

Conversational AI Tools

for K-12 Education

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Motivation

- AI + voice-based technology...
1. is everywhere
 2. has important implications
 3. can be used for good

Sheila's Story



Palette

User Interface

- Button
- CheckBox
- DatePicker
- Image
- Label**
- ListView
- Notifier
- PasswordTextBox
- Slider
- Spinner
- TextBox
- TimePicker
- WebView

Layout

Media

Drawing and Animation

Maps

Sensors

Viewer

Display hidden components in Viewer

Check to see Preview on Tablet size

9:48

Karabo the Zorilla walked through the forest.

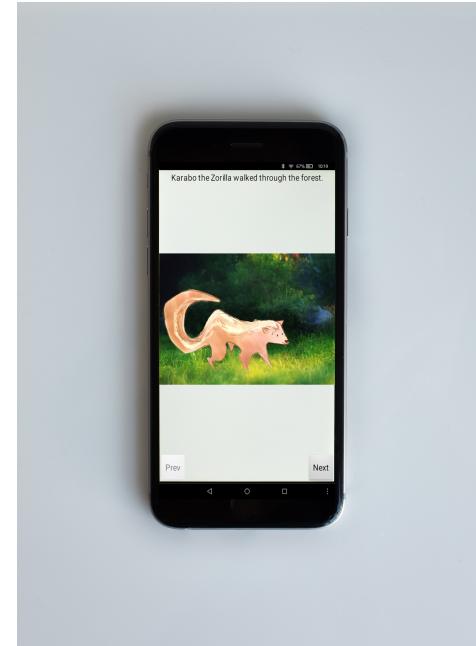
Components

- Screen1
 - story_text
 - story_image
 - HorizontalArrangement1
 - prev_btn
 - spacer
 - next_btn

Media

- zorilla_w_bg.jpg
- karabo_pg2.jpg
- karabo_pg1.jpg

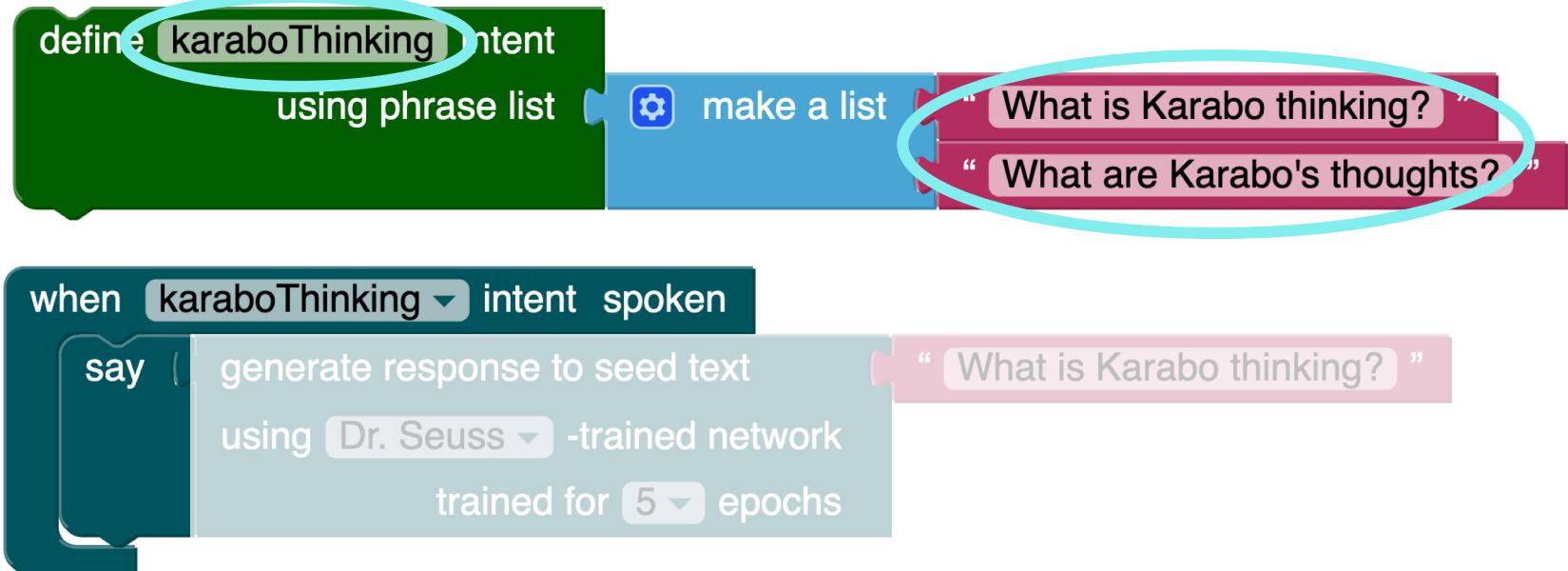
Upload File ...



Sheila's Story



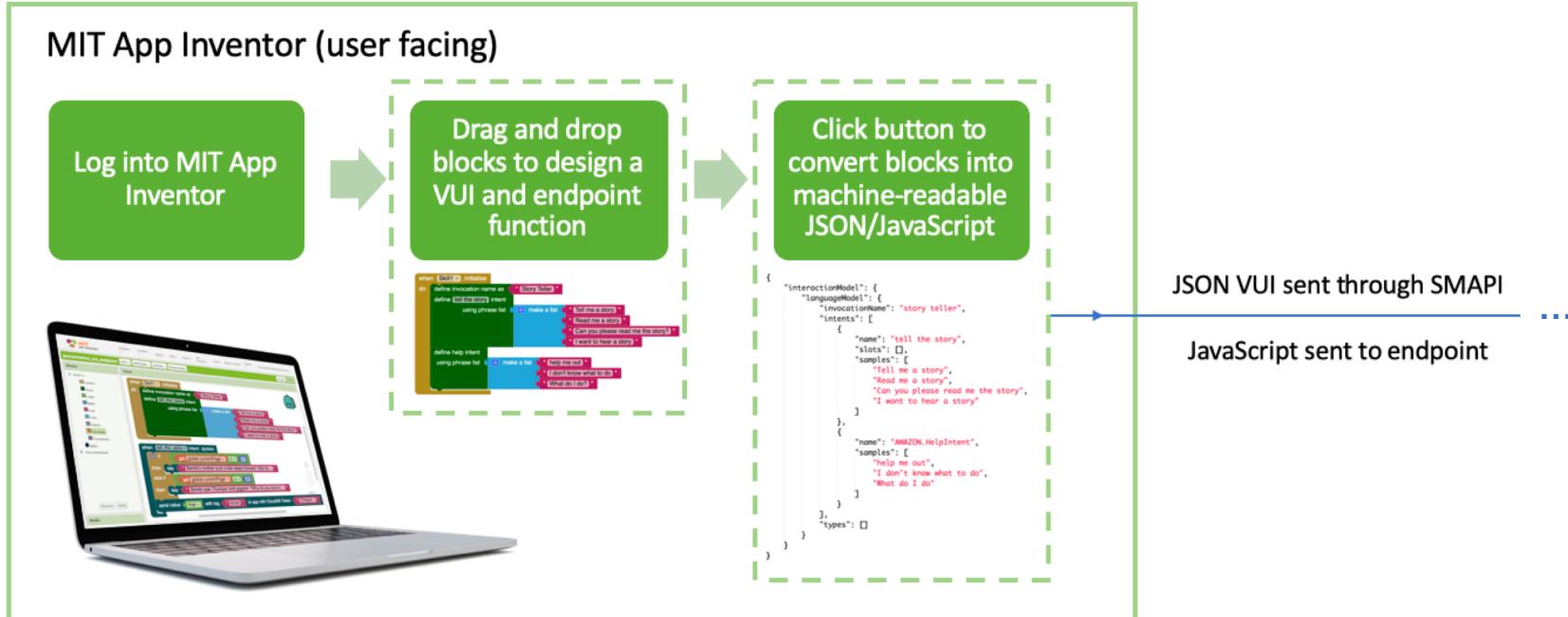
Sheila's Story



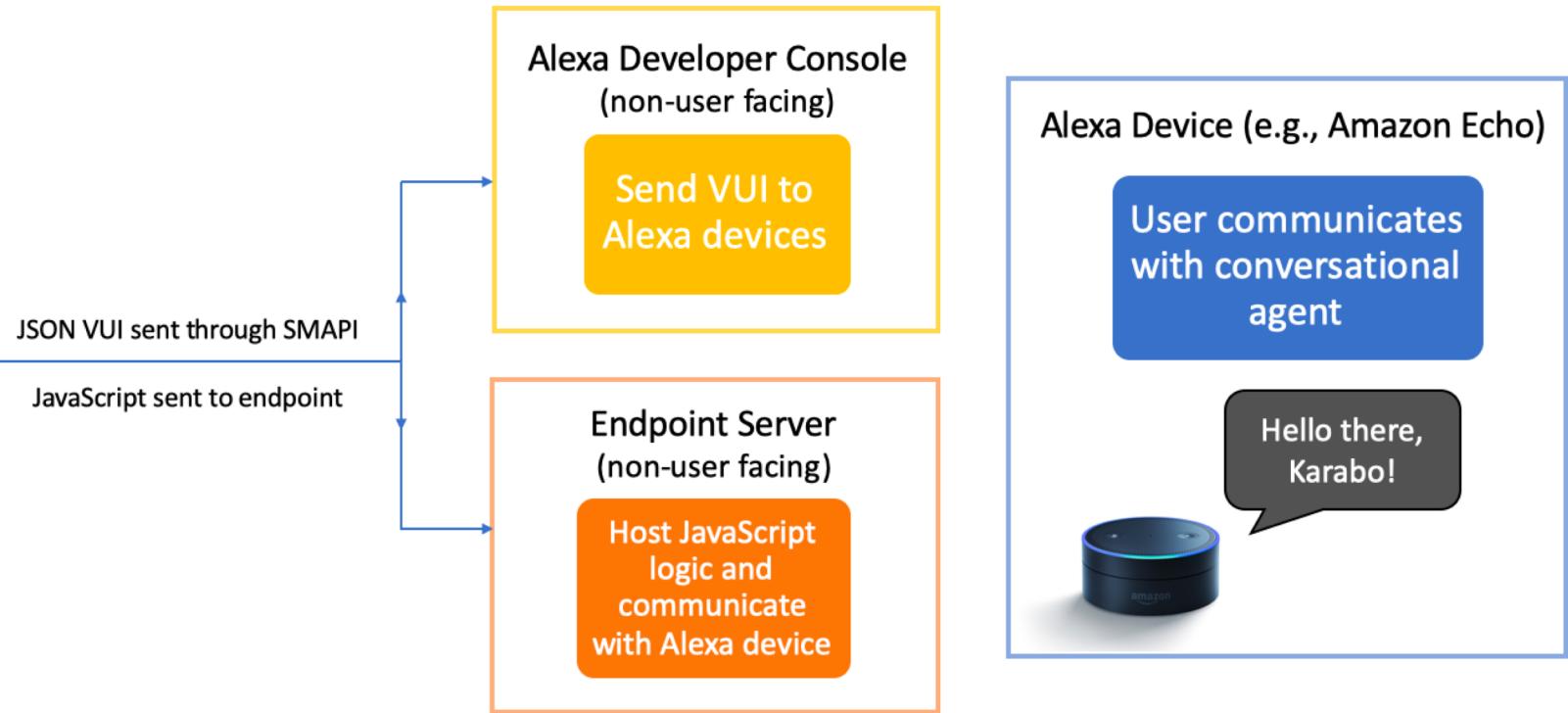
How it works

Demo of conversational AI
interface with Alexa

User Workflow



User Workflow



Blocks

Built-in

-  Control
-  Voice
-  Logic
-  Math
-  Text
-  Lists
-  Colors
-  Variables
-  Procedures



QASkill

Any component

Rename

Delete

Media

Upload File ...



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Show Warnings

Viewer



1. Initialize the Alexa skill





Curriculum

Computational thinking and
artificial intelligence.

Computational Thinking

Events

- E.g., When you hear, 'Hello', invoke the *hello_world* intent

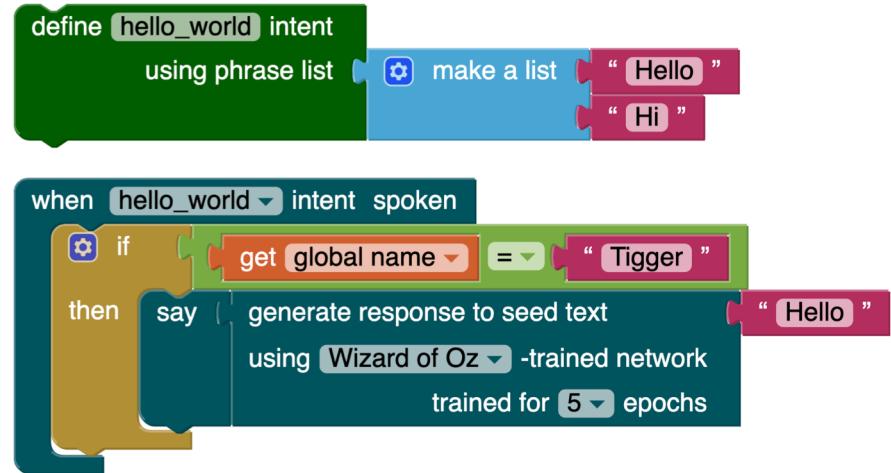
Conditionals

- E.g., If the name is 'Tigger', generate a response

Data

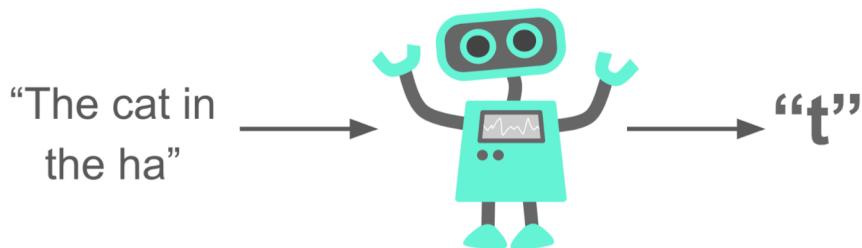
- E.g., Send button-press data from app to Alexa skill

...



Artificial Intelligence

Machine Learning with LSTM



Classification

- E.g., determine intent

Prediction

- E.g., predict best next letter

Generation

- E.g., generate text block

Training, testing, validating

- E.g., vary training length

Evaluating

- E.g., question project ethics



Final Projects

Student-developed
conversational AI projects.

Positive, socially-useful projects

Can I recycle this?

- E.g., "How do I recycle this battery?"

Memory Helper

- E.g., "The word is a fruit that grows in an orchard."

Math Teacher / Calculator

- E.g., "What's nine times six?"

The screenshot shows the Alexa Developer Console interface. At the top, it says "Skill testing is enabled in: Development". Below that are three tabs: "Alexa Simulator" (which is selected), "Manual JSON", and "Voice & Tone". A language selector shows "English (US)". To the right is a microphone icon with the text "Type or click and hold the mic". The main area displays a conversation:

Tell synonym finder that it grows in an orchard

(Alexa) I think you are referring to an apple

Tell synonym finder that it grows in a field

(Alexa) I think you are referring to a blueberry

Tell synonym finder it is blue

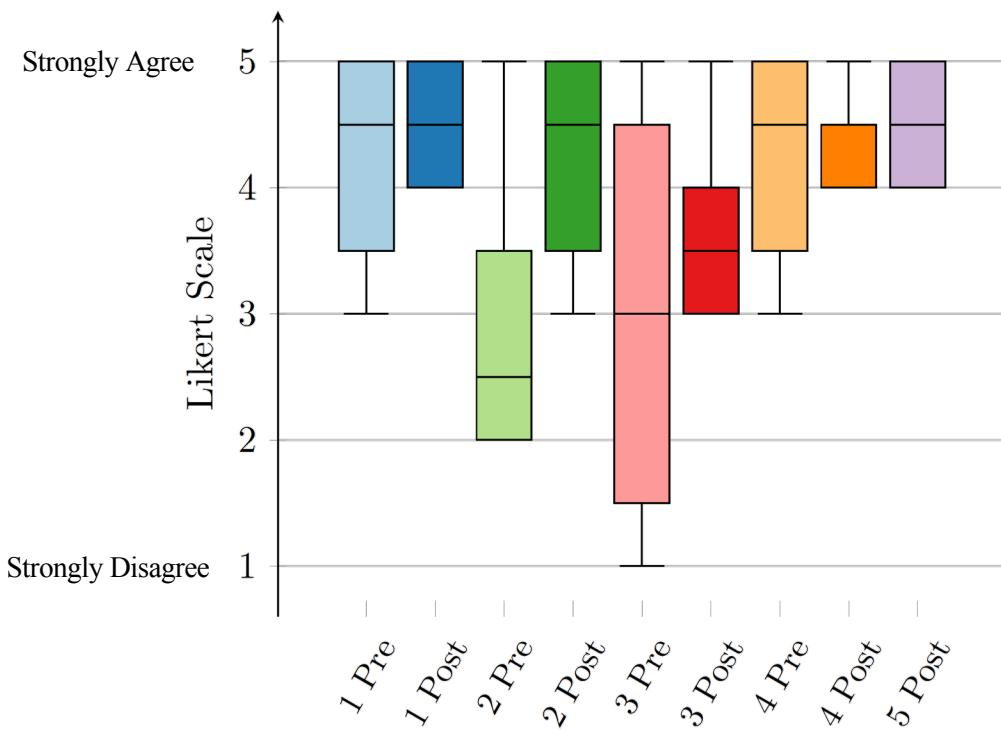
(Alexa) I think you are referring to a blueberry



Conclusions

Questionnaire and
interview observations.

Questionnaire Results



Post-workshop, students felt:

- they had learned how conversational agents decide what to say
- comfortable developing conversational AI projects
- their understanding of conversational agents increased

Student Quotes

"Machine learning evolves as it gets more experience [...]. Rule-based AI provides the same results every time."

"It was at first difficult to understand the way in which intents are defined."

"[Conversational agents] are capable to solve problems and help people."

Takeaways

Students learned about complex topics, like AI, through project-based curriculum.

Conversational AI concepts were challenging; nonetheless, students developed complex projects.

Students were optimistic about the future of conversational AI.



Next Steps

Potential future work.

Next Steps

Larger Scale

- Public interface
- Longer workshops
- Increase sample size

Voice-based Programming

- Natural language
- Voice-first
- Conversational

AI, CT Comparison

- Text-based
- Blocks-based
- Voice-based

Thank you

Special thanks to Tommy Heng, Atsu Manigar, Terryn Brunelle, Julia Gonik, Hal Abelson, and the MIT App Inventor team for making this project possible.

Want to learn more?

- appinventor.mit.edu
- jess@csail.mit.edu
- [jessvb on Github](#)