

# WHAT IT TAKES TO MAKE A ROBOT...

**HEAD** Special-purpose chips process sensory data and link to main computer

**EYES** Video camera with zoom lens

**MOUTH** Speaker for synthesized voice

## **CONTROLS**

- Fuel cell provides main source of power
- Primary computer
- Communications system for voice, Internet, and remote control

**EARS** Stereo microphones detect the direction of sounds

**CHEEKS** Translucent metal skin changes hue to depict "emotions"—with color patterns generated by internal arrays of light-emitting diodes

## **BATTERY PACK**

Rechargeable backup power

## **MOTION-SENSOR PACKAGE**

- Accelerometer for gauging speed and maintaining balance
- Angular-velocity sensor tracks twisting movements of the torso
- Infrared range finders measure distances

## **COMMUNICATIONS PACKAGE**

- Internal antenna for wireless communications

## **MOTORS**

- Electric motors operate joints; androids typically need two-dozen or more motors, in various sizes, for fingers, wrists, ankles, elbows, and other joints

## **HAND AND FOOT SENSORS**

- Pressure sensors measure grip
- Touch sensors interpret tactile impressions
- Olfactory sensor detects smells
- Temperature sensor
- Special-purpose chips process sensory data and link to main computer

