Assembly instructions for a scanning radar

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Abstract

We describe the assembly of a scanning radar/sonar, implemented by an Arduino control unit, a stepper motor, and an ultrasound sensor.

1 Material

- Arduino Uno
- Stepper motor, unipolar with driver, 28BYJ-48 and ULN2003
- Ultrasonic range detector, HC-SR04
- Prototyping connector cables, male-female, 10 pieces
- USB cable, A male – B male
- Sensor holder, 3D printed
- Assembly holder, 3D printed

2 3D printing

Print sensor holder and assembly holder in 3D printer. Parametric CAD drawings available in OpenSCAD. Render stl-file, open in suitable slicer program, send .gx-files to printer.

- sensorholder.scad
- scanningradar.scad

3 Assembly

1. Insert parts in assembly holder (Arduino, stepper motor, stepper motor driver). No screws are used, simply press them in place.
2. Put sensor holder on stepper motor axis (there is a hole in the bottom of the holder, note it is oblong to fit the oblong motor axis, not circular).

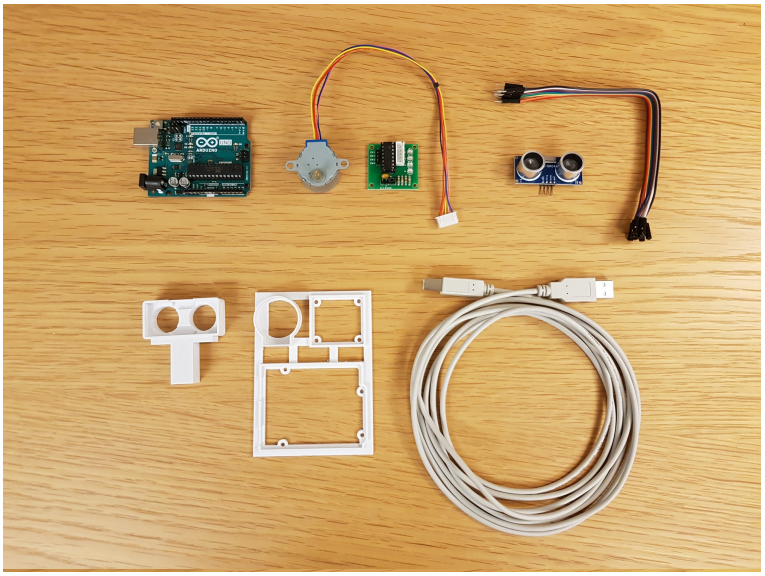

Figure 1: Material for the assembly.

3. Insert ultrasonic sensor in sensor holder, connector pins pointing up. Be careful not to press too hard on the sensor.

4. Connect stepper motor 5-cable connector to driver card. Only fits one way.

5. Peel off 6 connector cable from the bundle of 10. Connect pins IN1–4 on the driver card to pins 8–11 on the Arduino (IN1 to 8, IN2 to 9 etc). Connect driver card VDC+ to Arduino 5V, and driver card VDC- to Arduino GND.

6. Take the remaining 4 connector cables and connect the ultrasonic sensor to the Arduino. Sensor VCC to Arduino pin, sensor Trig to Arduino pin 12, sensor Echo to Arduino pin 13, and sensor GND to Arduino GND.

7. Connect Arduino to computer via USB cable. Upload sketch.

Done!

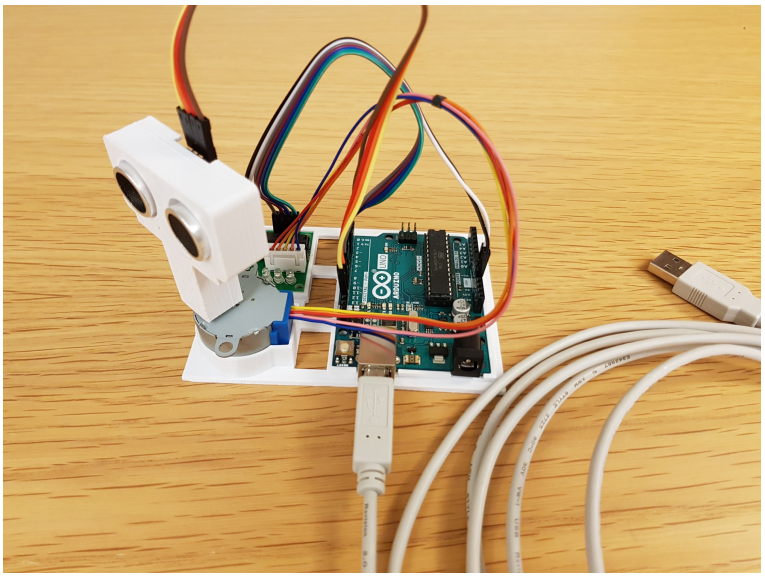

Figure 2: Finished assembly.