コミュニケーションロボット〝Tocco〟

Communication Robot "Tocco"

Interactive robot with computer vision and voice recognition

Purpose of research

In this research, this robot puts focus on human-robot communication and makes air pressure-type robot, to analyze the interaction between a human and robot.

To explore the possibility of interactive robot, we investigate cooperative operation between human and robot. It means not a one-sided relationship which a robot talks to human of carrying out something.

In the future, it would be developed into the robot that provides laughs to be able to activate natural healing for the elderly person as a mean to improve their immunity to disease.

Basic construction

The system of this robot is configured by body, valve-unit, control, and interface parts.

The body part is covered by plush of panda to feel users more familiar.

Drive system has 5 parts and 9 channels to move the neck, shoulders and legs. Neck's moving range is 28° for forward and backward, 40° for left and right to circumnutate. Shoulder's moving range is 40° for forward and backward, 30° for left and right. Leg's movement range is 20° for backward and forward. The body and valve-unit is connected by CC-link (FX2N-16CCL-M).

Sequencer (FX1N-24MT) is adopted as PLC (Power Line Communication) control device.

Oil-free, small-size compressor is adopted as the robot's compressor.

For computer vision, OpenCV has used for this robot. The program which used OpenCV materializes face detection and face following.

To calculate smile scale, the robot uses OKAOVision(OMRON Corporation). OKAOVision calculates user's smile scale by using the data received from OpenCV.

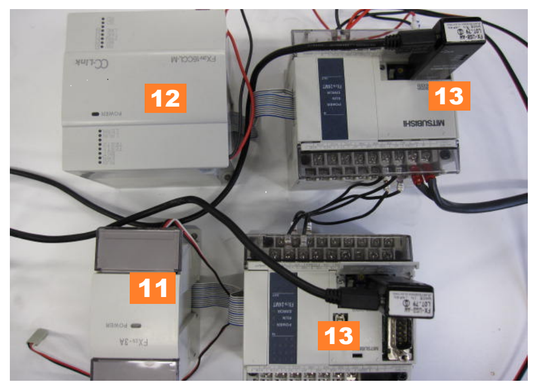
Voice recognition system adopts Julius, two-pass large vocabulary continuous speech recognition (LVCSR) decoder software.

Julius adopts acoustic models in HTK ascii format, pronunciation dictionary in almost HTK format, and word 3-gram language models in ARPA standard format (forward 2-gram and reverse 3-gram trained from same corpus).

Exterior covering

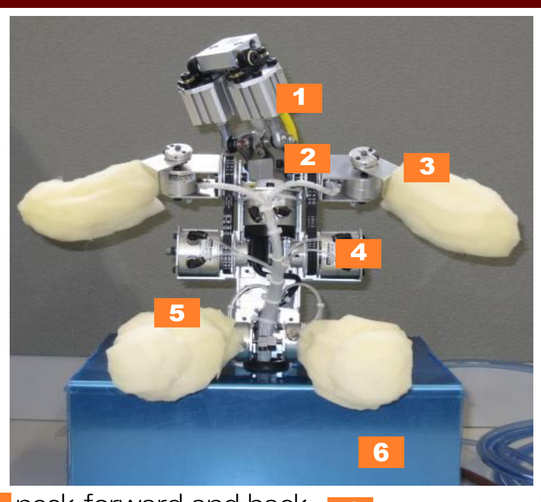
(Sekiguchi Corporation)

Control unit



11 Combined analog I/O module
12 CC-LINK (Fx2N-16CCL-M)
13 Sequencer

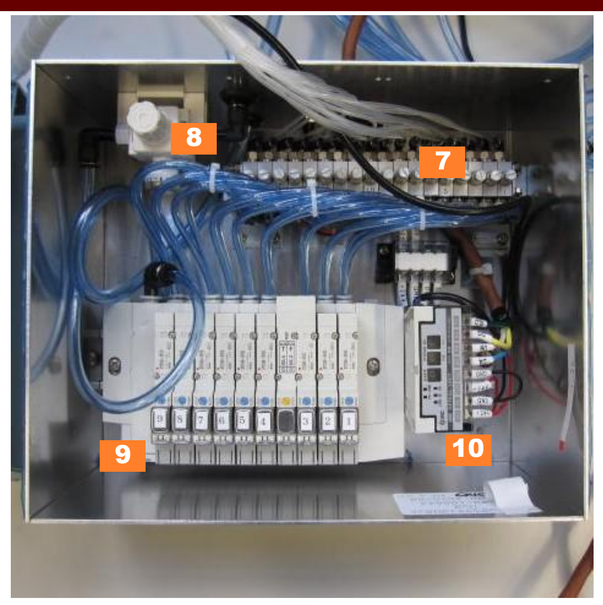
Body・Drive system



1 neck forward and back cylinder
2 neck right and left cylinder
3 arms opening and closing cylinder
4 arms up and down cylinder
5 feet up and down cylinder
6 valve box

Smile scale evaluation

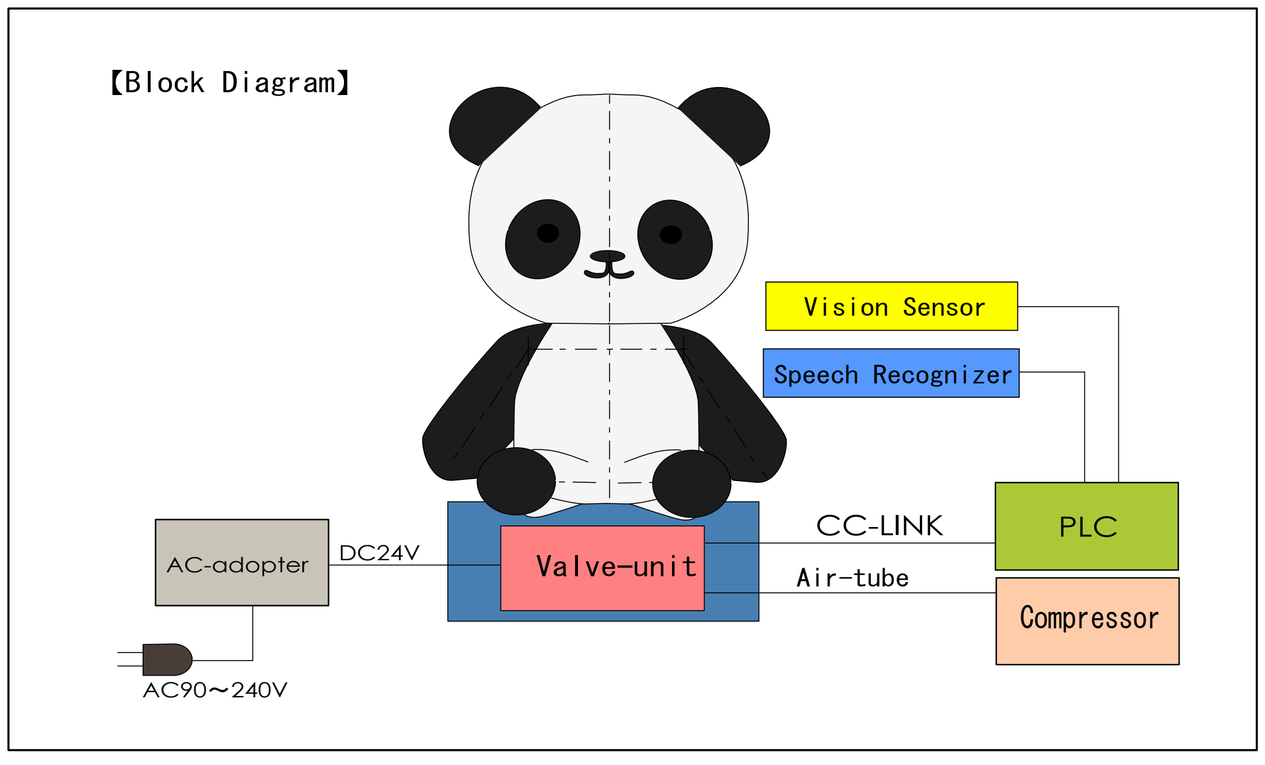
Valve-unit



7 Speed controler
8 Filter regulator
9 Valve
10 Cereal transfer system

Voice recognition

【Block Diagram】



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