

OPEN AUTOMATON PROJECT

<http://oap.sourceforge.net>

Introduction

At the start of the 21st century, should robotics enthusiasts be content with small rug-roving mobile robots with limited intelligence? The Open Automaton Project attempts to raise the bar for hobby robotics by providing building blocks that make it possible for the serious robotics enthusiast to assemble a mobile robot with advanced capabilities normally associated with research lab robots.

To keep the project accessible to the hobbyist, costs are minimized by using readily available "off-the-shelf" consumer-grade hardware components where possible, and designing custom electronic subsystems where ready-made components are either not readily available or are too expensive.

In terms of software, existing Open Source projects are leveraged as much as possible to take advantage of the research and development work that's already been done in the field of robotics.

Some of the capabilities of a robot based on the Open Automaton Project

The possibilities are virtually endless, but here are some of the things the robot should eventually be able to do:

- Map its environment, and move around avoiding obstacles.
- Obey a sequence of high-level tasks, like go to a target destination you specify by remote control, deliver a message, take a picture, or record audio.
- Patrol for intruders when you are away, record images and sounds of any intruders detected, and contact you.
- Sense when its battery voltage is low, and autonomously navigate to its docking station and initiate battery charging.
- Play chess with you.
- Wake you up in the morning, and remind you of upcoming birthdays and anniversaries.
- Notify you when you've received email, and read it aloud to you.
- Allow you to communicate directly with the robot via a web browser using a dedicated web application hosted on the robot itself. This would allow you to play back images and sounds recorded by the robot, enter new programs, and tele-operate it.

FAQ

What is the Open Automaton Project?

A set of Open Source blueprints for an intelligent PC-based mobile robot for home or office environments.

What is the status of the project?

There's still a lot of development work to do, particularly in the area of high-level software (vision, artificial intelligence), but already, all of the custom hardware and firmware modules have been developed and tested.

Can I build one? How much will it cost?

All of the project source code, circuit schematics, and documentation are freely available from the web site for anyone to download and use to assemble their own robot. However, building a robot based on the Open Automaton Project is an undertaking for the advanced robotics hobbyist with knowledge of electronics, and familiarity with GNU/Linux. You should budget between \$1,500 to \$2,000, but the actual cost of building a robot can vary greatly depending on how many of the electromechanical components are made in your own workshop versus purchased pre-fabricated.

In due course, kits for the custom hardware modules will be made available to make it easier to assemble Open Automaton Project-based robots.

How do I find out more?

Visit the web site:

<http://oap.sourceforge.net>

There's a mailing list you can join to stay abreast of developments and for discussing the project with other interested individuals.

PROTOTYPE DROID HARDWARE SPECIFICATION

SENSORS

- Vision using two ADS Technologies FireWire web cams mounted on a Pan and Tilt head from Lynxmotion.
- Eltec 442-3 pyroelectric passive infrared detector tuned to the human body's infrared emissivity, mounted on the Pan and Tilt head
- Sonar – 12 Devantech SRF04 sensors
 - Array of eight outward-facing sonars positioned around the perimeter of the robot
 - Three downward-facing precipice detecting sonars for sensing floor discontinuities
 - One sonar mounted on the Pan and Tilt head, facing in the same direction as the vision and human body heat sensors
- Plantronics PC Microphone
- Two Hewlett Packard HEDS-5500 quadrature wheel encoders for capturing odometry data

POWER

- 12V 13AH Sealed Lead Acid battery for approximately 2 to 3-hours continuous operation between charges
- PW-70 DC to DC converter from mini-box.com
- Smart charging docking station

BRAIN

- VIA M10000 EPIA M Mini-ITX mainboard with integrated video, audio and I/O, including FireWire, USB, IDE, RS232 and I²C
- 1GHz Nehemiah C3 processor
- 512MB PC2100 DDR RAM

BASE / LOCOMOTION

- Zagros Robotics Rex-12 base, with two drive wheels and one caster

STORAGE / NETWORK

- Seagate 40GB IDE hard disk
- Belkin 802.11b 11Mbps wireless network adapter

USER INTERFACE

- Output
 - On board 20x4 character LCD display from Crystalfontz
 - Stereo speakers for speech synthesizer output
- Input
 - On-board 6-key keypad
 - Standard Universal TV IR Remote Control
 - Custom RF Remote Control