Team Voice++

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The Smartphone
Personal Assistants

What can I help you with?
Personal Assistants
Personal Assistants
Now Imagine...

Mobile and hands-free
The Problem

Personal assistants have many drawbacks
The Problem

Cannot perform any functionality during a phone call
The Problem

Not completely hands-free and mobile
The Problem

Limited to their own individual platforms
Our team sponsor

INVOCA®
The power of talk
INVOCABOT

“The world’s first on-call voice-activated phone assistant.”
INVOCABOT

Voice-activated personal assistant
"Listens" on the phone line for a keyword
“Listens” for a command
Processing Command
Current Uses of Invocabot

Set up calendar schedule

JUNE
4th

THURSDAY
Current Uses of Invocabot

- Set up calendar schedule
- Delete events
Current Uses of Invocabot

- Set up calendar schedule
- Delete events
- List events for a given day
Current Uses of Invocabot

Save audio logs of calls
When does Invocabot come in handy?
In a professional setting
Invocabot!
Invocabot! *beep*
Invocabot! *beep* Command.
Invocabot! *beep* Command. *beep*
Sample Invocabot commands

“Invocabot! Set up a meeting with Chandra at 2pm.”
Sample Invocabot commands

“Invocabot! Set up a meeting with Chandra at 2pm.”

“Invocabot! Scratch that.”
Sample Invocabot commands

“Invocabot! Set up a meeting with Chandra at 2pm.”

“Invocabot! Scratch that.”

“Invocabot! List all events for three days from now.”
Technologies Used Overview

- Amazon Web Services™
- flowroute
- FreeSWITCH
- CMU Sphinx
- JavaScript
- Java
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flowroute
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CMU Sphinx

JavaScript
Java
Flowroute

PocketSphinx Listening

Caller

Callee

FreeSWITCH
Flowroute

FreeSWITCH

PocketSphinx Listening

Command detected and completed

Java TCP Sockets

Caller

Callee
FreeSWITCH

Flowroute

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Command detected and completed

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Command detected and completed

Java Task Manager

Java TCP Sockets

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Java TCP Sockets

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PocketSphinx

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Java Task Manager

API feedback
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Java TCP Sockets
Java Task Manager
API
API feedback
Command detected and completed
Text-to-Speech feedback
Flowroute

FreeSWITCH

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PocketSphinx
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Text-to-Speech feedback

Java TCP Sockets

API

Java Task Manager

API feedback

API feedback

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Flowroute

FreeSWITCH

Flowroute

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PocketSphinx Listening

Command detected and completed

Java TCP Sockets

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Java Task Manager

API feedback

Text-to-Speech feedback
Pitfalls
Pitfalls

FreeSWITCH + Sphinx-4 + PocketSphinx
Pitfalls

PocketSphinx vs. Sphinx-4
Pitfalls

Media Resource Control Protocol (MRCP) Server
Challenges

Bridging two channels together properly
Challenges

Cross language communication between JavaScript and Java
Challenges

Determining API based on sentence
Challenges

Example of a grammar parse tree

```
The little boy ran quickly

can be diagramed:

<sentence>

<noun phrase>  <verb phrase>

<adjective>     <noun phrase>  <singular verb>  <adverb>

<adjective> <singular noun>

The  little  boy  ran  quickly
```
Challenges

“Invocabot! Set up an appointment at tomorrow”

Likelihood of Google Calendar API: 1.0
Likelihood of Wolfram Alpha API: 0.05
Challenges

Voice accuracy
Challenges

So how are words even recognized?
Challenges

So how are words even recognized?

HENRY  
APPOINTMENT  
MEETING
Challenges

So how are words even recognized?

HENRY  HH EH N R IY
APPOINTMENT  AH P OY N T M AH N T
MEETING  M IY T IH NG
### Challenges

So how are words even recognized?

<table>
<thead>
<tr>
<th>Word</th>
<th>Pronunciation</th>
</tr>
</thead>
<tbody>
<tr>
<td>HENRY</td>
<td>$\text{HH EH N R IY}$</td>
</tr>
<tr>
<td>APPOINTMENT</td>
<td>$\text{AH P OY N T M AH N T}$</td>
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**INVOKE BOT?**
### Challenges

#### Dictionary

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<td>IH N V OW K AH B AO</td>
</tr>
<tr>
<td>INVOKEBOT2</td>
<td>IH N V AA K AH B AO T</td>
</tr>
<tr>
<td>INVOKEBOT3</td>
<td>IH N V AA K AH B AO</td>
</tr>
<tr>
<td>INVOKEBOT4</td>
<td>IH N V OW K AH B AO D</td>
</tr>
<tr>
<td>INVOKEBOT5</td>
<td>IH N V OW K AH B AA T</td>
</tr>
<tr>
<td>INVOKEBOT6</td>
<td>IH N V OW K AH B AA D</td>
</tr>
<tr>
<td>INVOKEBOT7</td>
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## Challenges

### Dictionary

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Challenges

Dictionary

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| INVOCABOT2 | IH N V AA K AH B AO T |
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| INVOCABOT7 | IH N V OW K AH B AA   |

Grammar

```java
#JSGF V1.0;

grammar invocabot;

<invocabot> = [ INVOCABOT ];
<person> = ( /5/ CHRIS | /5/ JULIO | /10/ BELSN | /5/ CHANDRA | /5/ SHENG | /5/ PETROS | /10/ BOB) \ [AT]);
<hour> = ( [ONE | TWO | THREE | FOUR | FIVE | SIX | SEVEN | EIGHT | NINE | TEN | ELEVEN | TWELVE ] [P\ M | A M ]);

public <basicCommand> = <invocabot><command><person><hour>;
```
Possible Enhancements

Support more APIs

- Yahoo! Weather, WolframAlpha, Google Contacts, etc.
Invocabot is open source

https://github.com/pkhachatrian/voicePlusPlus
Acknowledgments

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Invoca mentors
Colin Kelley and James Brown
Questions?