part. Lower part is connected to the Arduino Uno's case via 3D-printed pipe.

Arduino’s case

3D-modeled case is 3D-printed for the Arduino and the LCD-display. A circuit board is designed to Arduino’s top, where sensor’s wires and LCD-display are connected.



Programming

Speed sensor is read with a stop and sensor is to be connected to Arduino’s inputs D2 or D3.

Direction is read at digital inputs and sensor is connected to Arduino inputs D8-D11.

LCD-display is driven via I2C pins and display is connected to connectors SDA and SCL.

Code:

```
//Include needed libraries for I2C and LCD
#include <Wire.h>
#include <LiquidCrystal_PCF8574.h>


//Open LCD display in address 0x27 (CHECK ADDRESS FROM LCD!!!)
LiquidCrystal_PCF8574 lcd1(0x27);


//Define I/O-pins
#define SPEED 2
#define NORTHPIN 8
#define EASTPIN 11
#define SOUTHPIN 9
#define WESTPIN 10
```

```
int speedpin = 0;
int north;
int east;
int south;
int west;
float starttime;
float stoptime;
float pulsetime;
float windspeed;



void setup() {



  //Interrupt routine for windspeed measuring
  attachInterrupt(digitalPinToInterrupt(SPEED), wind_int, FALLING);



  pinMode(SPEED,INPUT);
  pinMode(NORTHPIN,INPUT);
  pinMode(EASTPIN,INPUT);
  pinMode(SOUTHPIN,INPUT);
  pinMode(WESTPIN,INPUT);

  Serial.begin(9600);



  Wire.begin();
  Wire.beginTransmission(0x27);



  lcd1.begin(16,2);
  lcd1.setBacklight(HIGH);
  lcd1.clear();



}



//Interrupt routine function for windspeed measuring
void wind_int()
```

```
{
  stoptime = millis();
  pulsetime = (stoptime-starttime)/1000;
  starttime = stoptime;
}



void loop() {



  //Reading wind direction sensors
  north = digitalRead(NORTHPIN);
  east = digitalRead(EASTPIN);
  south = digitalRead(SOUTHPIN);
  west = digitalRead(WESTPIN);



  //Calculate and show windspeed m/s, 0.98 is length of the circumference
  nopeus = 0.98/pulsetime;
  lcd1.setCursor(0,0);
  lcd1.print(nopeus);
  lcd1.print("m/s  ");



  //Calculate and show wind direction
  lcd1.setCursor(0,1);
  if(north == 0 && west == 1 && east && 1) lcd1.print("North     ");
  if(north == 0 && east == 0) lcd1.print("North-east");
  if(east == 0 && north == 1 && south == 1) lcd1.print("East      ");
  if(east == 0 && south == 0) lcd1.print("South-east");
  if(south == 0 && east == 1 && west == 1) lcd1.print("South     ");
  if(south == 0 && west == 0) lcd1.print("South-west");
  if(west == 0 && south == 1 && north == 1) lcd1.print("West      ");
  if(west == 0 && north == 0) lcd1.print("North-west");



}
```