The compete software for this robot is included in as the **C14_WallFollower** project included with the TExaS Chapter 14 installation.

VIDEO 14.7. AUTONOMOUS ROBOT DEMONSTRATION

Help

1:47 / 1:47 1.0x

DR. RAMESH YERRABALLI: Hi.

I'm Professor Yerraballi, and this is the University of Texas at Austin.

DR. JONATHAN VALVANO: And I'm Professor Valvano.

And today we're going to demonstrate this robot we've been building.

DR. RAMESH YERRABALLI: OK, so John, let's talk about some of the components

on that robot.

DR. JONATHAN VALVANO: There are three components.

The infrared sensors together with A to D converter

are used to measure distance to the wall.

The background thread, the interrupt service thread

will generate two PWM signals to control the power to the two motors

so that I can turn left and right.

And the controller, the main loop of the

software

will adjust the power to the two motors and attempt

to drive straight down the road.

DR. RAMESH YERRABALLI: OK, so we saw the software, we saw the components,

now let's see it run.

DR. JONATHAN VALVANO: Yeah, let's try it.

Straight down the road, there.

Straight down the road.

DR. RAMESH YERRABALLI: Wally.

DR. JONATHAN VALVANO: Oh, yeah.

Nice and straight.

DR. RAMESH YERRABALLI: Yeah.

DR. JONATHAN VALVANO: Nice and straight, nice and straight.

DR. RAMESH YERRABALLI: Take it easy.

DR. JONATHAN VALVANO: Look out for the wall.

Yeah.

And around the corner.

Yeah, Wally.

Good job.

Don't hit the cameraman.

DR. RAMESH YERRABALLI: So Jon, what have we learned from this lab?

DR. JONATHAN VALVANO: Today we learned that the sensors collect information,

and the A to D converter on the micro controller

converts that information into digital numbers.

The software then can make decisions on those numbers,

and then have outputs connected to actuators that can affect the world.

DR. RAMESH YERRABALLI: So that's it.

Embedded Systems shape the world.

DR. JONATHAN VALVANO: Indeed.

BILL OF MATERIALS

1) Two DC geared motors, HN-GH12-1640Y,GH35GMB-R, Jameco Part no. 164786
- 0.23in or 6 mm shaft (get hubs to match)

2) Metal or wood for base,

3) Hardware for mounting
- 2 motor mounts 1-1/4 in. PVC Conduit Clamps Model # E977GC-CTN Store SKU # 178931 www.homedepot.com
- some way to attach the LaunchPad (I used an Erector set, but you could use rubber bands)

4) Two wheels and two hubs to match the diameter of the motor shaft
- Shepherd 1-1/4 in. Caster Rubber Wheel Model # 9487 www.homedepot.com
- 2 6mm hubs Dave's Hubs - 6mm Hub Set of Two Part# 0-DWH6MM www.robotmarketplace.com
- 2 3-Inch Diameter Treaded Lite Flite Wheels 2pk Part# 0-DAV5730 www.robotmarketplace.com

5) Two GP2Y0A21YK IR range sensors
- Sparkfun, www.sparkfun.com SEN-00242 or http://www.parallax.com/product/28995

6) Battery

- 8.4V NiMH or 11.1V LiIon. I bought the 8.4V NiMH batteries you see in the video as surplus a long time ago. I teach a real-time OS class where students write an OS then deploy it on a robot. I have a big pile of these 8.4V batteries, so I used a couple for the two robots in this class. NiMH are easier to charge, but I suggest Li-Ion because they store more energy/weight. For my medical instruments, I use a lot of Tenergy 31003 (7.4V) and Tenergy 31012 (11.1V) (internet search for the best price). You will need a Li-Ion charger. I have used both of these Tenergy TLP-4000 and Tenergy TB6B chargers.

7) Electronic components
- two TIP120 Darlington NPN transistors
-2 1N914 diodes
-2 10uF tantalum caps
- 7805 regular
-2 10k resistors

Help

WEBSITES TO BUY ROBOT PARTS

Robot parts

Pololu Robots and Electronics (https://www.pololu.com/)
Jameco's Robot Store (http://www.robotstore.com/)
Robot Marketplace (http://www.robotmarketplace.com)
Sparkfun (http://www.sparkfun.com/)
Parallax (http://www.parallax.com/)
Tower Hobbies (http://www.towerhobbies.com/)

Surplus parts

BG Micro (http://www.bgmicro.com/)
All Electronics (http://www.allelectronics.com/)

Full-service parts

Newark (US) (http://www.newark.com/) or **element14 (worldwide)** (http://www.element14.com)

Digi-Key (http://www.digikey.com)

Mouser (http://www.mouser.com)

Jameco (http://www.jameco.com)

Part search engine

Octopart (http://octopart.com/)