

## THE HUMAN INTERFACE ROBOT

# PEOPLEBOT™

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PeopleBot™ provides a base for service or performance robots. The handsome black and silver PeopleBot™ offers a gripper, table-sensing IR's and precise pan-tilt-camera with ActivMedia Color-Tracking Software (ACTS) for sensing and grasping objects on tables. Included demo uses state machines to recognize a colored object, fetch it from one table and set it on another.



PeopleBot™ has the ability to:

- **PLAY** sound files or synthesized speech
- **LISTEN** for phrases or sounds it recognizes
- **RESPOND** to requests or conditions it senses
- **NAVIGATE** without running over toes or into furniture
- **FIND & FETCH** objects it recognizes
- **FOLLOW** colors
- **TRANSMIT** video images to surveillance monitors
- **COMMUNICATE** with other robots
- **CONNECT** to PC's via the Internet or LAN
- **RUN AUTONOMOUSLY**



At 112 cm (45 in), the PeopleBot™ stands midriff to chest height on most adults. Designed for use by seasoned professionals, the PeopleBot™ can be programmed in C or C++. PeopleBot™ is ideal for prototyping, research or applications such as

- tour guides
- waiters
- messengers
- monitors and guards
- trade shows
- exhibitions
- performances
- education
- research
- cooperative tasks

PeopleBot™ runs indoors on flat floors. It can traverse low sills and household power cords. With upper and lower sensing, the PeopleBot™ will turn away from nearly all obstacles. Performance PeopleBot™ also has the ability to sense tabletops and move its gripper into place for picking up objects. PeopleBot™ can run five days a week for six hours a day without maintenance for years. More intensive use may require regular factory maintenance, which is available by contract.

PeopleBot™ bases may communicate with each other via Ethernet and cooperate in teams.

## COMPONENTS COMMON TO EVERY PEOPLEBOT™

PeopleBot™ is available as a complete system, including accessories, or as a base for developer customization. Every PeopleBot™ includes:

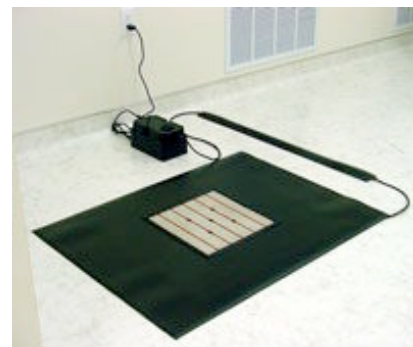
- body with hinged battery access door, vertical member(s) and upper platform
- 3 batteries with charger
- 2 wheels and 1 caster
- 2 motors with encoders
- front sonar rings, upper and lower
- lower rear sonar
- fixed IR for table & other mid-level avoidance
- microcontroller
- sonar board
- motor power board
- P2OS microcontroller server software
- [ARIA](#) robotics development environment
- [Saphira 8+](#) gradient navigation and localization
- [Colbert](#) real-time programming language
- operations manual

In addition, PeopleBot™ includes other components and accessories that vary by model, as shown in the [table](#) below.

## PEOPLEBOT™ MODELS

**NEW! PEOPLEBOT GUIDE WITH TOUCHSCREEN, AUTO-DOCK & TOUR/RECEPTIONIST APPLICATION SOFTWARE:** Now at our robot [applications systems site](#) .

PERFORMANCE PEOPLEBOT™ robot's sleek appearance immediately identifies it as a cut above the average robot. Not only does PeopleBot offer all the capabilities of other PeopleBot™ models, but it has a tabletop 2-degree-of-freedom gripper and two forms of tabletop sensing. Twin fixed-field IR point up and slightly forward from the front corners



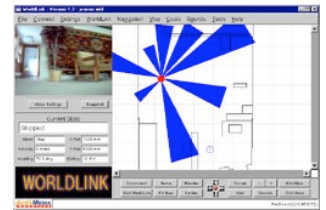
of the base to sense the underside of table (their range is too short to sense ceilings.) Twin vertical break beams from the upper to lower plates of the robot sense when the robot is parallel to the table. A switch under the gripper paddles indicate that they've dropped to the table's surface. Horizontal break beams between the gripper's paddles indicate that an object is available to be picked up. With its 120-degree pan-tilt 16X zoom camera, the Performance PeopleBot™ can track colors, aim upward to see faces and downward to see objects as it picks them up.

We probably shouldn't brag, but we think Performance PeopleBot™ is one of the best-looking robots on the market. It certainly has more capabilities than any other tall robot, regardless of cost. Yet with all its features, Performance PeopleBot™ costs less than other tall robots' base platforms.

Performance PeopleBot™ includes plug-n-play demos and examples and is compatible with ActivMedia Robotics Laser Mapping & Navigation software.

TALKING PEOPLEBOT™ adds speech recognition, voice synthesis and other sound to the actors' repertoire so that they can obey voice commands and banter with the humans around them. Our BotSpeak software combines the power of V1aVoice multi-lingual speech synthesis and voice recognition with our robotic development environment so that the robots' speech can depend upon their status and sensor readings. Or, for a more professional quality sound track, play recorded audio clips instead of synthesized speech. Wireless Ethernet is not included, but may be added.

PeopleBot™ robots are available in three versions, as detailed in the table below. BASIC PEOPLEBOT™ provides a human interaction robot operable from a standard desktop or laptop PC. You can drive PeopleBot™ with the optional joystick, but why bother? They can navigate autonomously, avoiding obstacles. If people approach, PeopleBot™ will move away, creating a game of cat and mouse that delights children. Display the robot's sonar or laser map on a remote monitor or plasma screen overhead to demonstrate how robots sense the world. Let PeopleBot™ waiters wander the lobby with hors d'oeuvres. And these are just the built-in behaviors. Using ARIA and Saphira development tools included with PeopleBot™, multitudes of behaviors may be created Custom accessories plugged into PeopleBot's user I/O bus are already integrated into ARIA through P2OS packets.



## PEOPLE BOT™ COMPONENTS BY MODEL

Components	PeopleBot™ Base	Talking PeopleBot™	Performance PeopleBot™	PeopleBot™ Guide
Robot Base with 3 batteries	X	X	X	X
ActivMedia Robotics Interface for Applications (ARIA)	X	X	X	X
Saphira 8+ Localization & Gradient Navigation	X	X	X	X
User I/O integrated in hdwe & sfwe	X	X	X	X
Charger, 110 or 220V	5X	5X	5X	10X
Upper & Lower Front Sonar	X	X	X	X
Mid-level Sensing	X	X	X	X
Lower Rear Sonar	X	X	X	X
Toe-level Bump Sensing	X	X	X	X
Sonar-based Navigation Software	X	X	X	X
Direct-Drive Joystick	X	X	X	X

Embedded onboard PC	optional	X	X	X
Microphone & Speakers	optional	X	X	X
PC104 Audio Board	requires onbd. PC	X	X	X
BotSpeak Voice Recognition & Speech Integration	requires onbd. PC	X	X	X
Wireless Communications	optional Ethernet / Modem	optional Wireless Ethernet	Wireless Ethernet & Access Point included	X
Robotic Pan-Tilt-Zoom Camera	optional	optional	Version C Complete PTZ	optional
Wireless Surveillance	optional	optional	X	optional
Color-Tracking Software	requires onbd. PC	optional	X	optional
Range-finding Laser	requires onbd. PC	optional	optional	X
Laser Mapping & Navigation Software	requires onbd. PC	optional	optional	X
Inertial Correction System	requires onbd. PC	optional	optional	optional
1 dof Vertical Bar Mount for gripper or camera	optional	optional	X	optional
Table-top Gripper	optional	optional	X	optional
Touchscreen	optional	optional	optional	X
Auto Dock/Charge System	optional	optional	optional	X

## TECHNICAL SPECIFICATIONS

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The Performance PeopleBot™ model's 47cm x 38cm x 112cm body are made of aluminum. PeopleBot™ has two 19 cm dia drive wheels with 36:1 gear ratios have plenty of power to carry a 13kg payload. Their 500-tick encoders provide <1% dead reckoning error. These differential drive platforms are highly holonomic and can rotate in place moving both wheels, or can swing around a stationery wheel in a circle of 32cm radius. A rear caster balances the robots.

PeopleBot™ can climb a 5% grade and sills of 1.5cm. On flat floor, the PeopleBot™ can move safely at speeds of .8 mps; faster speeds are possible, but not recommended. At slower speeds it can carry payloads up to 13 kg. Payloads include additional batteries and all accessories and must be balanced appropriately for effective operation of the robot.



In addition to motor encoders, all PeopleBot™ robots include 24 ultrasonic transducer (range-finding sonar) sensors arranged to provide 360-degree forward coverage. The sonar read ranges from 15cm to approximately 7m. Some robots also include rear sonar.

PeopleBot™ robot's hinged battery door makes hot-swapping batteries simple, though a bare PeopleBot™ base can run 18-24 hours on three fully charged batteries. With a high-capacity charger, re-charging time is only 2.4 hours.

The PeopleBot™ robot's easily removable nose allows quick access to any optional embedded computer for addition of up to 3 PC104+ cards. PeopleBot™ includes a Siemens C166-based microcontroller. On the microcontroller, we have 8 digin and 8 digout plus 1 dedicated A/D port; 4 digin can be reconfigured as A/D in; 4 digout can be reconfigured to PWM outputs. This user I/O is integrated into the packet structure, accessible through ARIA and Saphira.

PeopleBot™ also includes fixed IR with range of 50mm to 1000 mm to sense the underside of tables. It points up and slightly forward from the nose of the robot base. The IR beam is collimated using special lensing to allow reliable long-range reflective sensing.

Performance PeopleBot™ includes a vertical 1dof beam device with horizontal 1dof gripper. The gripper has a maximum 12 cm (4.75 in) spread between fingers. The combined beam/gripper mechanism has a payload capacity of 1 kg (2.2 lbs.).

● FOR MORE INFORMATION: [Cross-Platform Specifications Table](#)

A small proprietary P2OS transfers sonar readings, motor encoder information and other I/O via packets to the PC client and returns control commands. ARIA supplies the developer interface, for use under RedHat Linux with Motif or under Windows using their favorite C/C++ compiler. Saphira 8 offers localization and gradient navigation.

● FOR MORE INFORMATION: [Software](#)

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