PaPeRo the Talking Robot

Beginning in January of 1997, development of a communication robot was begun, with the child care robot "PaPeRo" being developed as a result, and a proof of concept was conducted at EXPO 2005 in Aichi, Japan. Afterwards, the PaPeRo R500 was developed to improve on the productivity and reliability of its predecessor, and is currently being used by R&D companies and institutions as a research/demonstration platform for robot experiments and applications.

To facilitate human interaction, PaPeRo is equipped with three sensory detection functions and a synthesized voice output function, described below:

-- Facial Recognition --
By mounting CCD cameras in its eyes, PaPeRo can detect, record and store the faces of the people it meets, and using facial recognition procedures, can attempt to identify the person it is speaking with, should that person already be familiar to the unit.

-- Noise-resistant Voice Recognition --
Each unit has a microphone installed inside of it, which it uses to recognize the voice of someone speaking to it; this signal is then passed to a system which converts the words it hears into a text string. Noise-resistance is implemented by having a microphone mounted on the front of its head, which takes human voice as its input, and a microphone on its back, which takes ambient sound as its input, and then applying noise-filter algorithms to the first, aforementioned, voice input signal. In addition, PaPeRo has a "rejection" dictionary method to strengthen it against malfunction due to unrecognized words/language or background voices.

-- Touch Sensor --
PaPeRo is equipped with five electrostatic sensors on the inside of its torso, and four on the inside of its head, that lets it tell if someone is touching it or not.

-- Synthesized Voice --
PaPeRo's voice system essentially takes a string of text as input, and then reads aloud that text using a newly-developed technology that allows it to modulate a synthetic voice source, giving its voice a cute, intonated sound.

Finally, to improve the safety of interacting with PaPeRo, several design features were implemented:

- it is lightweight, weighing approximately 6.5 kg;

- it has had its motions intentionally slowed down;

- it uses a motor with low torque, reducing its output energy when moving;

- its body is very rounded and smooth; and

- the gaps between its moving parts are all less than 3 mm, reducing the risk of something getting caught on, or pinched by, PaPeRo.