

WiFi Mobile Robot Development Platform with extreme mobility and Video/Audio Capability



This ready to use mobile robot platform is designed for researchers developing advanced robot applications such as remote monitoring, telepresence and autonomous navigation/patrol.

Mechanics



The X80 is the result of extensive efforts to develop a robot that would be fast and strong, while itself remaining lightweight and nimble. The wheel-based platform's two 12V DC motors each supply 300 oz.-inches(22kg.cm) of torque to the X80's 18 cm (7 in.) wheels, yielding a top speed in excess of 1 m/s (3.3 ft/s). Two high-resolution (1200 count per wheel cycle) quadrature encoders mounted on each wheel provide high-precision measurement and control of wheel movement. Weighing only 3.5 kg (7.7 lb.), the system is light, but it can carry an additional payload of 10 kg (22 lb.).

Sensors



X80 offers full WiFi (802.11g) wireless, multimedia, sensing and motion capabilities and comes with a wide range of sensor, camera, and audio modules, sufficient to serve in any variety of applications. The X80 offers broad expandability as well for projects that may require additional sensors, even specialized modules. Powered by separate RC servo motors, the integrated camera head can pan and tilt independently.

Architecture



The X80's underlying technology evolved from Dr Robot's Distributed Computation Robotic Architecture, originally developed for Dr Robot's Humanoid (HR) Robot. Using this approach, high-level control of the robot is maintained by a remote or local PC/server communicating by a secure wireless link. Low-level functionality is managed by an onboard digital signal processor (DSP) while computationally intensive operations are performed offboard. The result is a robot that's lighter, draws less power, runs longer and is dramatically less expensive than a fully bundled or self-contained system. Moreover, since primary processing resides in a server, any hardware upgrades to the central unit are shared by all the robots it controls.

With its integrated high bandwidth (11Mbps) WiFi 802.11 wireless module, the system can upload all sensor data (including encoder sensor readings) to a PC or server at rates in excess of 10Hz. Similarly, streaming audio (8Hz x 8bits) and video (up to 4 fps) either for direct monitoring or for processing by high-level AI schemes is a snap. Commands and instructions sent to the X80 via the same wireless link also pass at rates exceeding 10Hz, providing real-time control and access.

The X80 includes all WiRobot development software components (for MS Windows 2000 and up), enabling easy access to all data and information in a standard Microsoft Windows programming environment (e.g., MS VB and VC++). Under the approach of using a separate PC for high-level control, there are no longer onboard restrictions on a mobile system's processing power, memory and storage. For users of non-Windows operating systems (e.g., Linux), Dr Robot will provide the raw communication protocol for direct integration with any other system/device.

With the X80 system, researchers can develop a specialized intelligent robotic assistant, security robot or simply use it as a platform for a variety of projects built around applications such as human-machine interaction, mobile system navigation, robot behavior, image processing, object recognition, voice recognition, teleoperation, remote sensing, map building and localization etc.

The X80 system is fully integrated and each robot is fully assembled and tested prior to shipping so that it arrives ready for use. **Mechanical and Control Highlights:**

- Two 12V motors with over 300oz.-inch(22kg.cm) torque each
- 7 inch driving wheel
- Max speed of 1 m/sec
- Dimensions:
 - 38.0 cm (15 inch) diameter
 - 25.5 cm (10 inch) height
- Weight: 3.5 kg
- Large top mounting deck for additional devices such as a notebook computer
- Additional carrying payload:
 - 10 kg
 - 25 Kg (Optional, please contact info@drrobot.com for detail)
- Pre-programmed fine speed and position control achieved by an integrated PMS5005 module employing two 1200 count per wheel-cycle quadrature encoders.

Electronic System Highlights:

- Fully integrated WiFi (802.11g) system with dual serial communication channels (max of 912.6 Kbps per channel), supporting both UDP and TCP/IP protocol.
- Full color video and two-way audio capability. (CMOS color image module and audio module are fully integrated.)
- Battery: 3700mAh with over 3 hours for nominal operation.
- Collision detection sensors include 3 sonar range sensors and 7 IR range sensors
- 2 Pyroelectric Human Motion Sensors
- Additional sensors such as supplementary sonar sensors, temperature sensors, acceleration/tilting sensor, or customized sensors can be added.