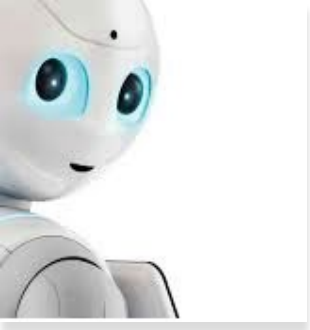


# Toward Robot-Assisted Psychosocial Techniques for Sound Stimulation of Children Born with Hearing Loss

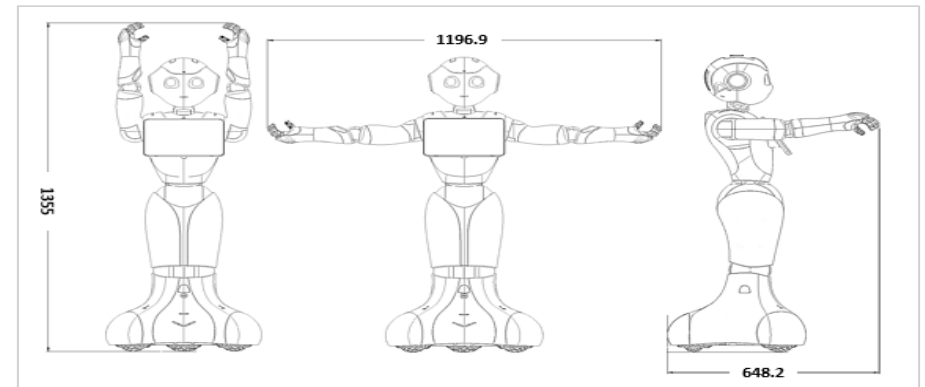
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# Description of Pepper

- Pepper is a humanoid robot with elements of artificial intelligence; it is autonomous, socially intelligent and makes contact with people as naturally as possible.
- It has a preinstalled operating system and an embedded system for detecting people and obstacles.
- It allows design, uploading (transferring) and implementation of personalized behaviors and interactivity (dialogue, touch, gestures, gaze, etc.)
- Pepper is 120 cm tall, weighs 28 kg, possesses 20 degrees of freedom and can move independently, using its three omnidirectional wheels





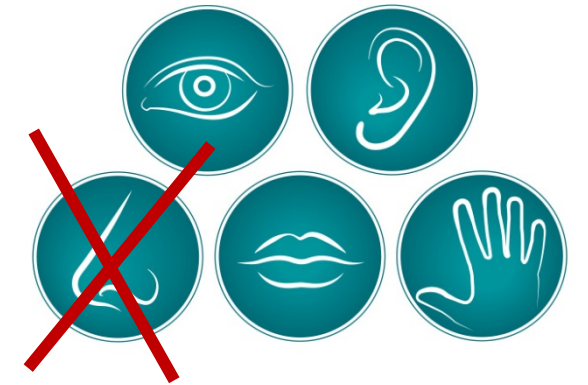
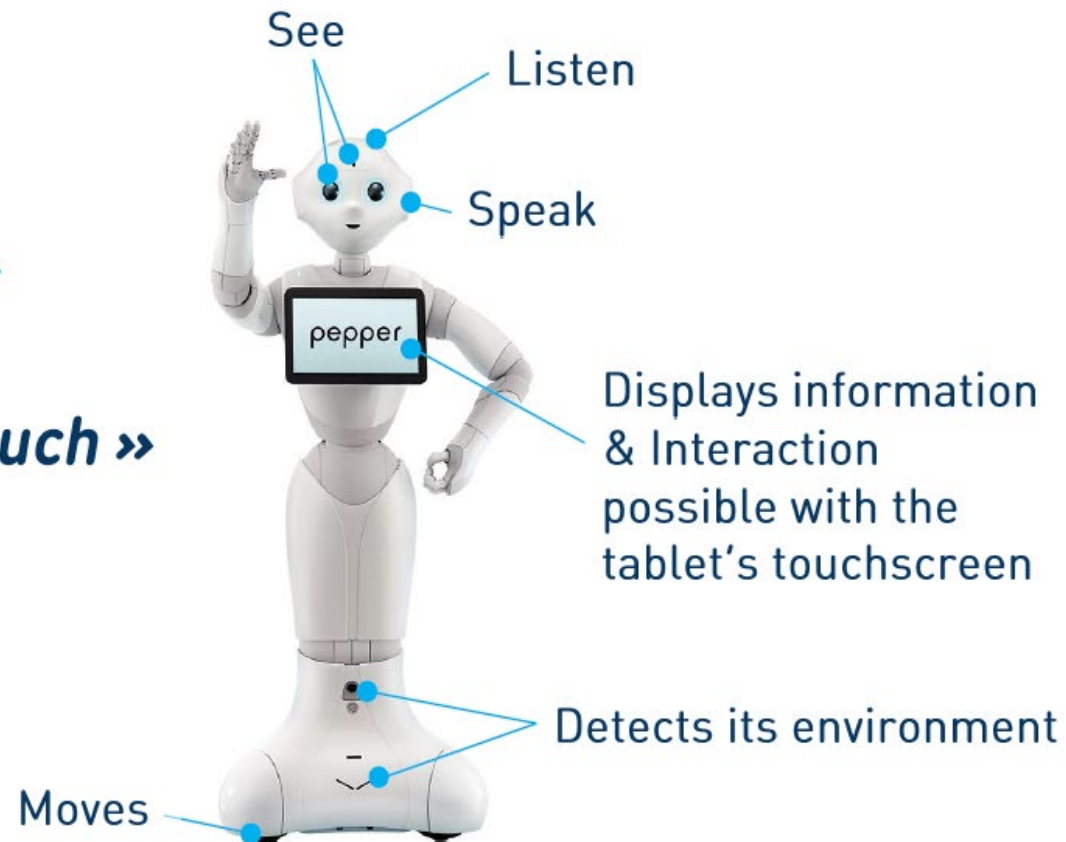
# Interaction with Pepper - voice, sight, listening and touchscreen

## # 1 Meeting Pepper

« *Social humanoid robot* »

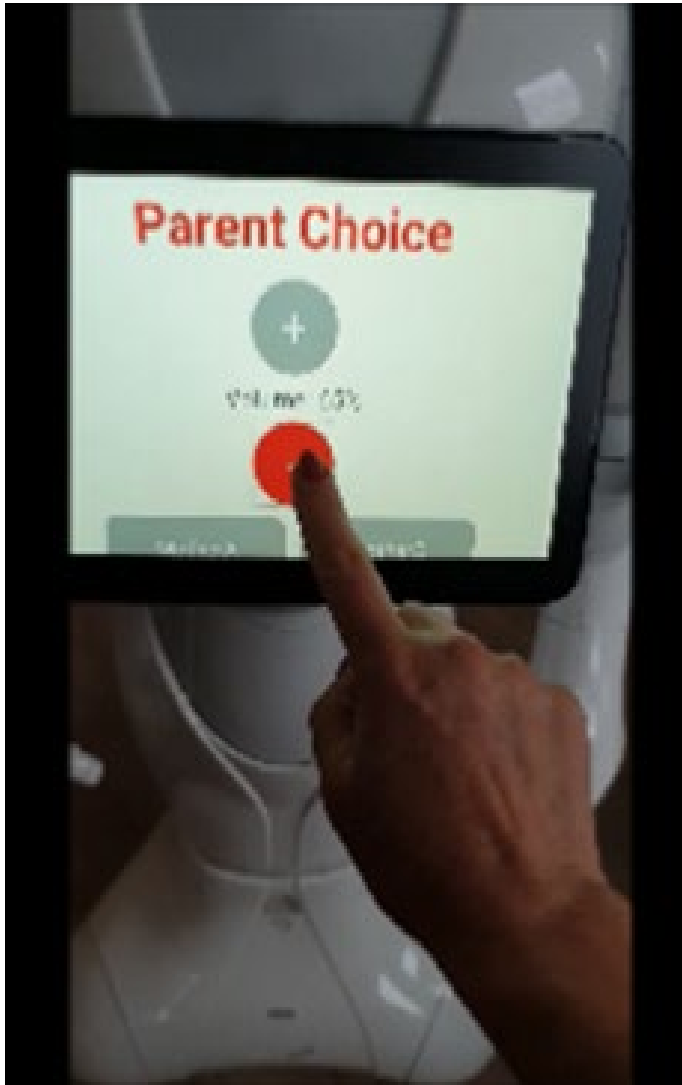
« *Voice and Touch* »

« *Helping employees* »





# How does Pepper interact?

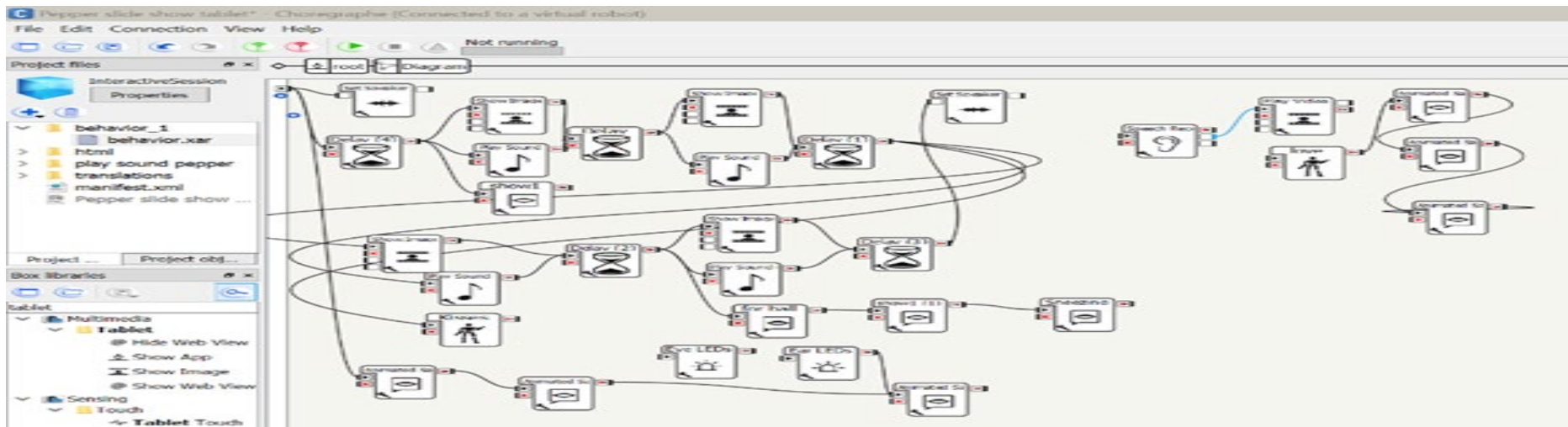


- For active interactions, Pepper uses pre-programmed gestures uploaded to the robot.
- The robot software also has an animation mode that allows programming of personalized gestures and movements.
- Another option for active interactions is via a tablet with a touch screen and a 10.1-inch display.
- The content and options for interacting with the tablet are carried out via JavaScript and HTML.
- It has access to the coordinates of the touch screen.
- You can control the sound, change behaviors or postures or restart the robot.
- Internet pages can be shown.

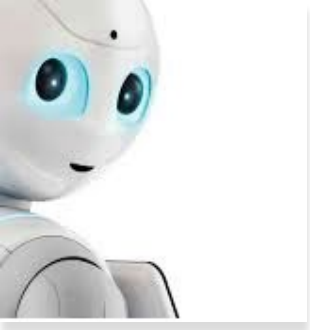


# Programming Pepper

- Pepper has a preinstalled Operating System either NAOqi or Android (we use NAOqi)
- Programming Pepper can be performed in two ways:
  - by using graphical interface of the Choregraphe environment

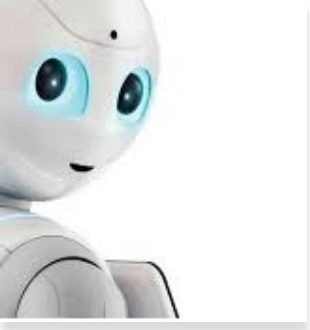


- via Python programming language inside in Choregraphe or from external IDE (integrated development environment)



# Intensive sound stimulation assisted by Pepper

- Different scenarios for rehabilitation sessions via the robot can be designed:
  - - the image of an object can be shown on the tablet and at the same time a voice sound can be played.
  - - the animation mode can be used to attract the baby's attention and to create movements which describe different gestures, shapes of objects, etc.
  - - Choregraphe behavior can be enriched with Python code in order to personalize the behavior for a particular family.
  - - Pepper can bring repetitive speech, daily live sounds, songs and story telling into therapy that has to be programmed
  - - colours, shapes and movements performed on the robot help parents to attract the baby's attention and to make the audio-visual connection



# Research protocol for the robo- psychosocial techniques for intensive sound stimulation

- The therapeutic scenario has been programmed in Choregraphe and different robot gestures, postures, movements, the tablet content and interactions have been proposed:
  - - sounds and vocabulary were recorded via the voice of a member of the technical team. Similarly, that voice could be the voice of the mother, father, sister, etc.
  - - The rehabilitation session can be started, stopped and rewound on Pepper's tablet or through voice commands. It has been checked and confirmed.
  - - The volume of the robot can be increased or decreased by voice or touch.
  - - There is a possibility for a child with hearing loss to listen and look at a picture of an object or a certain situation, accompanied by sign language.