

## TABBI - A Tangible Interface for Educational Chatbots

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**Abstract:** With the increasing popularity of Artificial Intelligence in educational research, chatbots seem to be a promising future technology that could help students with their daily problems. As part of Smart Learning Environments, they can be permanently accessible by natural language via a variety of interfaces. To investigate the property of "tangibility", we present TABBI, an interface for educational chatbots that allows students to interact with a physical robot. This robot interface will be used in future comparative studies to evaluate interaction possibilities with educational chatbots. In this paper, we describe the general idea and context of TABBI.

**Keywords:** Artificial Intelligence, Smart Learning Environments, Chatbot Interface, Tangibility, Robot, Assistant

### 1 Motivation

With possibilities of modern hardware, applications of Artificial Intelligence (AI) in education have become realistic in recent years. Chatbots in particular could help to improve the quality and availability of digital education. They enable natural language interactions by recognizing user intentions through an underlying neural network.

Chatbots can be integrated into a variety of applications and interfaced through text-stream inputs and outputs e.g. by instant messengers, websites, or smart speakers. In the field of educational technology research, interactions with chatbots have been researched for decades. However, only a few comparative studies of interfaces have been conducted in this regard so far. To enable future studies on the presence of chatbots, we have designed TABBI. It integrates into a widely used chatbot framework and can be utilized without changing the underlying logic. This should lead to more insights into robotic chatbots, smart speakers, and similar interfaces in the field of educational technologies.

### 2 Educational Setting

TABBI is a chatbot interface integrated into a robot, which can be placed in Smart Learning Environments to help students. According to the work of [Wo20] and [WS18], chatbots could lead to more optimized interactive Q&A systems, digital companions, or discussion partners. In this context, a number of pedagogical questions arise. The outstanding feature of TABBI, the physical embodiment, or "tangibility", can be used to

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examine the significance of this feature in the educational context. Tangibility could lead to more natural or less distracting interactions on the one hand, but also to barriers, e.g. through a loss of privacy in public conversations. Experience in this respect could in turn be used to optimize chatbots and interfaces for their specific use in education and learning environments.

### 3 Technical Design

From a technical point of view, TABBII consists of a double robot 2, paired with a customer-specific connection to RASA, a chatbot framework commonly used in the educational sector. This connector consists of a sensor bridge for coupling the mobile robot device with the rest of the logic, a Text-To-Speech module (Mozilla TTS<sup>2</sup>), and an Automatic-Speech-Recognition module (Mozilla DeepSpeech<sup>3</sup>). A detailed elaboration of the interface design can be found in Fig. 1:

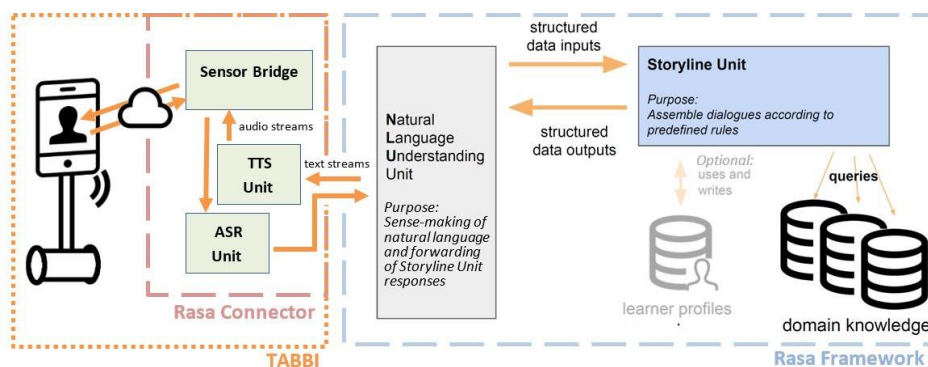


Fig. 1: Conceptual design of the robot chatbot interface TABBII

This structure makes it easy to exchange TABBII with other chatbot interfaces in order to compare human interactions based on the interface used.

### Bibliography

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<sup>2</sup> Project website: <https://github.com/mozilla/TTS> – accessed on 2020-06-29, 8:36 pm

<sup>3</sup> Project website: <https://github.com/mozilla/DeepSpeech> – accessed on 2020-06-29, 8:35 pm