ROBOSOFT SA & ACTIV MEDIA ROBOTICS PRESENT

P3-AT

outdoor mobile robot for research

(shown with Novatel DGPS, active PTZ Vision, sonar , onboard computer and Ethernet.)

PIONEER 3-AT is a highly versatile all-terrain robotic platform, software-compatible with all ActivMedia robots, chosen by many DARPA grantees and others requiring a high-performance robot with plenty of real estate for customization. Powerful, yet easy to use; reliable, yet flexible, P3-AT is a popular team performer for outdoor or rough-terrain projects.

P3-AT offers an embedded computer option, opening the way for onboard vision processing, Ethernet-based communications, laser, DGPS, and other autonomous functions. The P3-AT stores up to 252 watt-hours of hot-swappable batteries. Optional 8 forward and 8 rear sonar sense obstacles from 15 cm to 7 m. P3-AT's powerful motors and four monster wheels can reach speeds of .8 meters per second and carry a payload of up to 20 kg. The P3-AT uses 100 tick encoders with inertial correction recommended for dead reckoning to compensate for skid steering. Its sensing extends far beyond the ordinary with laser-based navigation options, integrated inertial correction to compensate for slippage, GPS, bumpers, gripper, vision, stereo rangefinders, compass and a rapidly growing suite of other options.

The bare P3-AT base with included ARIA and Saphira8+ software has the ability to:

- WANDER randomly
- DRIVE controlled by keys or joystick
- PLAN PATHS with gradient navigation
- DISPLAY a map of its sonar and/or laser readings
- LOCALIZE using sonar (with optional laser upgrade)
- COMMUNICATE SENSOR & CONTROL information relating sonar, motor encoder, motor controls, user I/O, and battery charge data
- TEST ACTIVITIES QUICKLY with ARIA API from C++ programs
- SIMULATE BEHAVIORS OFFLINE with the simulator that accompanies each development environment

The Pioneer 3-AT is an all-purpose outdoor base, used for research and prototyping applications involving:

- mapping
- navigation
- monitoring

reconnaissance
- vision
- manipulation
- cooperation
- and other behaviors

P3-AT's are made for use outdoors; they run on many earth, stone or paved surfaces. Unencumbered, they can climb steep 45% grades. To operate on carpet, select Indoor wheels, which may be swapped as needed. P3-AT's are not water-proof.

P3-AT COMPONENTS

Pioneer 3-AT's provide a ready-to-use all-terrain base with:

- body with hinged battery access door
- 1 battery
- 4 wheels
- 4 motors with encoders
- microcontroller
- motor power board
- AROS microcontroller server software
- user I/O bus integrated into hardware and ARIA software
- ARIA Robotics API for developers
- Saphira 8+ localization & gradient navigation
- operations manual

In addition, the robot requires:

- communication with a PC client, via one of the following:
  - wireless radio modem
  - robot-to-laptop connector
  - robot-to-desktop tether
  - or connection to an embedded computer
- a recharger
  - standard for overnight charging
  - high-capacity to cut charge time 80% or to use as a computer power supply *(requires 3 batteries)*

P3-AT OPTIONS

Pioneer 3-AT's wide suite of integrated options makes it the most versatile platform available. Other robots may provide accessories that are integrated in hardware; they can be physically run by the robot. However, they often do not provide the software to gather sensing or other data from the accessory and to send control commands to any motors or other effectors. Writing these integration programs takes valuable research time. By handling these integration worries, ActivMedia Robotics saves you headaches. In addition, custom accessories plugged into P3-AT's user I/O bus are already integrated into ARIA through AROS packets

P3-AT's accessories and optional software range from:

- *NEW! Inertial Correction overcomes skid steer dead reckoning error!*
- ActivMedia Robotics Basic Suite and Laser Suite Pro software
- wireless Ethernet
- laser rangefinders
- front and rear sonar
- pan-tilt-zoom color cameras
- day/night cameras
- stereo rangefinding cameras

color-tracking
- GPS
- compasses & tilt-position sensors
- bumpers
- grippers
- Internet-based operation
- *and more!*

TECHNICAL SPECIFICATIONS

The rugged P3-AT 50cm x 49cm x 26cm aluminum body with 21.5cm dia drive wheels loves to run outdoors. The four motors use 66:1 gear ratios and contain 100-tick encoders. This skid-steer platform is holonomic and can rotate in place moving both wheels, or it can move wheels on one side only to form a circle of 40cm radius.

P3-AT can climb a 45% grade and sills of 9cm. On flat floor, the P3-AT can move at speeds of .7 mps. At slower speeds on flatter terrains, it can carry payloads up to 20 kg. Payloads include additional batteries and all accessories and must be balanced appropriately for effective operation of the robot.

P3-AT's hinged battery door makes hot-swapping batteries simple, though a bare P3-AT base can run 3-6 hours on three fully charged batteries. With a high-capacity charger, re-charging time is only 2.4 hours.

The P3-AT's easily removable nose allows quick access to any optional embedded computer for addition of up to 2 PC104+ cards. All P3-AT's include a Hitachi H8s-based microcontroller. On the microcontroller, we have multiple I/O varieties. This user I/O is integrated into the packet structure, accessible through ARIA and Saphira.

A small proprietary AROS transfers sonar readings, motor encoder information and other I/O via packets to the PC client and returns control commands. Users can run the robot from the client or design their own programs under RedHat Linux with Motif or under WIN32 using their favorite C/C++ compiler. Our robotics development environments supply library functions to handle navigation, path planning and many other robotic tasks.