Tom Donahue

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Experience

Sept 2020 – **Character AI Lead**, *NTT Disruption*, Boston, MA

Engineering Lead in charge of architecting, developing and evaluating cutting-edge conversational technologies and character experiences for Jibo.

- Led design, development and collaboration with Microsoft on *Project Pupil*—a multi-lingual, multi-turn, memory-assisted dialog experience built atop Neo4j and BotFramework
- Integrated and deployed new advanced multi-lingual TTS engine into conversational pipeline; replaced aging, unsupported mono-lingual on-board engine
- Upgraded and augmented proprietary, rule-based, mono-lingual NLU pipeline with modern, scalable, multi-lingual cloud services backed by ML/statistical approaches
- Contributed to ideation, design and definition of collaborations with, and Jibo deployments to, B2B customers (e.g. Children's Hospitals)

Keywords: TypeScript / JS / Node, Azure Speech/ Cognitive Services, Neo4j, BotFramework, NLU, HRI

2018 – 2020 **Human-Robot Interaction Engineer**, *Piaggio Fast Forward*, Boston, MA

Software Integration Lead and Smart Behaviors liaison; bridged the gap between the investigation and design of high-level behaviors in gita and their implementation.

- Managed, tracked and tested feature development in the pre– and post–launch phases of gita.
- Co-designed, implemented and integrated brokerless, type-safe messaging framework atop ZeroMQ and Cereal as replacement for ROS core / messages.
- Co-developed numerous core app architectures across gita—incorporating modern C++ features and techniques when prudent.
- Core contributor to the investigation, design and specification of numerous novel human-robot dyad behaviors for gita.

Keywords: C++ (17), ROS, ZeroMQ, Autonomous Robot, HRI, Linux

2016 – 2018 **Character AI Engineer**, *Jibo*, Boston, MA

Member of the team tasked with making the first social robot for the home—Jibo—feel lifelike, produce dynamic behavior, and ensure a consistent character experience across his wide range of interactions and skills.

- Co-architect and lead developer of *Embodied Speech*, a subsystem that blends Jibo's speech with animation, graphics and sound to create character-rich dialog interactions.
- Lead developer of *Chitchat*, Jibo's ontological dialog ability, and co-led *GQA*, Jibo's general question-answering service—the most frequent user-initiated interactions with the robot.
- Co-designed and implemented a novel, distributed robot/cloud skill architecture resulting in a significant interaction latency reduction and a far more scalable content-delivery pipeline.
- Led development of an animation database, a core module that enables queries for, and configuration of, animation and sound assets for on-demand playback and control on Jibo.

Keywords: TypeScript / JS / Node, Python, Docker, NLP/NLU, HRI, OSX

2014 - 2016 **Robot Software Engineer**, *Softbank Robotics (Aldebaran)*, Boston, MA

Member of a small agile team working across the Aldebaran stack—from NaoQi middleware modules to core applications.

- Designed and built *Act* framework for semi-autonomous multi-robot–human interactions.
- Co-developed *ALTactileGesture*, a high-level touch sequence gesture recognition module.
- Released *Mad Chats*, an interactive Mad Libs-esque word game played between human and robot.
- Part of the team that designed and built a core application launching and dialog interaction for all Aldebaran robots.
- Designed, built and regularly demoed semi-autonomous robot greeter for range of external clients.

Keywords: Python, JS, C++, HTML/ CSS, HRI, Linux

Research Experience

2012 - 2014 **Graduate Research / Teaching Assistant**, *Human Robot Interaction Lab*, *Tufts University*, Medford, MA

Areas of focus: human-robot teaming, situated natural language understanding and generation.

- Implemented distributed notification system for ADE robotics middleware.
- Overhauled system GUIs for ADE middleware, yielding improved stability, efficiency and a simplified UI.
- Developed data-mining tools for rich audio and video corpora and annotations.
- Designed and built web-survey platform for multiple HRI studies.
- Designed, conducted and analyzed multiple HRI studies investigating multiple factors within human-robot teams.

Keywords: Java, Clojure, C++, JS, HTML/ CSS, PHP, HRI, NLP, Linux, LaTeX, R

2010 - 2012 **Graduate Research / Teaching Assistant**, *Computer-Human Interaction Lab*, *BGSU*, Bowling Green, OH

Areas of focus: Tangible interfaces and accessibility

- Designed, built and tested an alternative UI for World of Warcraft for the visually impaired community.
- Investigated the learning benefits of—and trade-offs between—mouse, touch and tangible input systems via a novel deduction puzzle/ game.
- Part of a team that developed a novel tangible password input system.
- Helped build a series of web-tools for use in undergraduate Geology courses.

Keywords: Java, C++, HCI, Windows

2008 - 2010 **Research Assistant**, *Rhythm, Attention and Perception Lab*, *Bowling Green State University*, Bowling Green, OH

- Independently designed and built neural-network that modeled human auditory tone categorization.

Keywords: MATLAB

Technical Skills

Languages

Core: Typescript / JS, C++ **Rusty:** Python, Java, HTML/ CSS **Familiar:** Clojure, PHP, R

Software / Tooling

Database: Neo4j, MongoDB, MySQL **Cloud:** Docker, Elastic/Kibana **Source:** Git, SVN

Platforms / Robots

- Microsoft **BotFramework**—Enterprise-grade framework for building conversational AI experiences.
- **Jibo**—One of the first social robots for the home.
- Piaggio Fast Forwards' **gita**—Hands-free cargo carrying, following robot.
- **ROS**—Most widely adopted open-source robotics middleware.
- Softbank / Aldebaran's **Pepper and Nao**—Humanoid robots used in various business/educational settings.
- **ADE**—A research-focused, distributed, multi-agent robotics middleware.

Education

2012 - 2014 **Doctoral studies in Computer Science & Cognitive Science**, *Tufts University, Medford, MA*
Withdrew in good standing from joint-Ph.D. program

2011 - 2012 **M.S. in Computer Science**, *Bowling Green State University, Bowling Green, OH*
Concentration: Human-Computer Interaction

2007 - 2011 **B.S. in Computer Science & Psychology**, *Bowling Green State University, Bowling Green, OH*
Minor in Mathematics, Cum Laude

Patents

2018 *Embodied Dialog and Embodied Speech Authoring Tools For Use With An Expressive Social Robot*
US20180133900A1. Jibo/NTT Distrupt. *Patent Pending*

2018 *Maintaining Attention and Conveying Believability via Expression and Goal-Directed Behavior with a Social Robot*
US20180229372A1. Jibo/NTT Distrupt. *Patent Pending*

Publications

2015 *Investigating the Effects of Robot Affect and Embodiment on Attention and Natural Language of Human Teammates.* (CogInfoComm '15)

2014 *Investigating Human Perceptions of Robot Capabilities in Remote Human-Robot Team Tasks based on First-Person Robot Video Feeds.* (IROS '14)

2013 *On Interface Closeness and Problem Solving.* (TEI '13)

2012 *Leveraging Motor Learning for a Tangible Password System.* (CHI '12)

2011 *Access-a-WoW: Building an Enhanced World of Warcraft UI for Persons with Low Visual Acuity.* (UAHCI '11)

Achievements

2020 gita awarded Red Dot's 'Best of the Best' in 'Innovative Products' meta-category

2017 Jibo named Time Magazine's #1 of the "25 Best Inventions of 2017"