



A TECHWELL EVENT

W13

Bot Testing/Testing Bots

Wednesday, October 3rd, 2018 3:00 PM

How to Automate Testing for Next- Generation Interfaces (BOTs, Alexa, Mobile)

Presented by:

Sanil Pillai

Infostretch

Brought to you by:



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Sanil Pillai

Sanil Pillai is the Director of Infostretch Labs & Strategic Insights. He is an experienced leader for digital and enterprise applications. Throughout his career he has built and managed offshore and onsite engineering teams, including managing several mobile projects for Fortune 500 clients, and has deep technical and functional expertise in the world of testing and agile. This has allowed him to speak at testing conferences in the past including STAREAST. During his time at Infostretch, Sanil has established agile development and Continuous integration methodologies, tracking metrics and monitoring processes to ensure continuous improvement in the development organization to make testing and agile more efficient and effective. Prior to Infostretch, Sanil was the Director of Project Management at AirKast, Inc. where he managed development and successful delivery of iOS, Android and Blackberry applications for clients like Disney, Univision, Salem Communications, Musicians Institute and Bloomberg. Before AirKast, Sanil held various engineering and engineering management roles with companies including Oracle, Citi and Workday.

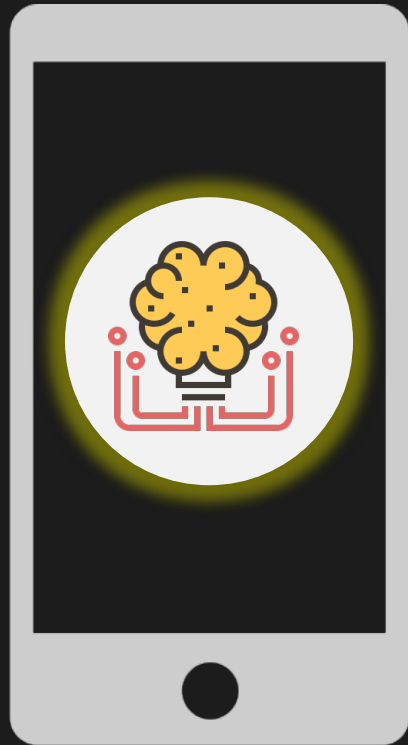


Test Automation for New Generation Digital Interfaces

Sanil Pillai | Infostretch

October 3, 2018

New Generation Digital Interfaces



New Gen. Apps



DJI Drone Reacts to Hand Gestures



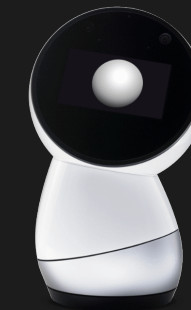
BMW Car Dashboard

Gesture Based



Amazon Alexa

Google Home



JIBO Robot

Voice Based Interactions



Apple Watch



Fitbit

Wearables

New Generation Digital Interfaces

Insomnobot-3000

Hey, Are you actually awake?

Last call for pizza. I'm getting two pies. Sometimes you need to live a little!

Can I come over? I'm hungry

Well, this escalated quickly.

Ha, I'm already wearing my pajamas anyway

Text Based Interactions

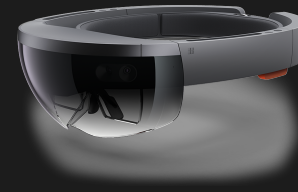


AR Apps



Car Navigation - WAYRAY

Augmented Reality



Microsoft HoloLens



Magic Leap



Oculus Rift



HTC Vive

Mixed & Virtual Reality



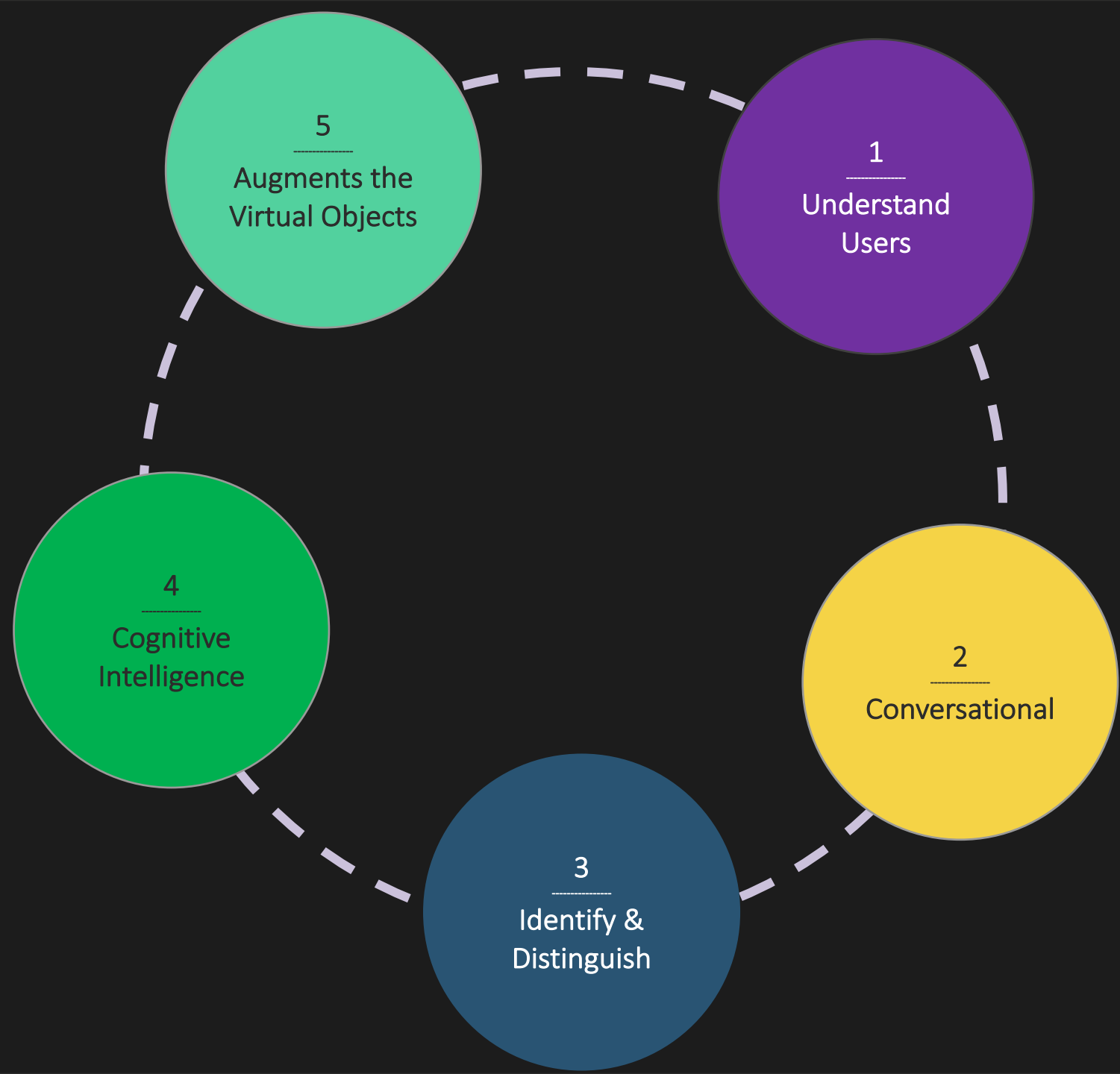
Microsoft Surface Hub



Google Jamboard

Tangible UI

Characteristics of New Generation Digital Interfaces

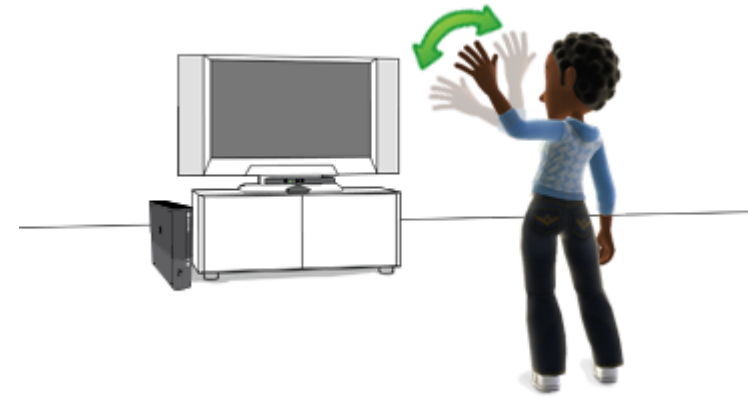


Understand Users



Google Pixel Buds

- Understands user's language
(English, Spanish, French, etc. - either spoken or written)
- Processes the natural language

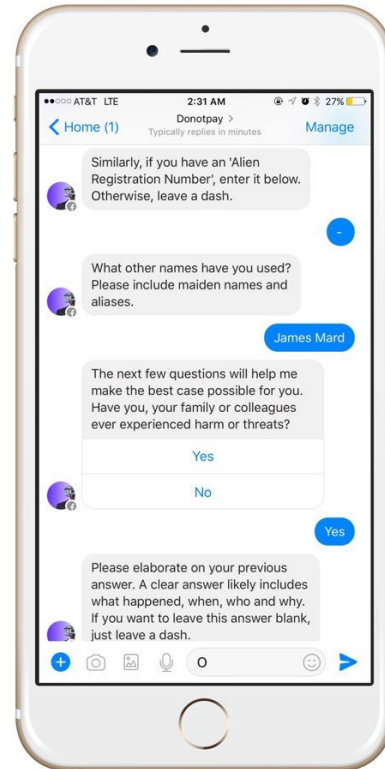


Microsoft Kinect XBOX

- Understands Gestures of User
- Be the part of user's life

Conversational

- Understands User's Natural Language (NLP)
- Replies to the User's query (NLG)



DoNotPay Chatbot



Capital One Alexa Skill - Voice Bot

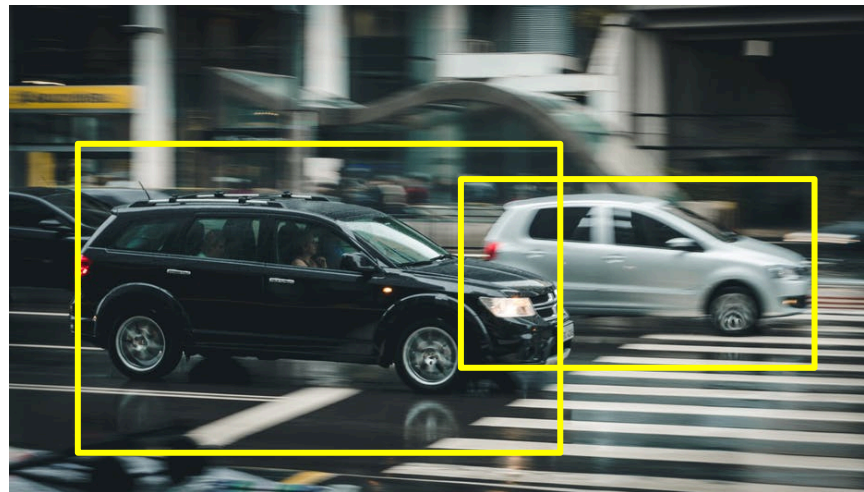
- NLP and NLG
- Text-to-speech and Intents

Identify & Distinguish



Face Detection

- Identify the object or person



Multiple Objects Detection

- Multiple objects, person, etc.
- Track the object and Handshake from one device to another



Touch ID

- Distinguish the user by verifying biometric details (Face, Fingerprint, etc.)
- Distinguish moods (Happy, Sad, etc.)

Cognitive Intelligence



Estimote Mirror

- Identify which object has been picked up and show relevant information.



Olly (Robot)

- Understands the mood of the person, and interacts accordingly. Plays user's favorite music to elevate the mood.

Virtual Objects Augments Reality



Healthcare Industry

- Doctor can get body vitals of the patient instantly via smart glasses.
- Data with contextual information helps to improve efficiency



Retail Industry



- Customer can place the object in the home environment before purchasing it.
- View from different angle can help customer to take informed decision.

A person is seen from behind, holding a large, glowing paper lantern. The lantern is lit from within, casting a warm orange and yellow light. The person is standing on a beach or near water, with the sunset sky in the background. Several birds are flying in the sky above. The overall scene is peaceful and evocative.

What do bugs in these interfaces look like?

#NexGen-Interface-QualityMatters

Passport photo

Select photo  

X The photo you want to upload does not meet our criteria because:

- Subject eyes are closed

Please refer to the technical requirements. You have 9 attempts left.

Check the photo [requirements](#).

Read more about [common photo problems and how to resolve them](#).


After your tenth attempt you will need to start again and re-enter the CAPTCHA security check.


Reference number: 20161206-81

Filename: Untitled.jpg

If you wish to [contact us](#) about the photo, you must provide us with the reference number given above.

Please print this information for your records.

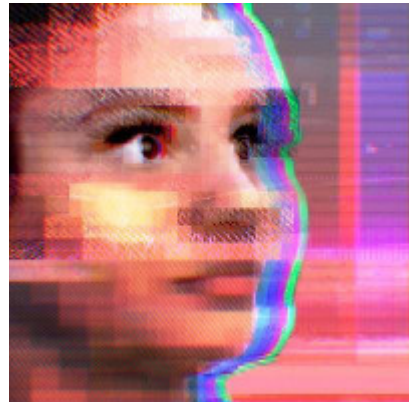
Print 



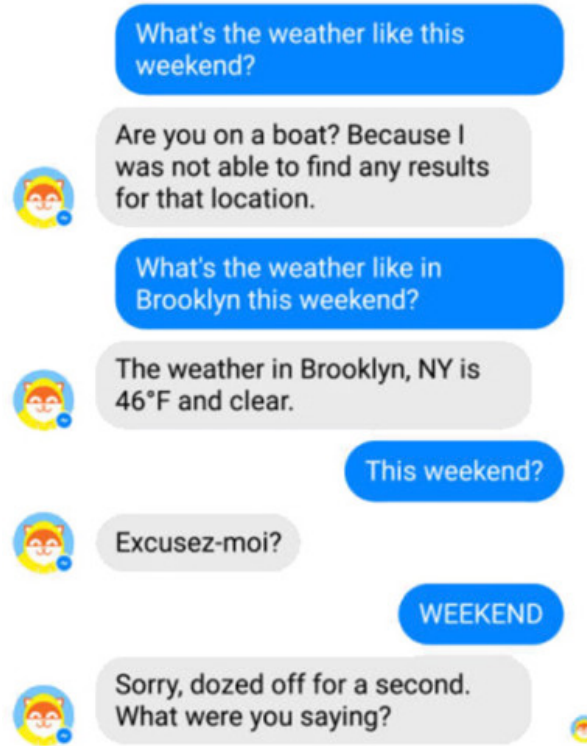
New Zealand passport robot tells applicant of Asian descent to open eyes

Source: <https://www.reuters.com/article/us-newzealand-passport-error/new-zealand-passport-robot-tells-applicant-of-asian-descent-to-open-eyes-idUSKBN13W0RL>

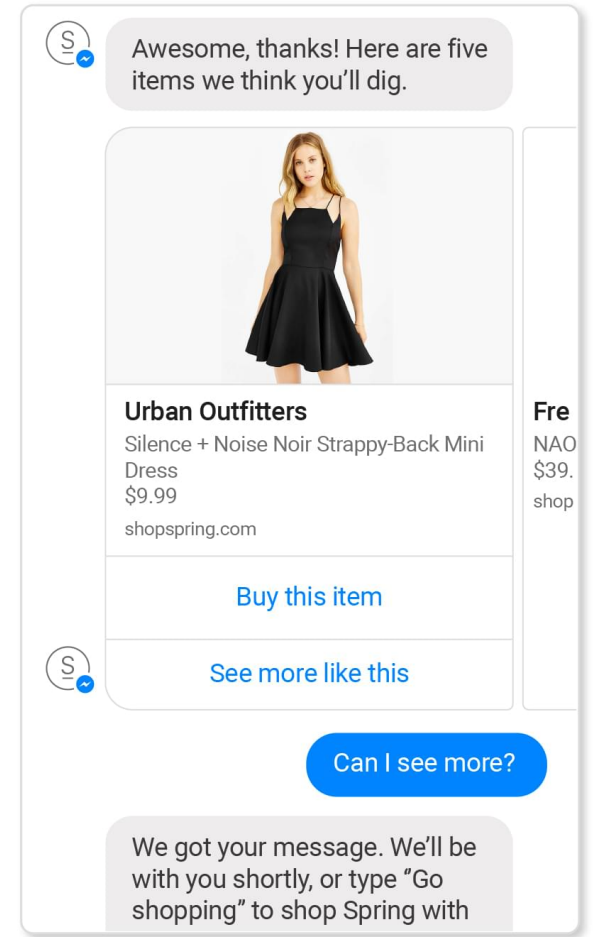
#NexGen-Interface-QualityMatters



Tay Bot



Poncho Chatbot



Source: Multiple Images from <https://chatbot.fail/>

#NexGen-Interface-QualityMatters



Gavin Hightower
@GavinHightower

Follow

Lying in bed about to fall asleep when Alexa on my Amazon Echo Dot lets out a very loud and creepy laugh... there's a good chance I get murdered tonight.

9:46 PM - 25 Feb 2018



ashleigh
@ashleighcorby

Follow

Scariest thing just happened: I'm watching the biathlon for the olympics and I said "it must be even harder for them because it's a flat surface" and my Amazon alexa LAUGHED out of no where and it was such a creepy laugh and my mom and I lost it

12:31 PM - 18 Feb 2018

Amazon admitted Alexa was making terrifying laughing sounds



Amazon AI Speaker throws "Her own Party" in empty flat, forcing police to break in.

Source: <https://www.independent.co.uk/life-style/gadgets-and-tech/news/amazon-alexa-echo-speaker-music-how-to-control-hamburg-germany-police-oliver-haberstroh-a8048771.html>

Popular New Generation Digital Interfaces & Automate Testing for Quality Assurance



New Generation Mobile Apps



Conversational UI



Augmented Reality

Testing New Generation Mobile Applications



Testing Challenges of the New Generation Mobile Applications

BLE Connected Devices

Smart thing connected to Mobile app via BLE. Testing the Sync of data, scenarios like - connect, disconnect, broadcast, etc.

Limitations of Popular Tools

Location Specific Apps

Certain actions get triggered based on the device location, e.g. A job can be started only when that specific location coordinates are found.

Image Processing

Automating the Image Processing based Apps where image based actions to be taken - OCR, Scanning Check, etc.

Date and Time

Smart application that allows users to avail the discount coupons for certain duration (date & time).

Complex to Instrument Code for Automation

Biometric Authentication - Automate Testing

Peripheral Devices or Triggers

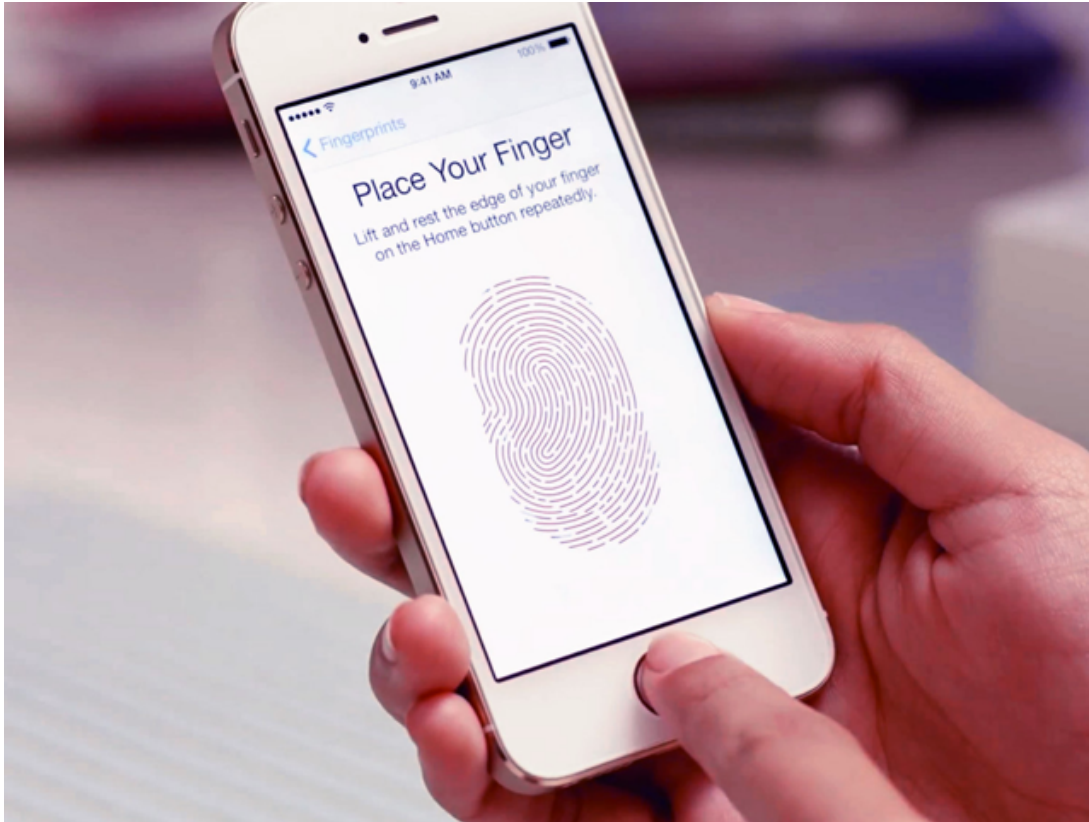
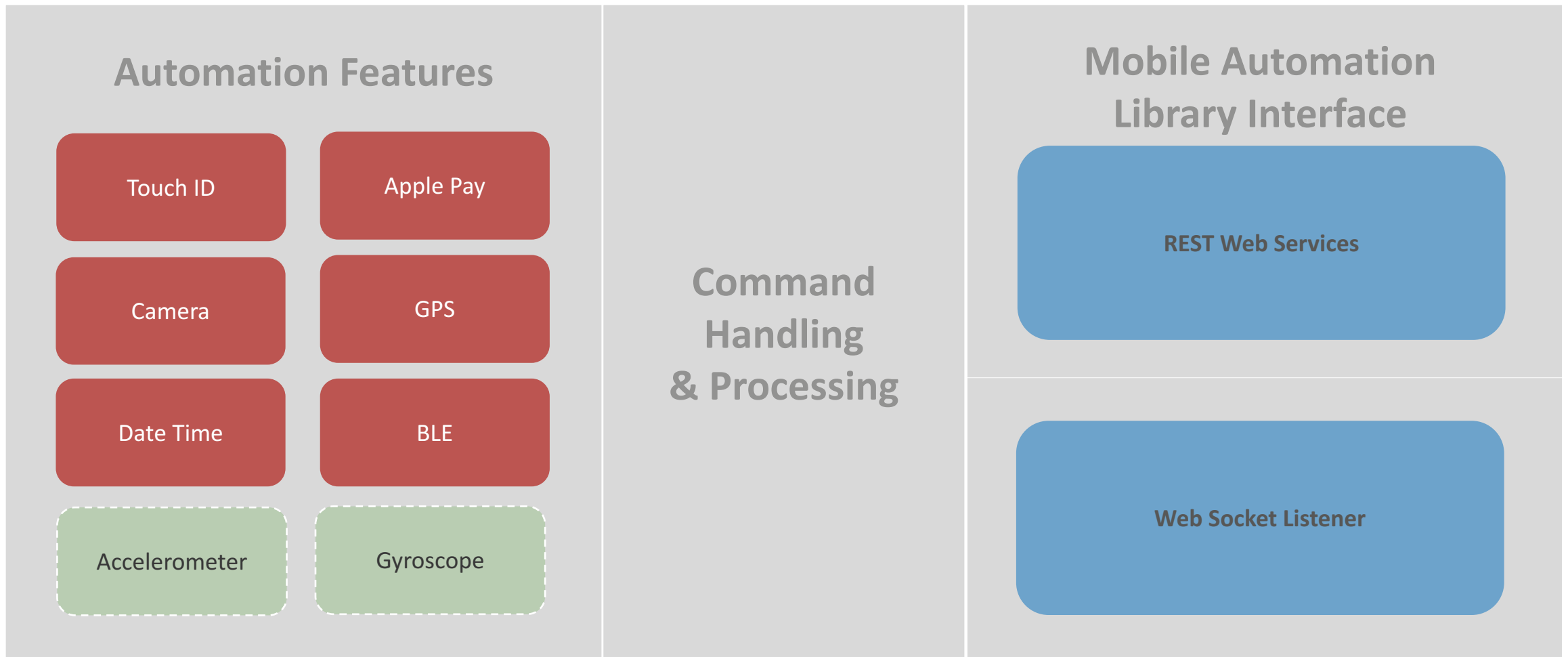


Image Source: https://www.imore.com/sites/imore.com/files/styles/larger/public/field/image/2013/09/iphone_5s_touch_id_fingerprint_video_hero_4x3.jpg?itok=bhma0a7k

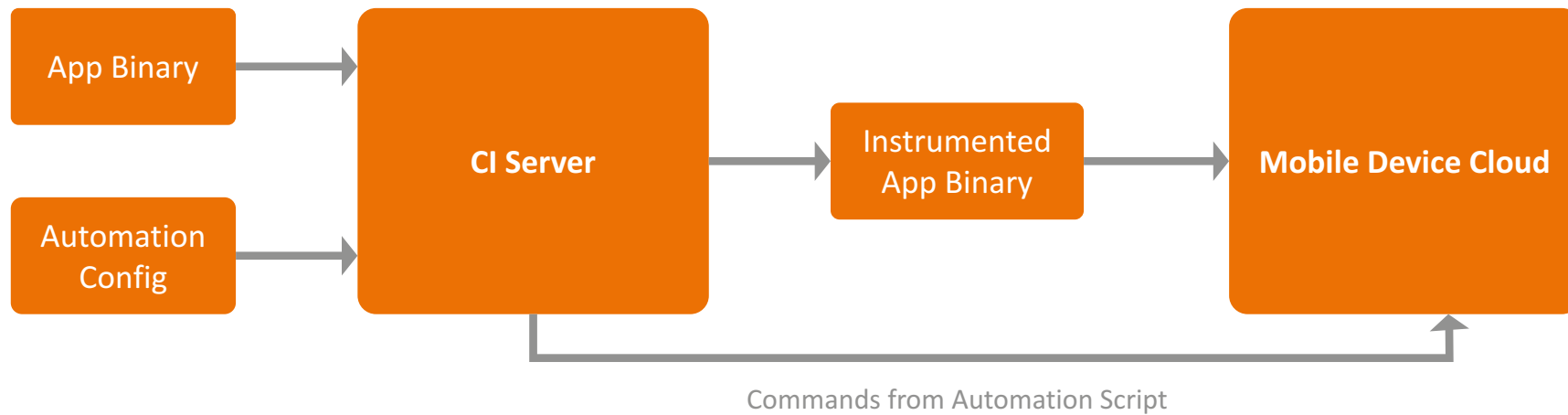
Authenticate User & Take Actions

- Fingerprint Scanning
- Authenticate & Trigger Action
- Example Use case:
 - Fund transfer authentication via TouchID Verification of User.

Automation Library Approach



Automation Approach



A photograph of two women sitting on the ground in a forest, next to a campfire. The woman on the left is wearing a black vest over a light-colored long-sleeved shirt and is holding a smartphone. The woman on the right is wearing a colorful striped sweater and is holding a small cup. The background shows tall trees and a misty atmosphere. The text 'Testing Conversational UI' is overlaid in white on the left side of the image.

Testing Conversational UI

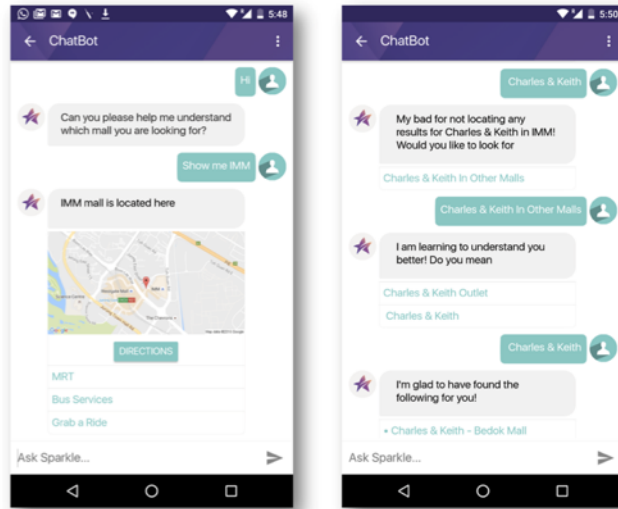


Image Source: <https://ncmedia.azureedge.net/ncmedia/2017/11/app-1.png>

Chat Bot

Tell Reception Bot, **Acme International** team is here

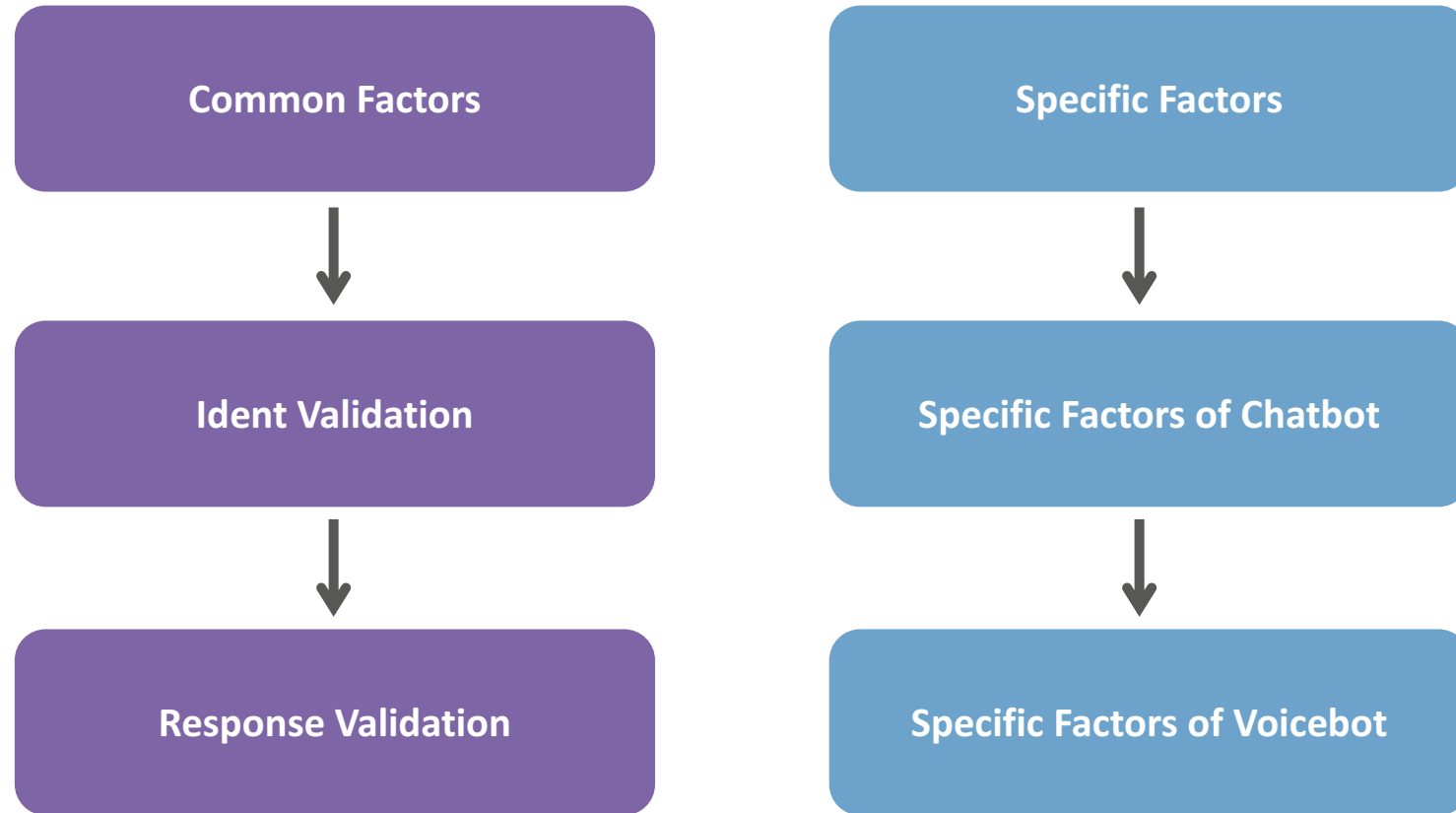


Welcome to **Infostretch Corporation**.
Hope you had a pleasant drive.



Voice Bot

Nuances of Bot Testing



Factors to be tested for Chatbot

Different Response – Same Query

Smart bots would react differently to the same query. When a user mentions “thanks” it would reply as – “Welcome” or “My Pleasure” or “No problem”

Response time from bot

How much time your bot is taking to respond back to your user’s queries. Timeout defined for the bot response must also be aligned to that during automation

Bot’s understanding of intents

Different users asks the same query in different ways. User 1 asks – “Growth of my portfolio”
User 2 asks “percentage change in my portfolio”

Multiple Queries in a single sentence

How does your bot handles the multiple queries in single statement? User asks – Show me the suspicious transactions value and total loss in 2017

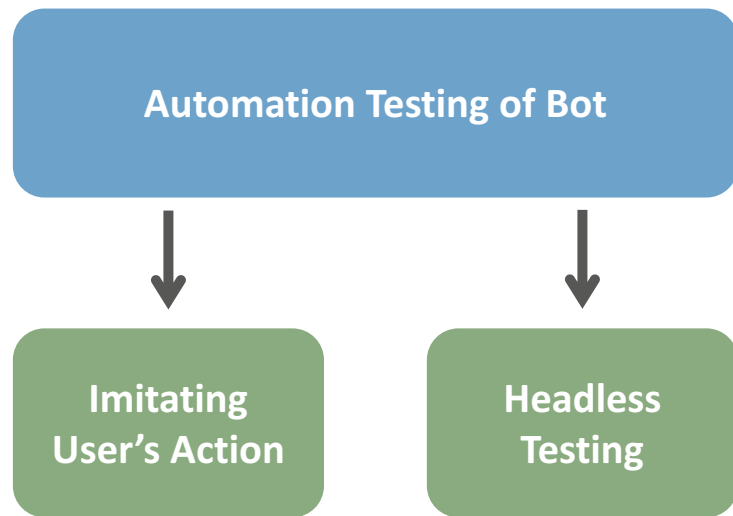
Understanding Typo Errors

How far a bot can understand the the typo error from a user without polluting with other intent.

Mixed Language Queries

Can your bot understand the multiple languages that has been asked? User may write - Combien avez-vous facturé pour mon POS system?

Approaches



THURS 06:58

hi

Hello, Welcome to Bot Automation Tester. I have two approaches to test your bot: via Automation and Headless Testing. Please select approach by which you want to test:

Imitating User's Action

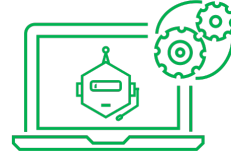
Headless Testing

Infostretch's Automation bot testing the "bot under Test"

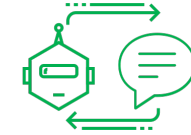
Some Desired Features in a Bot Tester



Follow the actions taken by user



Easy definition of your test cases in a simple spreadsheet template



Configurable



Integrated with the host Bot platform



Dual mode of automation (Headless and GUI)

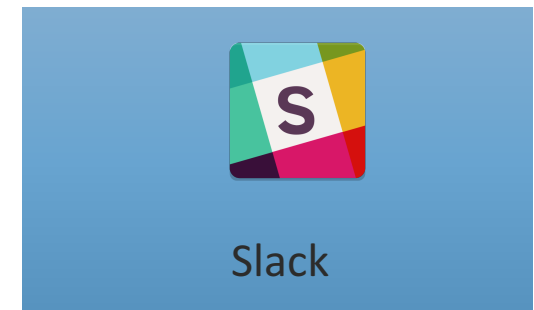
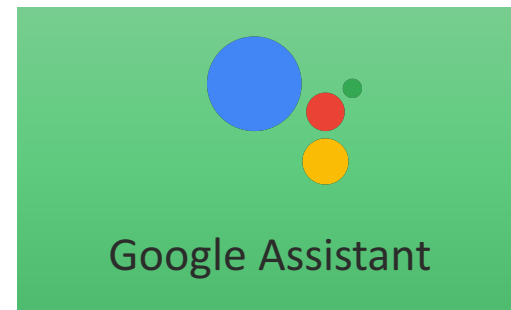
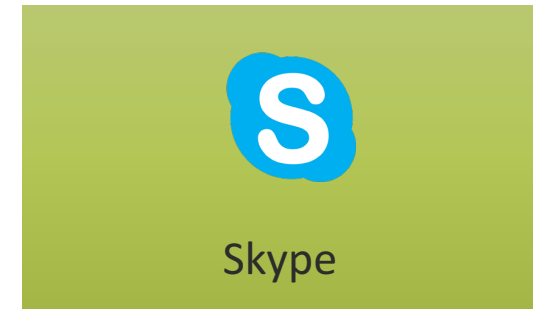
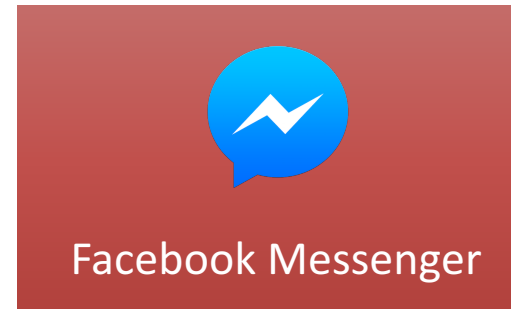


Exportable results (Ex: As a CSV)

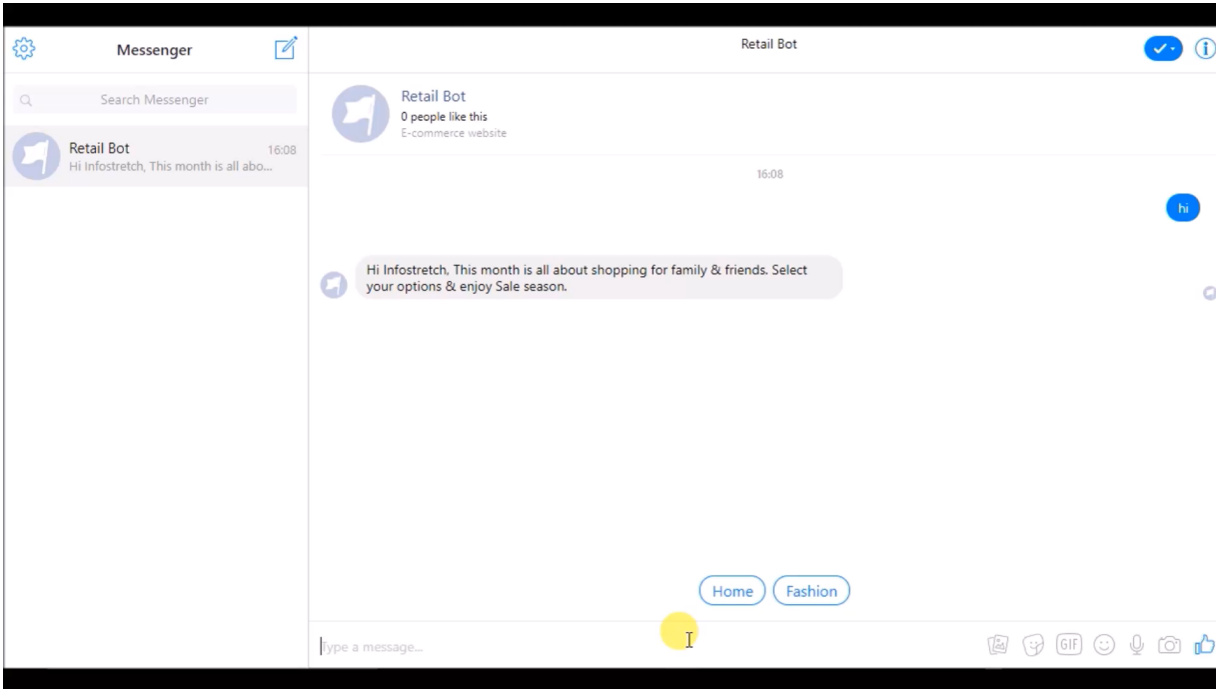
QMetry Bot **Tester**



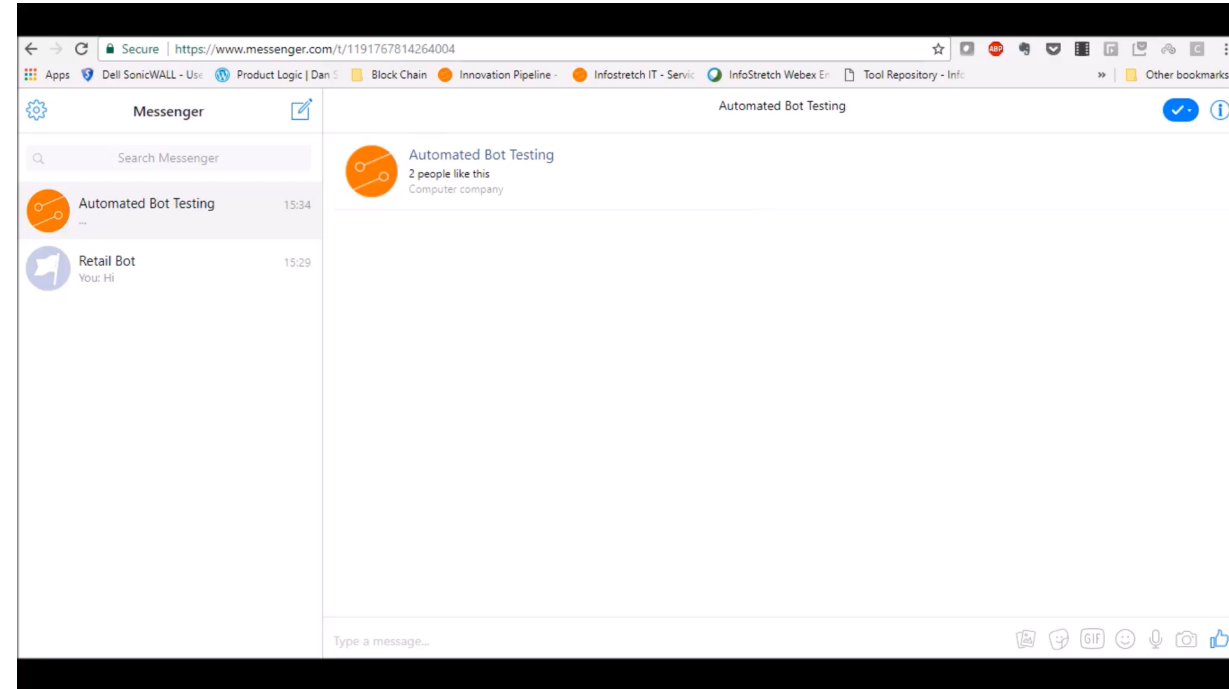
Automates complex bot testing process



Demo



Bot Under Test - Functionalities



QMetry Bot Tester

Automated Testing of Voicebot



Factors to be Tested for Voicebot

Different accents, gender

How does bot behaves for different accents & gender combinations - American female, British Male

Punctuations

How bot interprets the punctuations:
*Tools, without any, skill is helpless – vs -
Tools, without any skill is helpless ?*

Same meaning different utterance

Yes, yeah, true, exactly, certainly, etc. can be used interchangeably. Bot must understand them.

Background Noise

Check for the effect of noise on the bot's capability to understand user's intent.

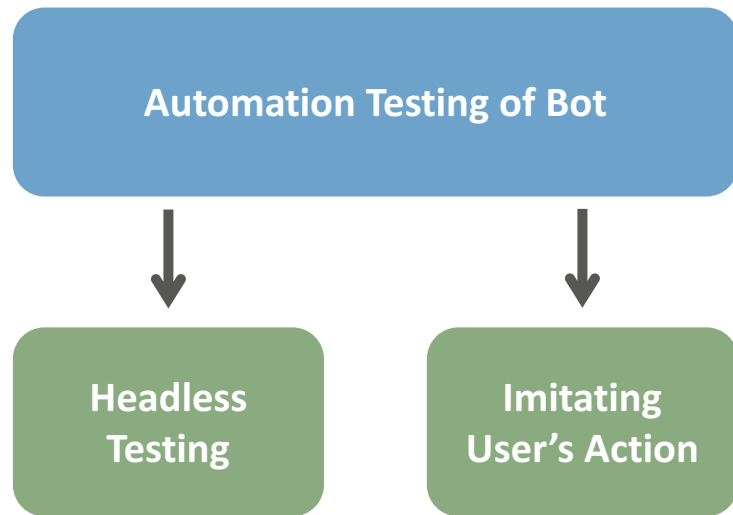
Different pronunciations

People often pronounce assessorly instead of accessory – does your bot understands the essence of user's intention?

User speaking at distance

Effect of user speaking from distance, or in case of listening device being stationary (e.g. Echo) and user is moving and speaking – how does that impact bot's behavior?

Approaches



Tell "Reception Bot",
We have Guests at
Infostretch

Infostretch's Automation bot
testing the "bot under Test"

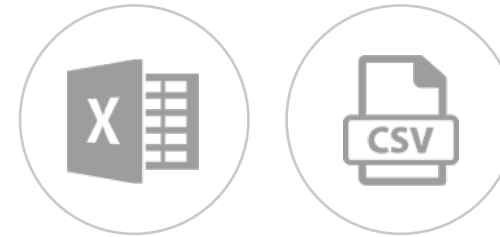
1



Headless Testing

Headless Testing - Approach

Upload Test Data using Excel/CSV



- ✓ Infostretch Framework will create input JSON with Intent and make API call to AWS Lambda function of Alexa based Voice Bot under test.
- ✓ Captures the response of the bot and compares with the response data mentioned in Test Data excel/CSV
- ✓ A report would be generated for the testing results.

Demo

	A	B	C
1	User Action	User Data	BOT DATA (expected)
2	Speak	Alexa, open event advisor	Welcome, I can suggest interesting events and activities for you based on your hobbies and interests. You can also set your preferences like city and interests. What would you like to do?
3	Speak	Set preferences	You can set your hobbies and interests like, music, sports, food, movies, technology, Do you want to know more hobbies and interests?
4	Speak	No	You have set your hobbies and interest as music sports. Do you want to reset it and set new choices?
5	Speak	Yes	What are your hobbies and interests?
6	Speak	Music, Sports	Ok, You have set California as the current city you live in. Do you want to change it?
7	Speak	Yes	Which city you live in?
8	Speak	California	Thanks, I have updated your preferences successfully.
9	Speak	Alexa, ask event advisor to suggest me for last week of december in Boston	Here are few events that you may like : <break time='1s'/> Gary Hoey in Salisbury on <say-as interpret-as='date'>2017-12-02 08:00 PM</say-as> <break time='1s'/> Maximo Park in Allston on <say-as interpret-as='date'>2017-12-01 08:00 PM</say-as> <break time='1s'/> Music in the Meeting House December 2 in Amesbury on <say-as interpret-as='date'>2017-12-02 12:00 AM</say-as> <break time='1s'/> Do you want to know few more events?
10	Speak	No	
11	Speak	Alexa, ask event advisor to suggest me for last week of december in Seattle	Here are few events that you may like : <break time='1s'/> Zepparella in Seattle on <say-as interpret-as='date'>2017-12-01 07:00 PM</say-as> <break time='1s'/> Zepparella in Seattle on <say-as interpret-as='date'>2017-12-01 11:00 PM</say-as> <break time='1s'/> Run or Wine August 2017 in Woodinville on <say-as interpret-as='date'>2017-12-01 12:00 AM</say-as> <break time='1s'/> Do you want to know few more events?
12	Speak	No	
13			
14			
15			
16			
17			

2

Imitating User's Action - Approach

Intent Testing



Test Suite with Test cases running in sequence



Utterances as input (pre-recorded/runtime generated using third-party TTS API)



Change distance using Turtlebot, add Noise, etc.

Ask Automation Bot, Run Test Suite for Diagnosis

Another Approach for Voicebot Testing - Distance Factor

- Check out the effect of the distant sound on your Voice BOT
- Add Noise or any other parameters to test NFR
 - Background Noise,
 - Change in Voice Pitch,



1. Test Case 1 ✓
2. Test Case 2 ✓
3. Test Case 3 ✓
4. Test Case 4 ✗
5. Test Case 5 ✓
6. Test Case 6 ✓



Testing Augmented Reality Applications

Factors to be Tested for Augmented Reality

Environmental Conditions

Low lighting may affect behavior of AR apps as Scene recognition engine would not recognize required objects under low light.

Device under motion

Once an object is placed, it should be steady to that position, in spite of user's movement.

Placement of Object

Some object needs to be placed only if enough surface is detected. While, some the objects (e.g. Glasses) to be placed only when specific item (e.g. eyes) are detected

Augmented Object Dimensions

Any object placed into real world must have realistic dimension. (e.g. Furniture app, once table is placed into real world, dimension should match to actual table.)

User's Interactions

Capturing the user's interactions with the objects - e.g. Pinch & Zoom, swipe, long press, double tap, etc.

Others

AR App involves many compute & memory intensive tasks like Recognizing scene (Computer Vision), Rendering of 2D/3D objects into real world camera stream.

AR App Testing - Approach



Input the sample images of AR objects - Train the ML model using Tensorflow



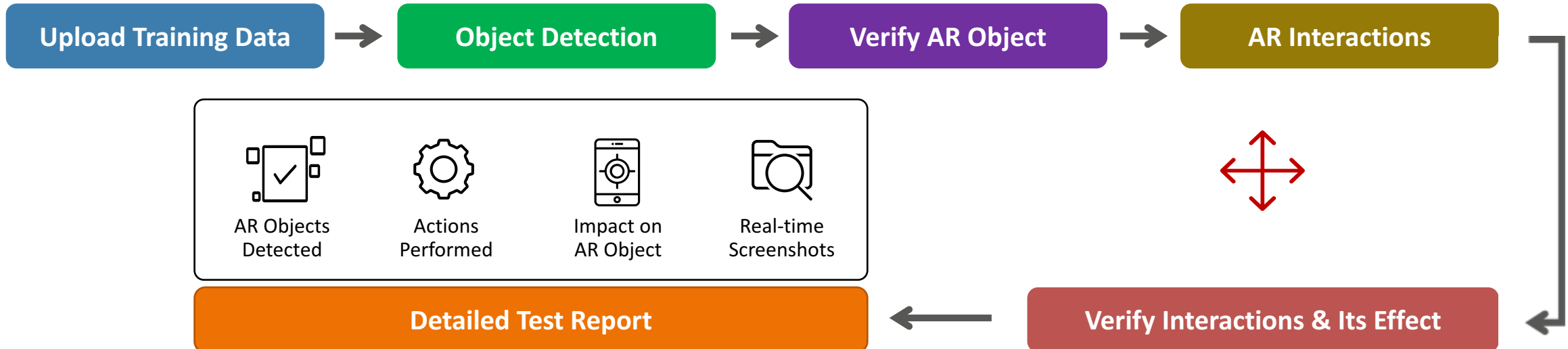
Detect objects in the AR application



Validate the AR Objects



Simulate the user interaction for AR objects

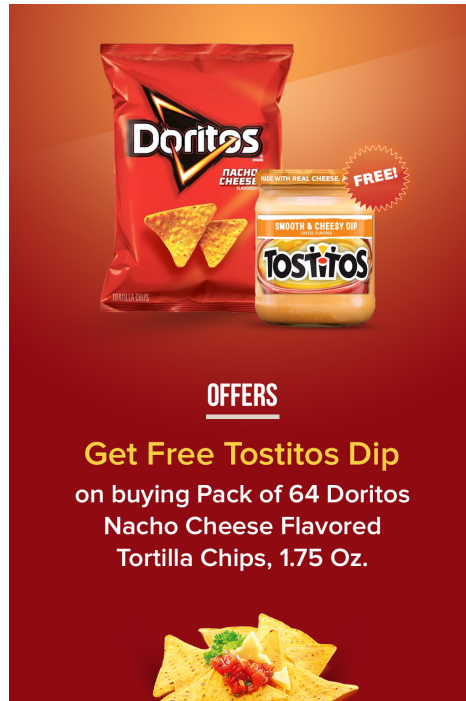


Generate Reports using QAF

Verify interactions like object movement, reorientation, etc. and its outcome based on interactions

Training Set comparison with Actual

Training Data Set for Expected Output



PRODUCT COMPARISON

Calories	140 cal	150 cal	150 cal
Price	\$3.13	\$3.98	\$2.17
Carbohydrate	16g	16g	18g
Varieties/Flavors	2	5	3

Real-time Screenshots of automated interactions



AI for AR App Testing



- 1 Object Identification
- 2 Distinguish right Object
- 3 User's Gestures Imitation
- 4 Identify new Augmented Object & Rectify

A woman with long brown hair is wearing a VR headset and holding two VR controllers. She is looking to the left. The background is a dark, textured wall with vertical lines. The text "Testing Virtual Reality Applications" is overlaid in white, bold font across the middle of the image.

Testing Virtual Reality Applications

Factors to be tested for Virtual Reality

Content

Video

Audio

Graphics

Text

Animations

Stitching

Tearing

Motion Lag

Blur

Frame Rate

Performance

Total frame time

Application dropped frames

Runtime warp dropped frames

Asynchronous Space Warp (ASW) synthesized frames

User Experience

Gyroscope tracking and mapping to the application (related to end user dizziness)

User gaze/ Interaction with objects

Navigation and Content Consistency

Other Parameters

Refresh rate

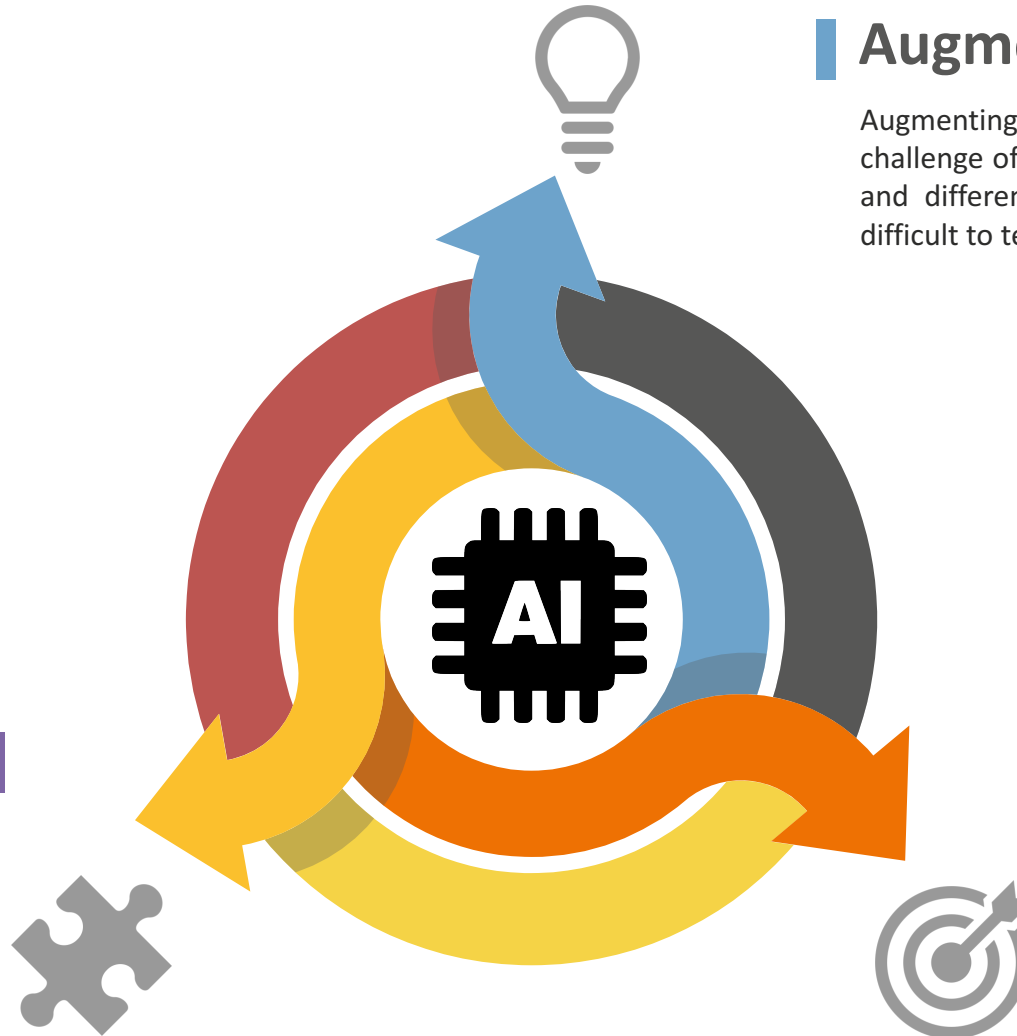
Audio to video synchronization

Motion to audio latency

What? No Machine Learning?

Advanced CUI

Conversational UI have advanced and responses of the Bot are generated by advanced level of NLG. Testing the dynamically generated responses are a challenge for automating.



Augmented Scenarios

Augmenting the information for the users has a challenge of different scenes, different objects, and different ways users would interact. It's difficult to test such scenarios.

Complex Scenarios

Different permutation & combination of the testing scenarios pose another challenge due to time constraints. Right size of the test cases & scenario without compromising the quality plays vital role.



Thank You

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