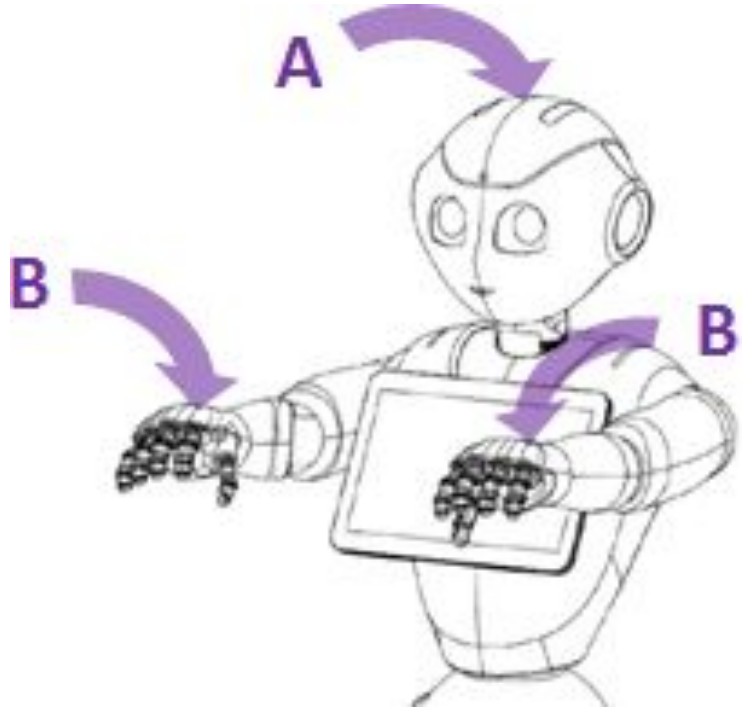
Robot Karel Pepper

NLP Centrum, FI MU
nlp.fi.muni.cz/projects/pepper

Technical equipment of humanoid robot Pepper

- 2 x CPU - 1 in robot's head, 1 tablet
- OS Linux - progr. language Python,
  OS Android with the tablet
- height 120 cm, width 48 cm, weight 28 kg
- movement on 3 wheels, max speed 3 km/h
- microphones (4 on top of head), loudspeakers
  (2 ears)



- sensors: touch (head, hands, tablet, bumpers), 3D (eyes), obstacle detection (infra, lasers, sonars), 2D cameras (forehead, mouth)
- 14 motors with Magnetic Rotary Encoders (read position)
- battery 30 Ah, 10 hours of work
- natural languages: ASR and TTS by Nuance, 20 languages

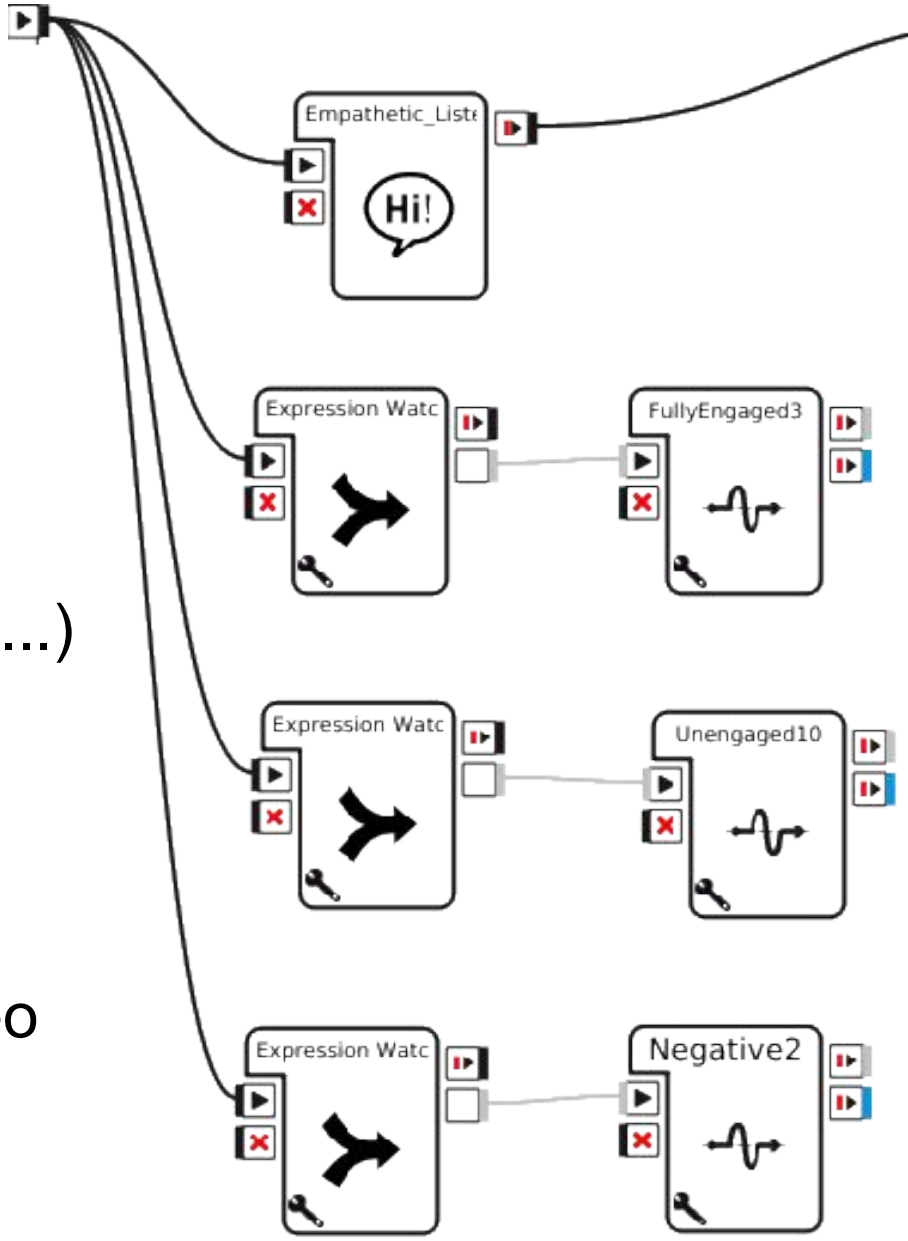
Pepper in the world and in the Czech Republic

- by Softbank Robotics, JP (formerly Aldebaran, FR)
- a "family" of three robots:
  - NAO (2008, 58cm, 5.5kg)
  - PEPPER (2014, 120cm, 28kg)
  - ROMEO (2012, 140cm, 36kg)
- several thousand Peppers in the world
- Czech Republic - about 10 pieces

  (CTU 4x, T-Mobile, OREA hotels 2x, Prague airport, FI MU)

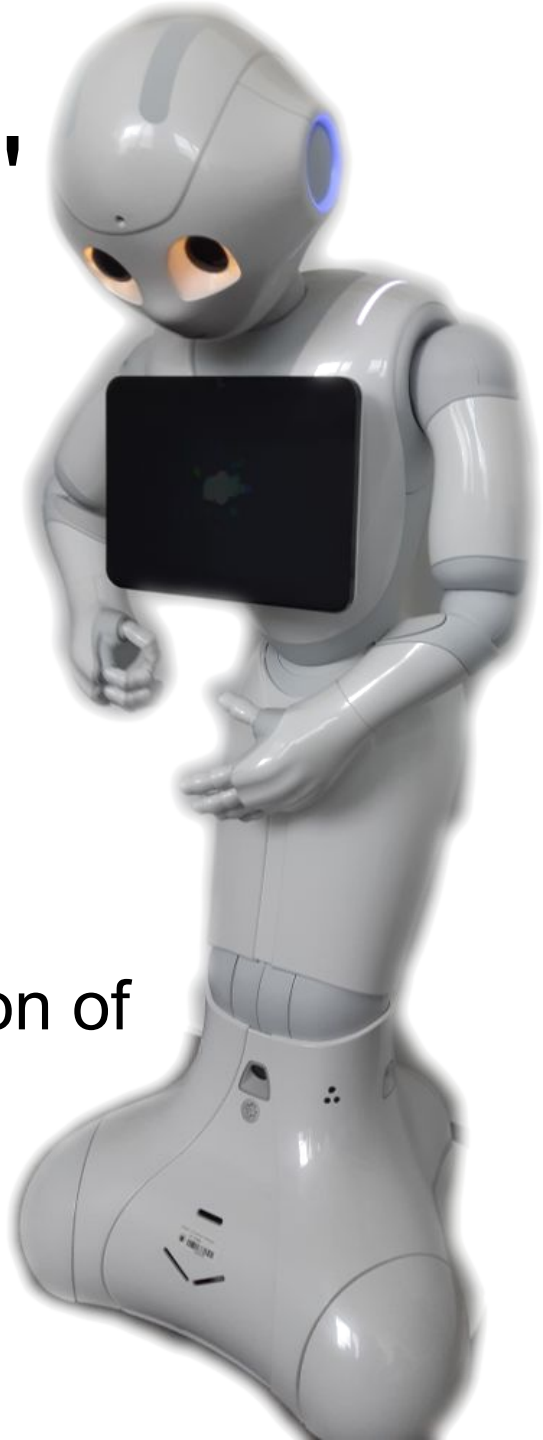
Programming the robot

- guidelines of Programming for a living robot
- API versions - NAOqi (Python, C++, Java, Javascript), QiSDK (Android on tablet)
- access via (download for registered only):
  - GUI tools - monitor and choregraphe
  - direct programming via SDK above (Python, ...)
  - ssh and command line
- interaction:
  - voice - separate words or complex dialogues
  - played sound and music
  - tablet - HTML5, touch, web, images and video
  - robot animations
  - touching
  - moving around



Ability of "intelligence" and "empathy"

- pleasant and welcoming look and height of a child
- partly female look (internal code name Juliette)
- autonomous life - background movements, basic awareness
- emotion detection (ALMood):
  - gaze analysis (eye opening degree, look angle, ...)
  - face characteristics (age, gender, smile, anger, ...)
  - voice analysis (4 emotions, level, excitement)
- API functions for keeping track of people around, detection of waving or sitting people (cannot track children well)
- easy integration with powerful dialog API
- video analysis of robot's surroundings
- basic movement, tracking and navigation capabilities



Applications of robots in general

- industrial use, non-humanoid robots
- healthcare - various types of assistance and assistants and auxiliary work
- administration - auxiliary administrative work
- marketing - querying, data mining, attracting
- research in the field of human-machine communication in the indicated areas

Our plans and goals with Karel Pepper

social communication research

- mastering natural language **communication** (primarily in Czech)
- research in **question answering**, inference and deduction
- robot programming in relation to tasks mentioned before
- **student works** in project topics in relation to AI