

# Advances in Business Automation

**28 JAN 2021 GovTech Talk**

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# Agenda

**1.1 Overview**

**1.2 Hard Automation vs. Soft Automation**

**1.3 New Jobs in Automation Era**

**1.4 Summary**

**1.5 Appendices**

1.5.1 NUS-ISS Learners' Intelligent Automation Projects

1.5.2 How can I apply AI to my business problem?

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### 1.5.2 How can I apply AI to my business problem?

# Automation at Home???

???

THRU  
THE  
LENS

# Air-Con?



# Robotic Vacuum?

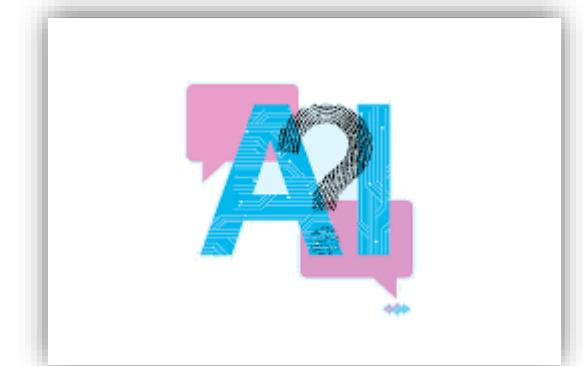
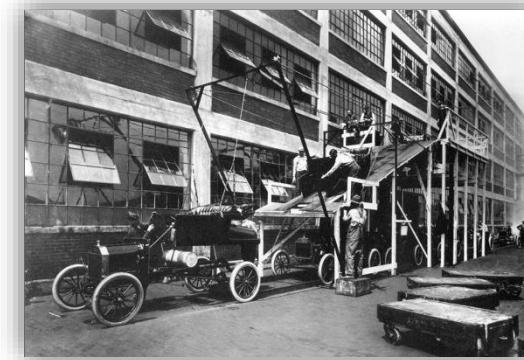


# 1.1 Overview : Automaton History

- **The evolution of task automation**
  - Mayans automating water transportation via aqueducts
  - Henry Ford's automation of the mechanical assembly line
  - Now: New age of intelligent automation.



Source  
[https://direct.astutesolutions.com/  
wp-content/uploads/2020/11/mayan-aqueducts-e1605620293474.jpg](https://direct.astutesolutions.com/wp-content/uploads/2020/11/mayan-aqueducts-e1605620293474.jpg)  
[https://upload.wikimedia.org/wikipedia/  
commons/d/d6/A-line1913.jpg](https://upload.wikimedia.org/wikipedia/commons/d/d6/A-line1913.jpg)



# 1.1 Overview : Business Automaton

## What's Automation?

- Automation is the technology by which a process or procedure is performed with **minimal** human assistance.

## Purpose of Automation?

- Make use of **automated machinery** [cost1] to produce the **most** **the need** at scale [value] with the **least** **human effort/intervention** [cost2]. E.g. Conduct 10x more GovTech sessions with 10x less ISS lecturers, by using automated machinery/technology.

**WHEN [value] > [cost1] + [cost2] THEN Automate**

## What's Business?

- A business is an organization where **people** work together. In a business, people work to **make and sell products or services** [value].

## Purpose of Business Automation?

- In a business, **people** work (**less**) [cost2] to make and sell (**more**) **products or services** [value], by using **automated machinery/technology** [cost1], e.g. RPA, AI, Robotics.

**Enterprise functions where process automation has penetrated furthest**  
 (% of respondents stating that more than half of processes have been automated)

IT operations

67

Operations/production

63

Finance

56

Customer service

33

Administration/office management

33

Procurement

33

Marketing

33

Sales

29

R&D

29

Human resources/talent

28

Legal

25

Source: The Economist Intelligence Unit

**The Economist - The advance of automation - Business hopes, fears and realities**

A survey of 502 C-suite executives

<https://automationfirst.economist.com/wp-content/uploads/2019/06/EIU-UiPath-The-advance-of-automation-briefing-paper.pdf>

## Priorities for technology implementation to meet strategic objectives

(% of respondents citing each technology as a “high or essential priority”)

IoT



AI



Software automation (eg, RPA)



Blockchain



Hard automation (eg, physical robots)



Augmented/virtual reality



Source: The Economist Intelligence Unit

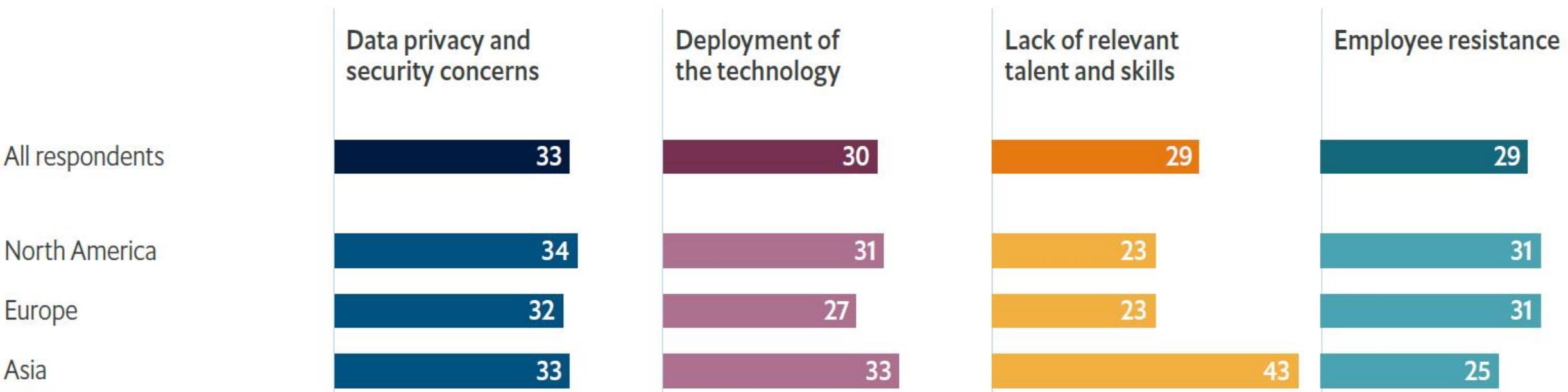
The Economist - The advance of automation - Business hopes, fears and realities

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<https://automationfirst.economist.com/wp-content/uploads/2019/06/EIU-UiPath-The-advance-of-automation-briefing-paper.pdf>

## The most difficult challenges faced in automating business processes

(top responses, out of 13 possible choices)



Source: The Economist Intelligence Unit

**The Economist - The advance of automation - Business hopes, fears and realities**

A survey of 502 C-suite executives

<https://automationfirst.economist.com/wp-content/uploads/2019/06/EIU-UiPath-The-advance-of-automation-briefing-paper.pdf>

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# 1.2 Hard Automation vs. Soft Automation

**Hard Automation using physical robots in physical environment, e.g. Factories, Singapore parks**

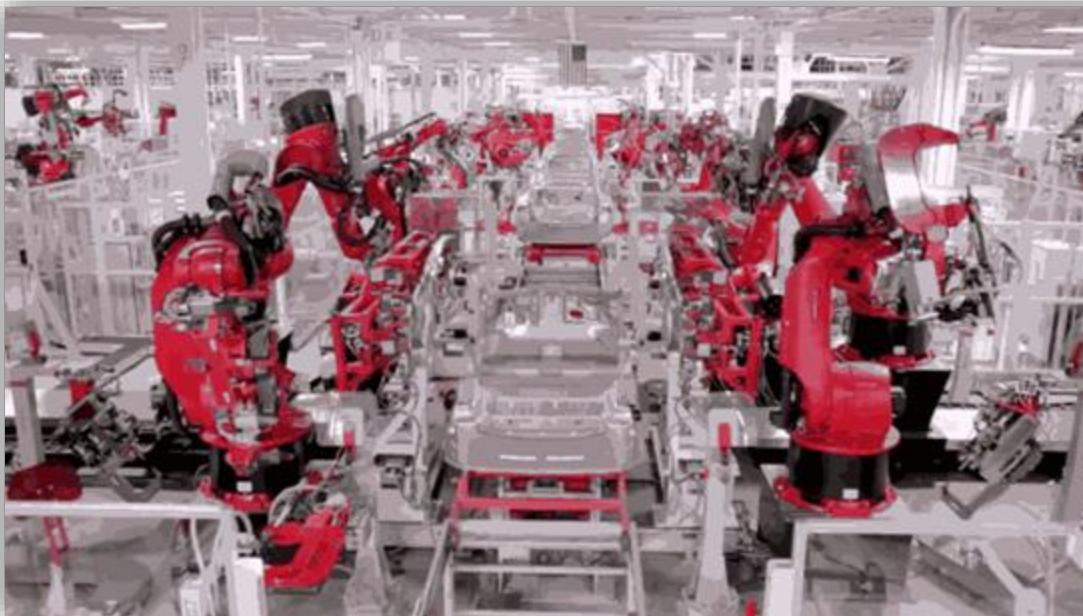
**Soft Automation using software agents in virtual environment, e.g. Email inbox, Internet Web**

- Manipulator Robotics
- Mobile Robotics
- Rule-based Automation (RPA Software Agent)
- AI-based Automation (Intelligent Process Automation IPA = RPA + AI Software Agent)

## 1.2.1 Hard Automation (Robotics)

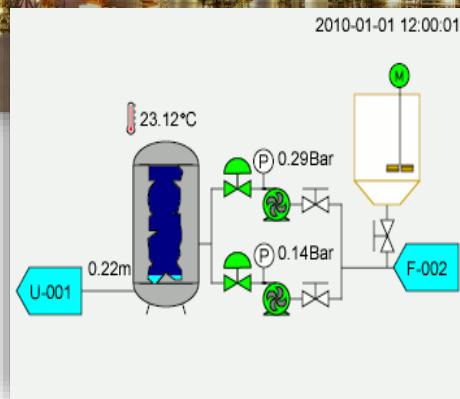
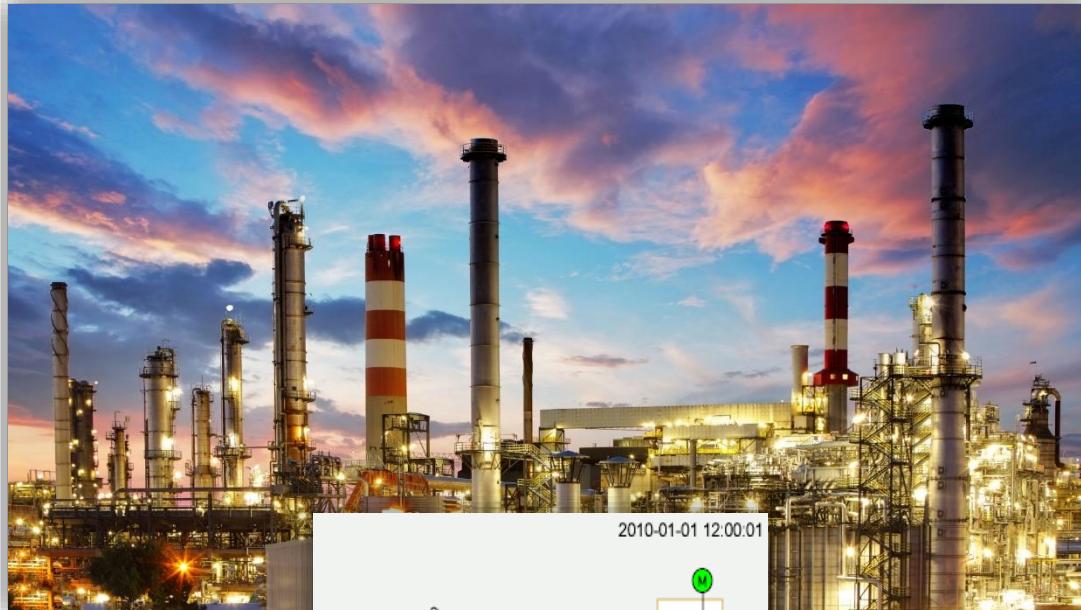
## 1.2.1 Hard Automation : Manipulator Robotics

- Automate 'Hard' Processes



## 1.2.1 Hard Automation : Manipulator Robotics

- Automate 'Hard' Processes



NEWater: A Singapore Success Story  
[https://youtu.be/DWWU-8\\_4wu0](https://youtu.be/DWWU-8_4wu0)

## 1.2.1 Hard Automation : Mobile Robotics

- Automate 'Hard' Processes



## 1.2.1 Hard Automation : Mobile Robotics

- Automate 'Hard' Processes



Airbus Skyways drone

Source: <https://airbus-h.assetsadobe2.com/is/image/content/dam/events/airshows/Airbus-skyways-project-day3-SIN2018-002.jpg>



SPOT

<https://youtu.be/viuR7N6E2LA>

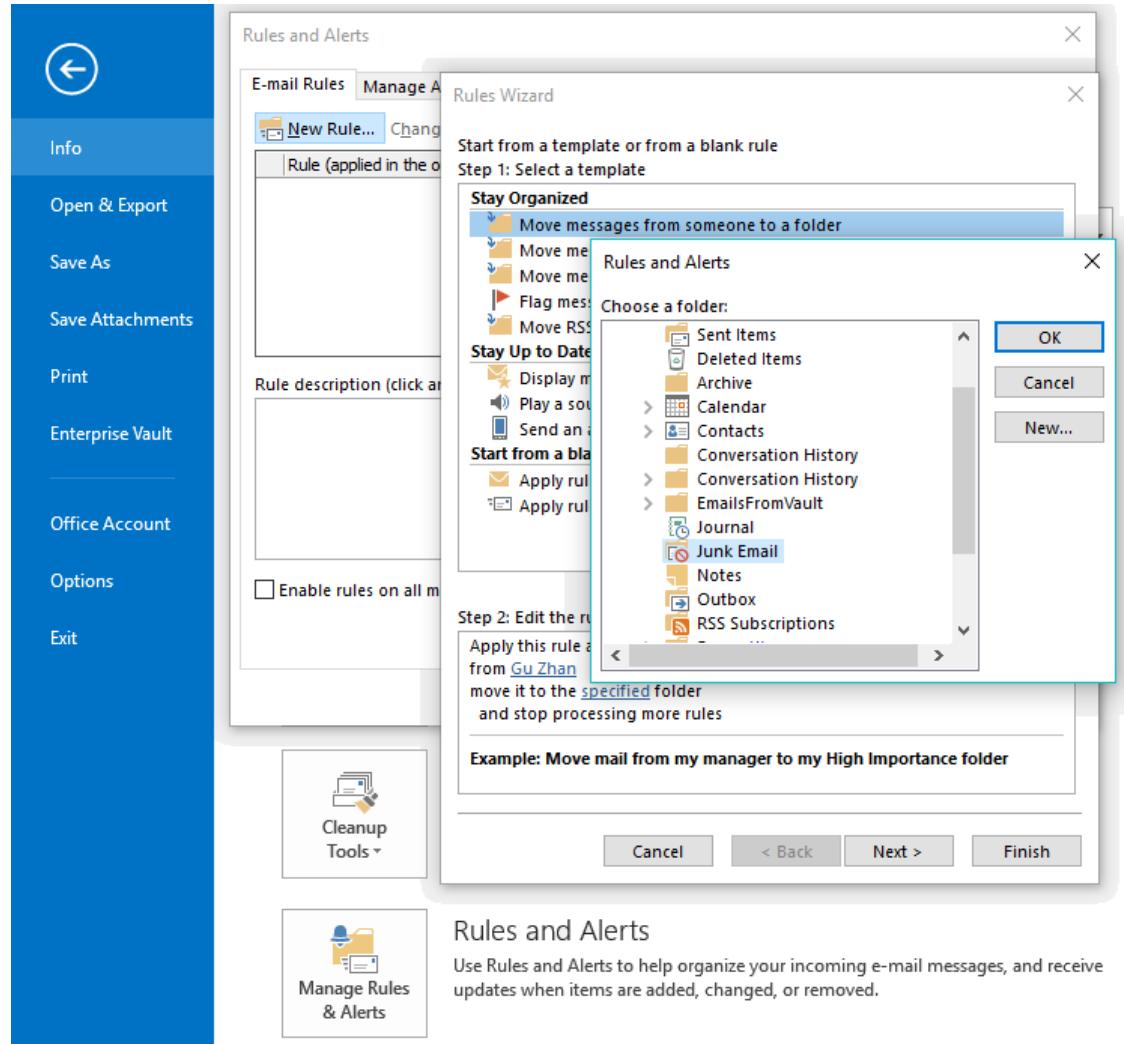
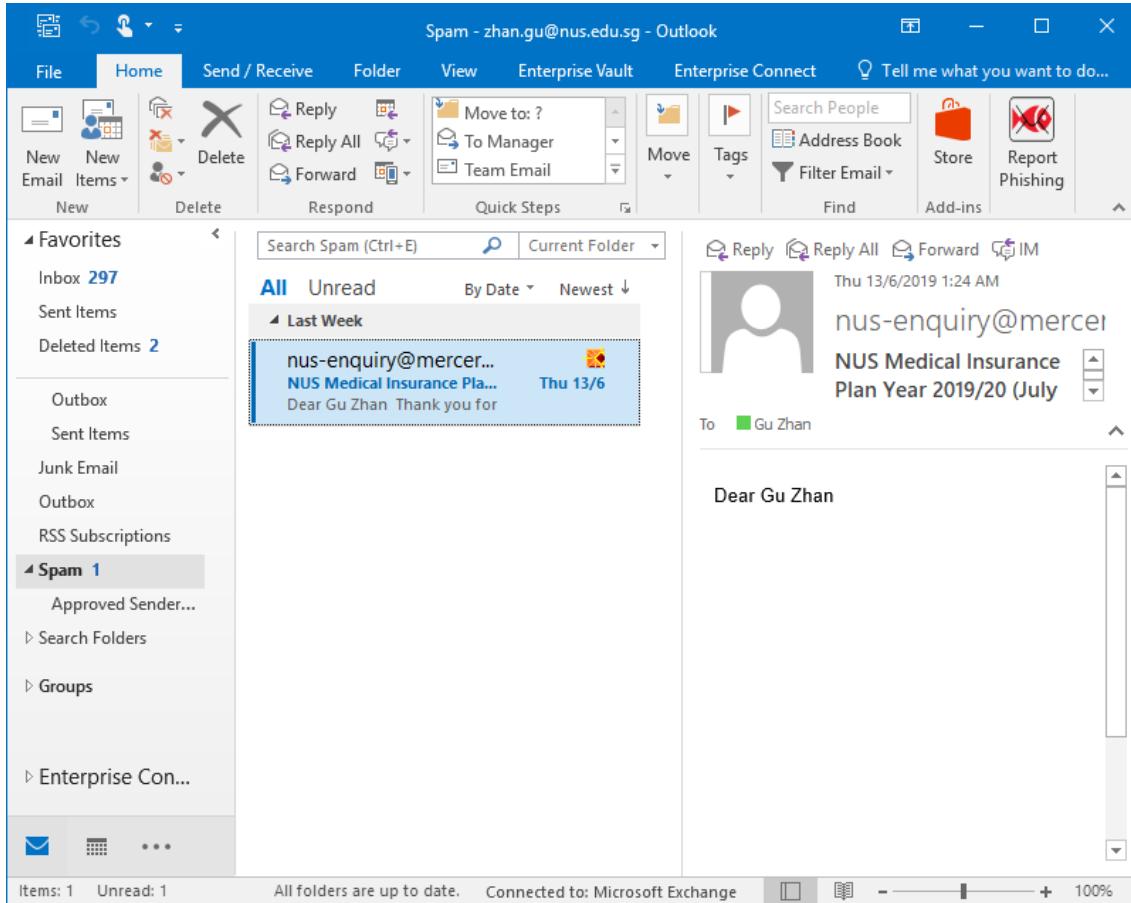
Source: <https://www.arabnews.com/node/1671696/offbeat>

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## 1.2.2 Soft Automation (Software Agents)

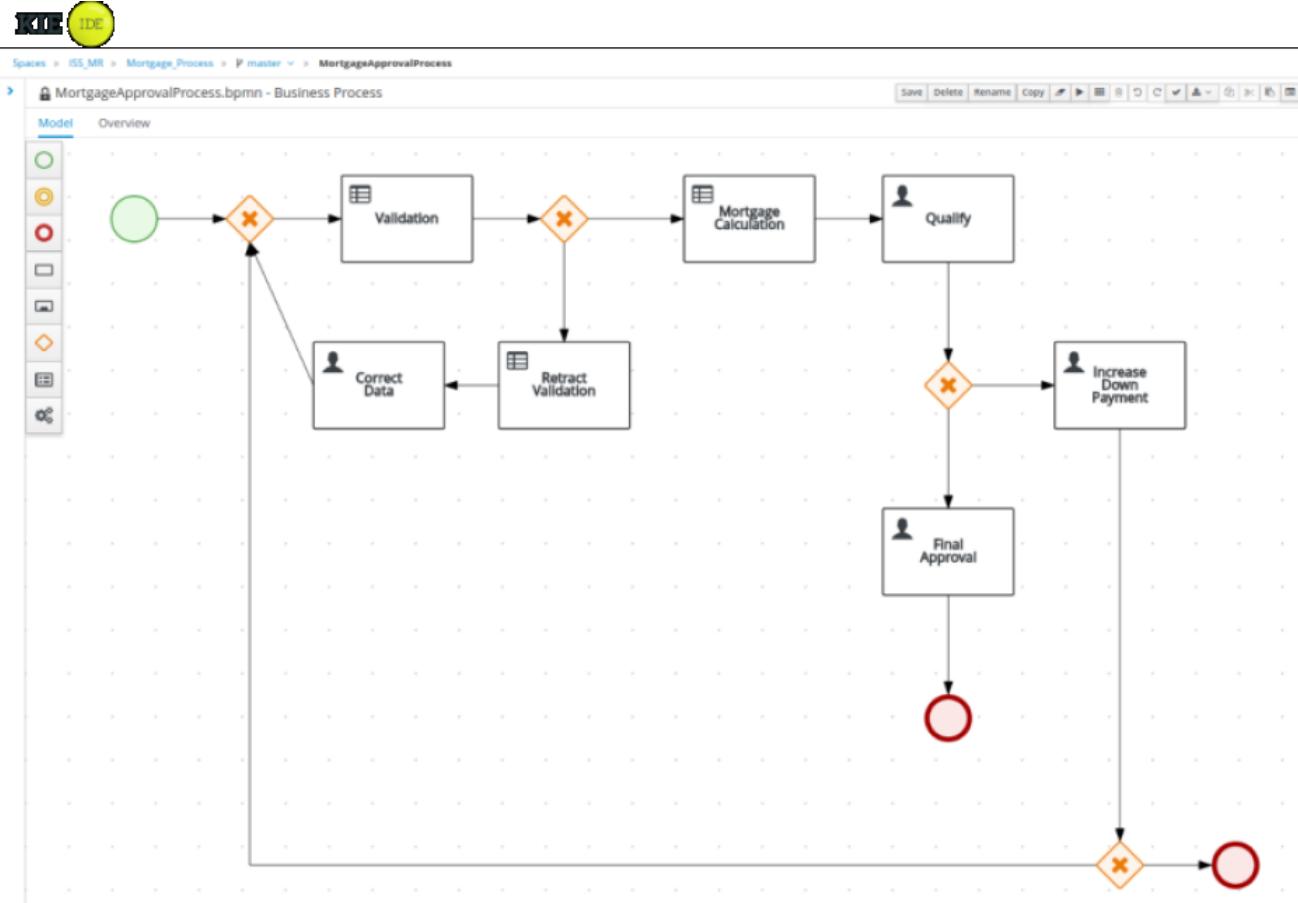
## 1.2.2 Soft Automation : Rule-based BPA RPA

### • Automate 'Soft' Processes



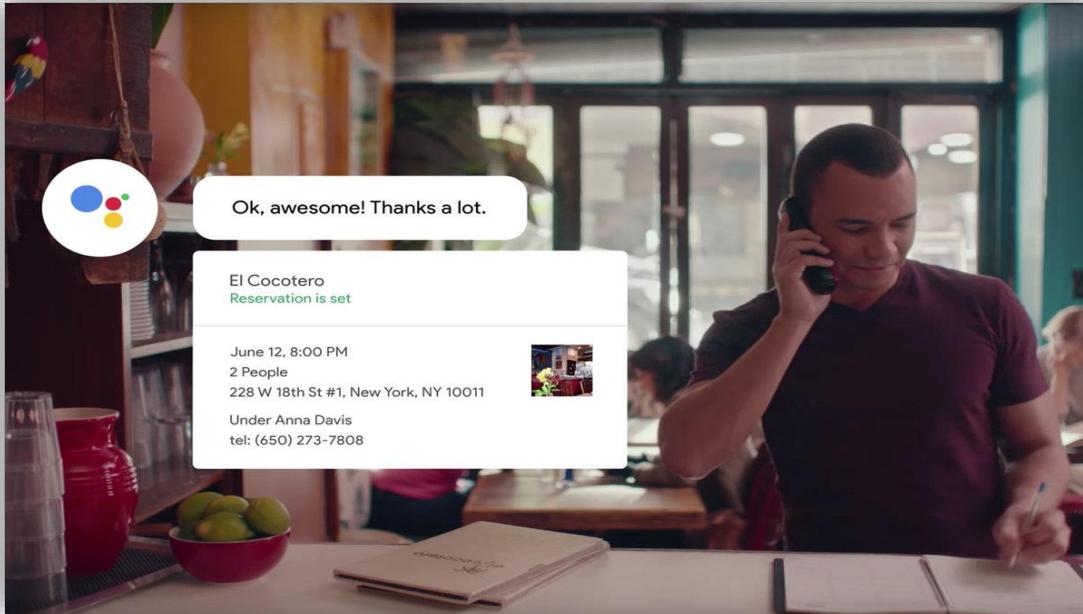
## 1.2.2 Soft Automation : Rule-based BPA RPA

- Automate 'Soft' Processes



## 1.2.2 Soft Automation : AI-based IPA

- Automate 'Soft' Processes



Google Duplex  
<https://youtu.be/-qCanuYrR0g>

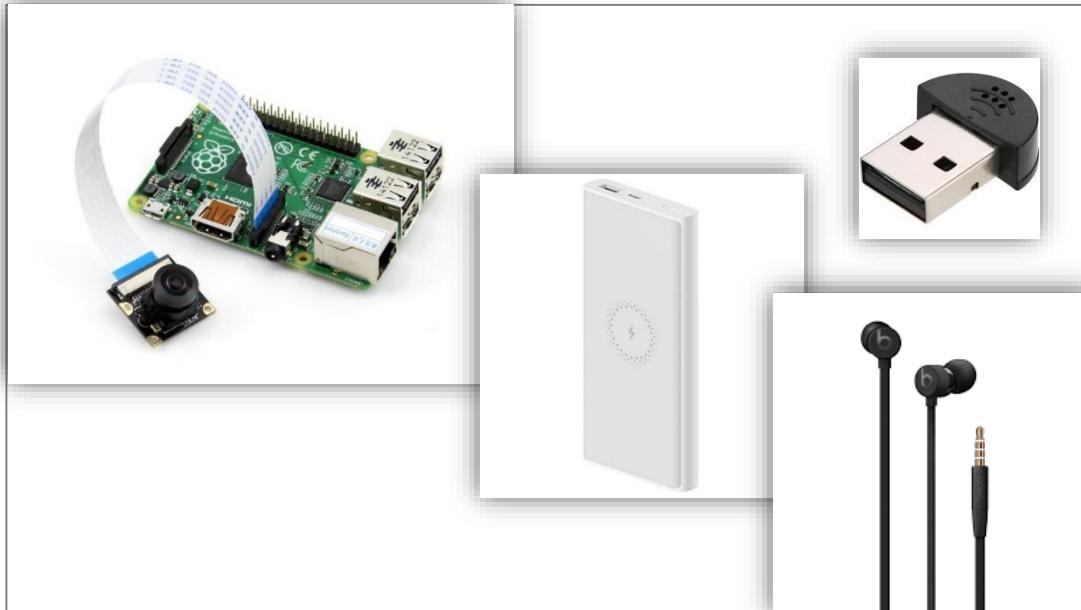
Source: <https://cdn.pocket-lint.com/r/s/1200x/assets/images/146008-feature-google-duplex-release-date-how-to-try-the-human-sounding-ai-bot-image1-gyt9zdpgu4.jpg>

EnVision Glass \$5,265  
<https://www.letsenvision.com/envision-glasses>

Source: <https://www.gizchina.com/2020/03/11/envision-glass-developed-with-google-will-help-the-blind-to-see/>

## 1.2.2 Soft Automation : AI-based IPA

- Automate 'Soft' Processes



NUS-ISS Open Vision Glass **SS\$200**

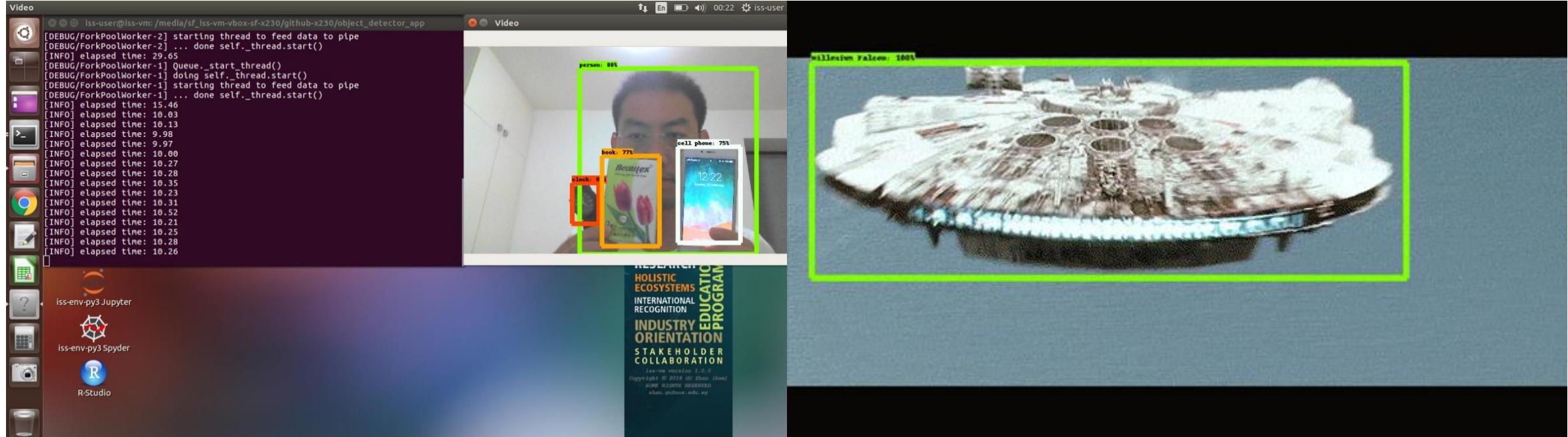


EnVision Glass **SS\$5,265**  
<https://www.letsenvision.com/envision-glasses>

Source: <https://www.gizchina.com/2020/03/11/envision-glass-developed-with-google-will-help-the-blind-to-see/>

## 1.2.2 Soft Automation : AI-based IPA

### Object Detection

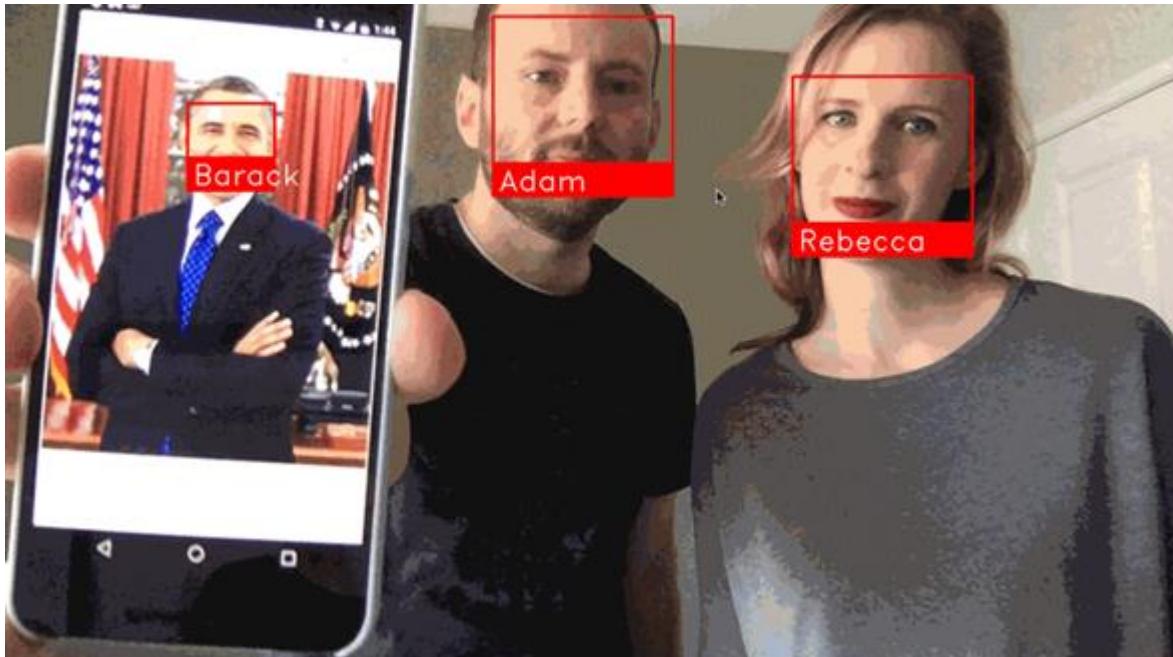


Source [https://github.com/telescopeuser/object\\_detector\\_app](https://github.com/telescopeuser/object_detector_app)

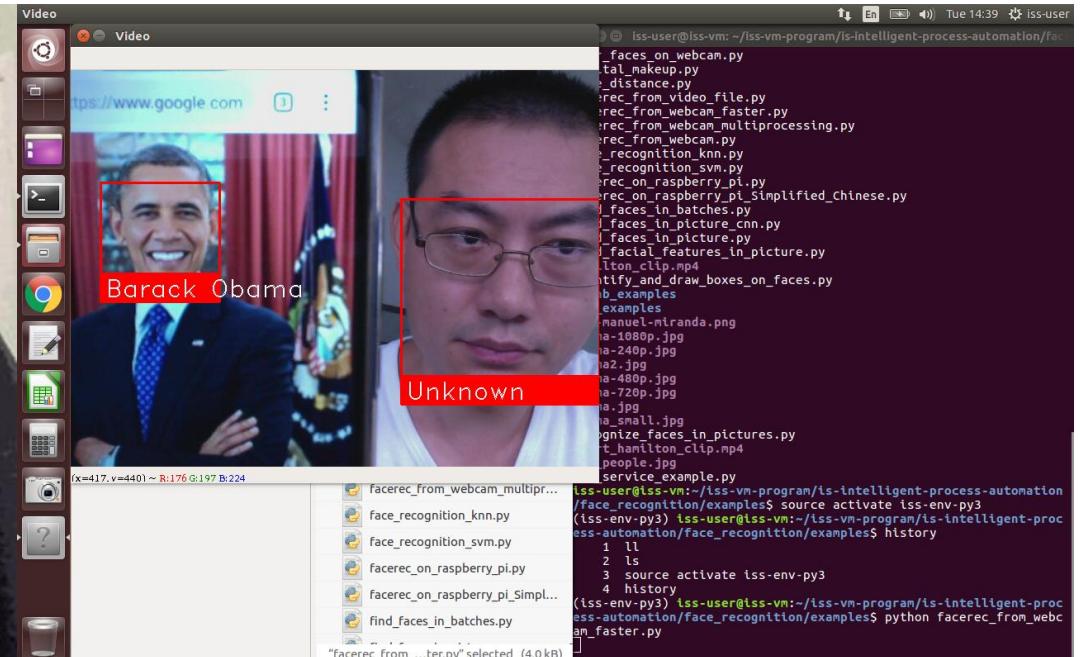
Source <https://github.com/bourdakos1/Custom-Object-Detection>

## 1.2.2 Soft Automation : AI-based IPA

### Face Detection



Source [https://github.com/ageitgey/face\\_recognition](https://github.com/ageitgey/face_recognition)



Source [https://github.com/telescopeuser/S-IPA-Workshop/tree/master/workshop1/LocalAI/IPA\\_a\\_facedetect](https://github.com/telescopeuser/S-IPA-Workshop/tree/master/workshop1/LocalAI/IPA_a_facedetect)

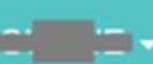


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# Parcel Tracker



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运单号 : DZ140053181NZ  
出发地 : Auckland, New Zealand  
目的地 : 中国  
件数 : 1

关于身份证件上传说明:  
\*\*\*如果收件人之前已经上传过身份证正反面复印件, 则无需重复上传\*\*\*

时间	内容
2019-06-26 19:06	【新西兰-奥克兰】订单已扫描, 进入操作中心等待处理 Order received, waiting for processing
2019-06-27 12:07	【新西兰-奥克兰】订单正在进行分拣, 请尽快上传收件人身份证 Order is processing, please upload your ID for custom clearance
	【新西兰-奥克兰】已递交目的地海关申报

返回首页 会员中心 Member Center 登陆 注册 忘记密码 奥克兰总部 (工作时间: 新西兰时间9:30am-6:00pm) QQ交谈 QQ交谈 QQ交谈 QQ交谈 中国上海分部 (工作时间: 北京时间9:00am-6:00pm) QQ交谈 QQ交谈



## 1.2.2 Soft Automation : RPA IPA

- **Automate 'Soft' Processes**
  - Car Insurance (Vehicle Damage Estimation)  
<https://youtu.be/nHyqz1PY4hk>
  - Mortgage loan application  
<https://youtu.be/LXCgHxKgxfs>
  - Payslip optical character recognition (OCR)  
[https://youtu.be/SFPz\\_oLAa8M](https://youtu.be/SFPz_oLAa8M)
  - IVR Automated Phone System

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# 1.3 New Jobs in Automation Era

- **Automation administrator:** Automation software runs using logical rules, not magic. It does exactly as it is told. And that means that someone needs to tell it what to do.
- **Automation economist (Statistician, Scientist):** The prediction that automation is set to destroy future jobs might be off the mark. But, without automation, we wouldn't have the experts to measure performance and reassure us of that.
- **AI trainer:** You need to 'teach' our automation tools to translate input into the desired outcome. It's not unlike the way a dog needs training if you want it to do something.
- **Business Process Automation (BPA) programmer:** AI might be learning how to write code. Automation software might seem extremely able and smart. But as clever and as capable as your automation tool may be, it's not smart enough to code itself into existence.

# 1.3 New Jobs in Automation Era

- **Chatbot copywriter (design dialogs/conversations):** As much as chatbots are coming into their own in customer service interactions, they aren't helpful, friendly, or witty by themselves. Nor are they tone sensitive.
- **ML/AI engineer:** Machine learning is a subsection of artificial intelligence. It's a core tool that's helping fuel more and more automated decisions.
- **Robot technician:** The maintenance of the physical automation machines is already a common job in manufacturing. Nowadays, robots are spreading into retail and even the home. As these uses of robots become increasingly commonplace, the role of robot technician is set to rise alongside it.
- **Machine relations manager (psychologist HR):** Humans are increasingly working alongside automation and robots. It might be an obvious side effect of the rise of automation, but that doesn't mean that it's a partnership that comes easily.

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# 1.4 Summary



Source: <https://officefinder.com.sg/wp-content/uploads/2020/02/Marina-Bay-Financial-Centre-Lift-Lobby.jpg>

vs.



a alamy stock photo

Source: <https://c8.alamy.com/comp/2C2H896/pyongyang-north-korea-april-29-2019-elevator-operator-girl-invites-to-lift-up-almost-any-mechanism-in-the-country-has-an-operator-as-a-way-to-2C2H896.jpg>

# 1.4 Summary

## Automation Benefits:

- (Automatically) produce the required for human survival & development by (automatically) sourcing resources from this planet.
- A potential benefit attractive to many managers is the freeing up of employees to focus on higher-level activities.

## Automation Hurdles:

- Technology-specific issues also figure prominently, but nearly as important are human factors: an absence of relevant skills and employee resistance.

### Views on the impact of automation

(% of respondents who "strongly agree")

Automation is most effective when it complements humans, not replaces them

All respondents  47

North America  45

Europe  50

Asia  45

Automation will change the skills and requirements the workforce needs

All respondents  57

North America  64

Europe  47

Asia  59

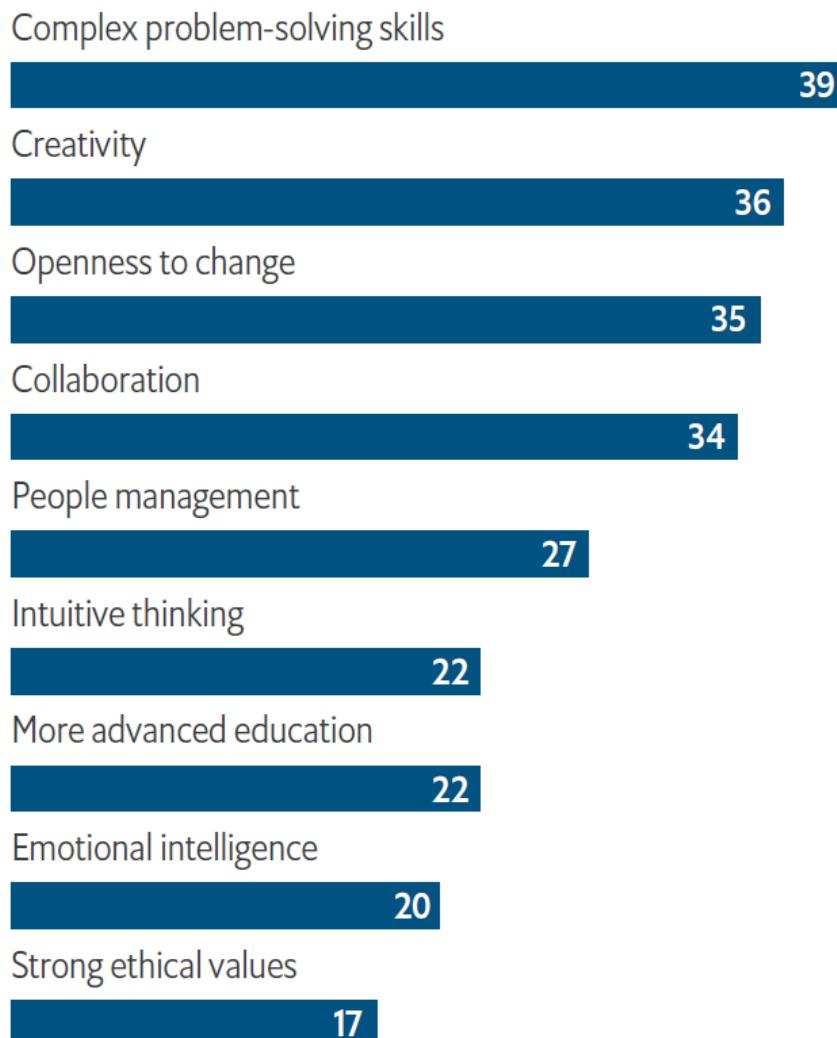
## 1.4 Summary

### Moving Forward:

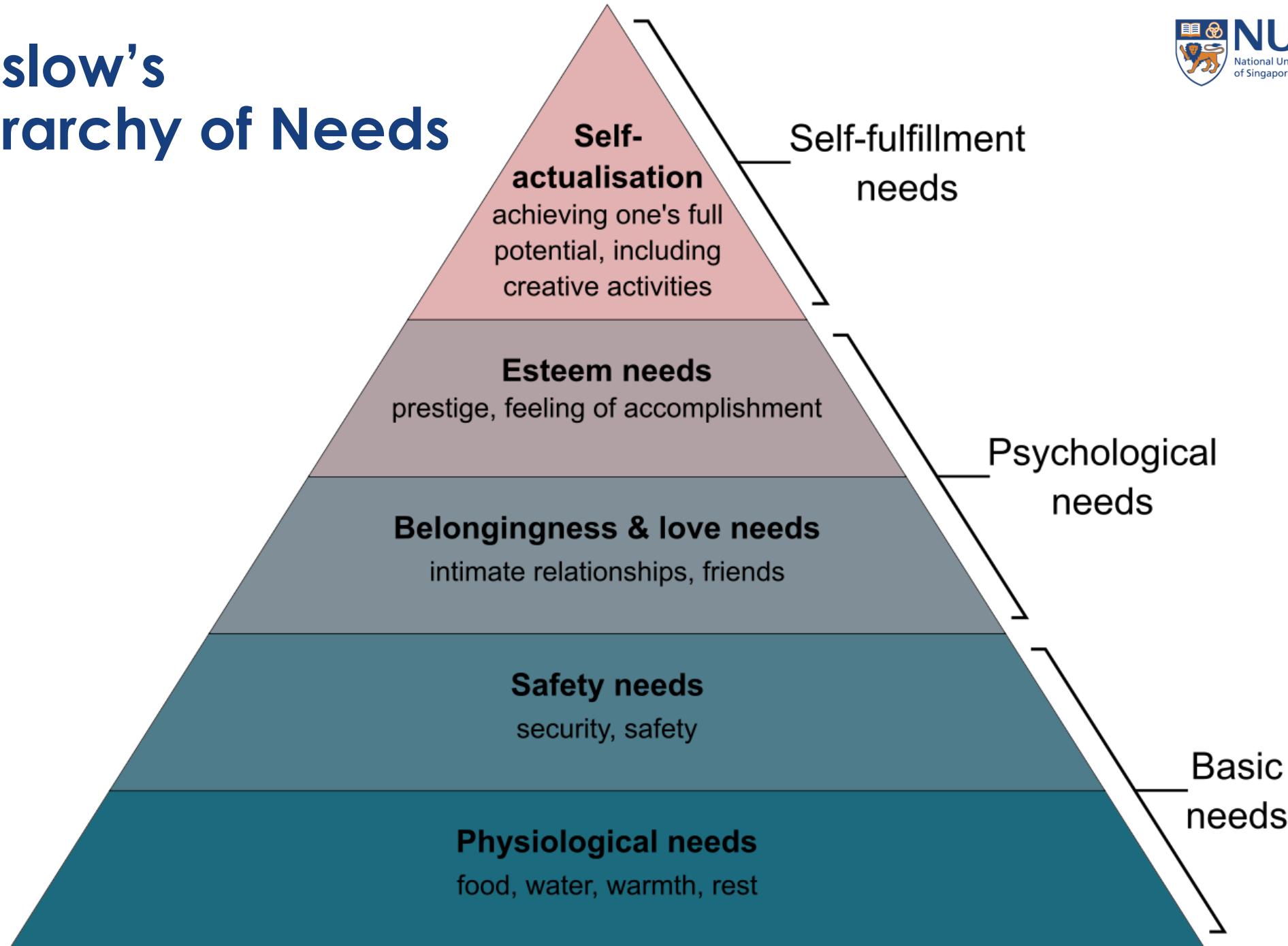
- All C-suite respondents emphasize the importance of providing education and reskilling opportunities as a means of lessening resistance.
- The types of skills that respondents believe will be most in need revolve around problem solving, creativity and collaboration.



Given automation, what are the characteristics and skills believed to be most needed for the future workforce?  
(% of respondents)



# Maslow's Hierarchy of Needs



# 1.4 Summary

Sam's success story  
of home automation  
journey:



Return on Investment (ROI): S\$600 (TCO) in 1 week only! (our private home tuition S\$100/hour)



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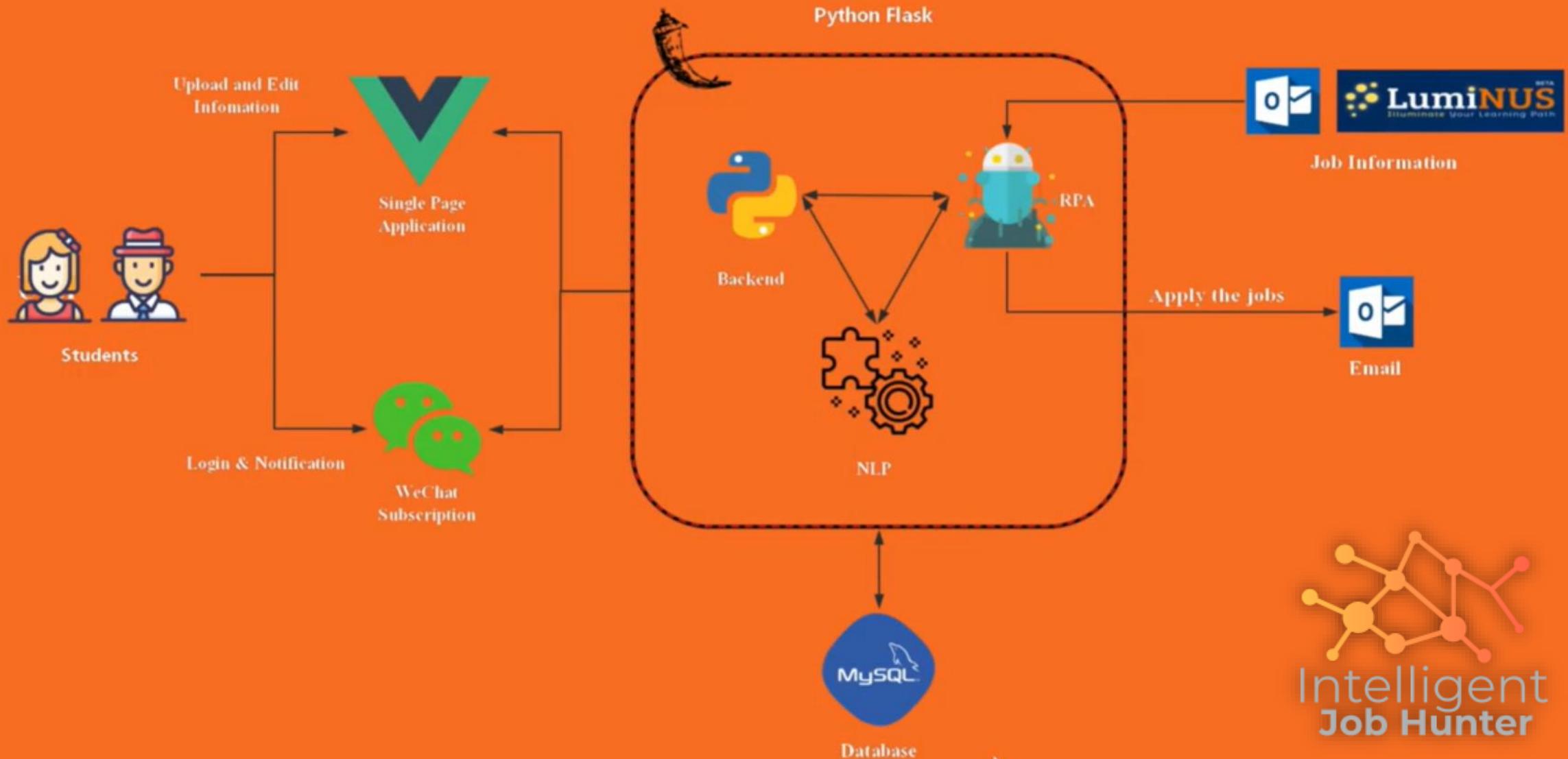
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# 1.5.1 NUS-ISS Learners' Intelligent Automation Projects

- **Agent Systems created for MTech Group Projects**

<https://github.com/ISA-IPA>

# Intelligent Job Hunter



<https://youtu.be/PAedEATYn1E>

# Intelligent Property Hunter



Property Hunter

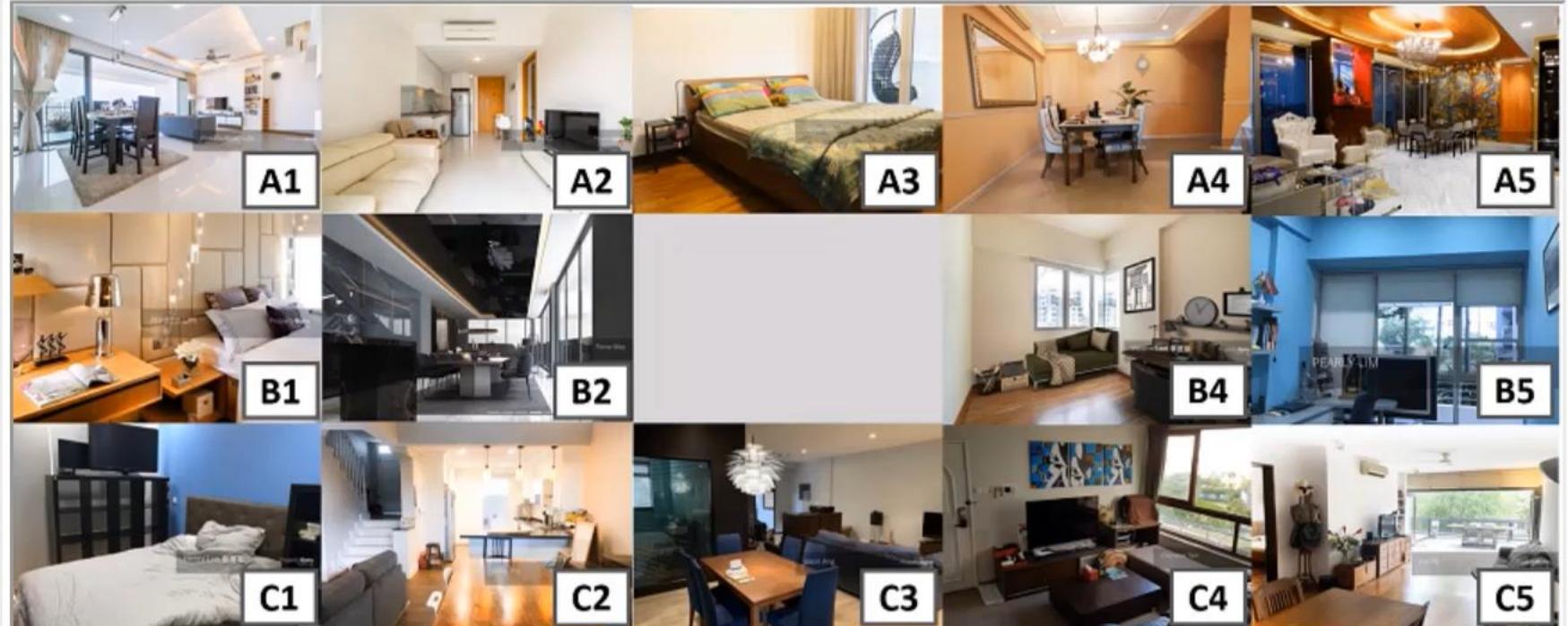
PropertyHunter

POWERED BY Dialogflow

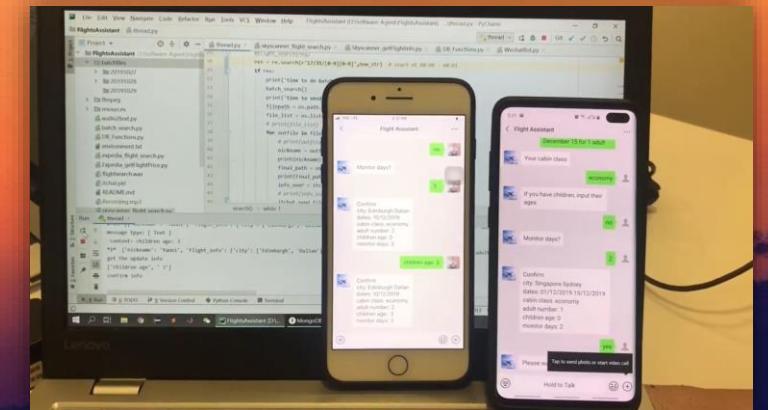
I like to view property ID12345678

Glad to hear that, just to let you know that the fair market price of this property is estimated at \$1,163,785. Shall I proceed to arrange a viewing for you?

Ask something...



# Flights Booking Assistant

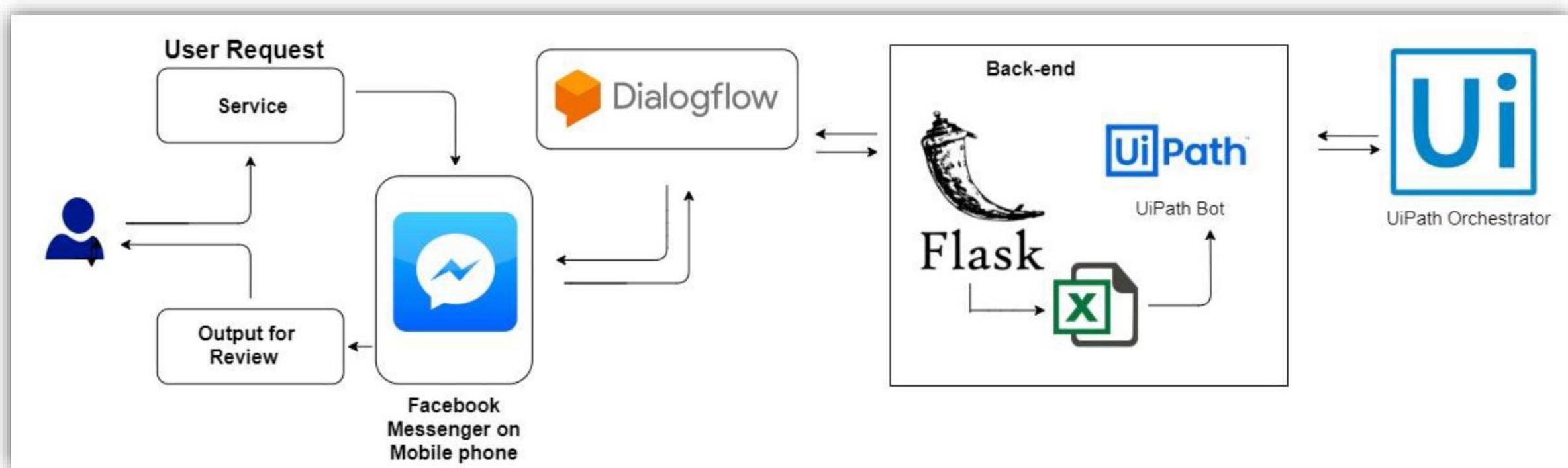


<https://youtu.be/27LIN8W5NUk>

# EasyReq – Address Updates



ΕΔ\$ΥΡΕΩ



[https://youtu.be/taU9\\_02-69o](https://youtu.be/taU9_02-69o)

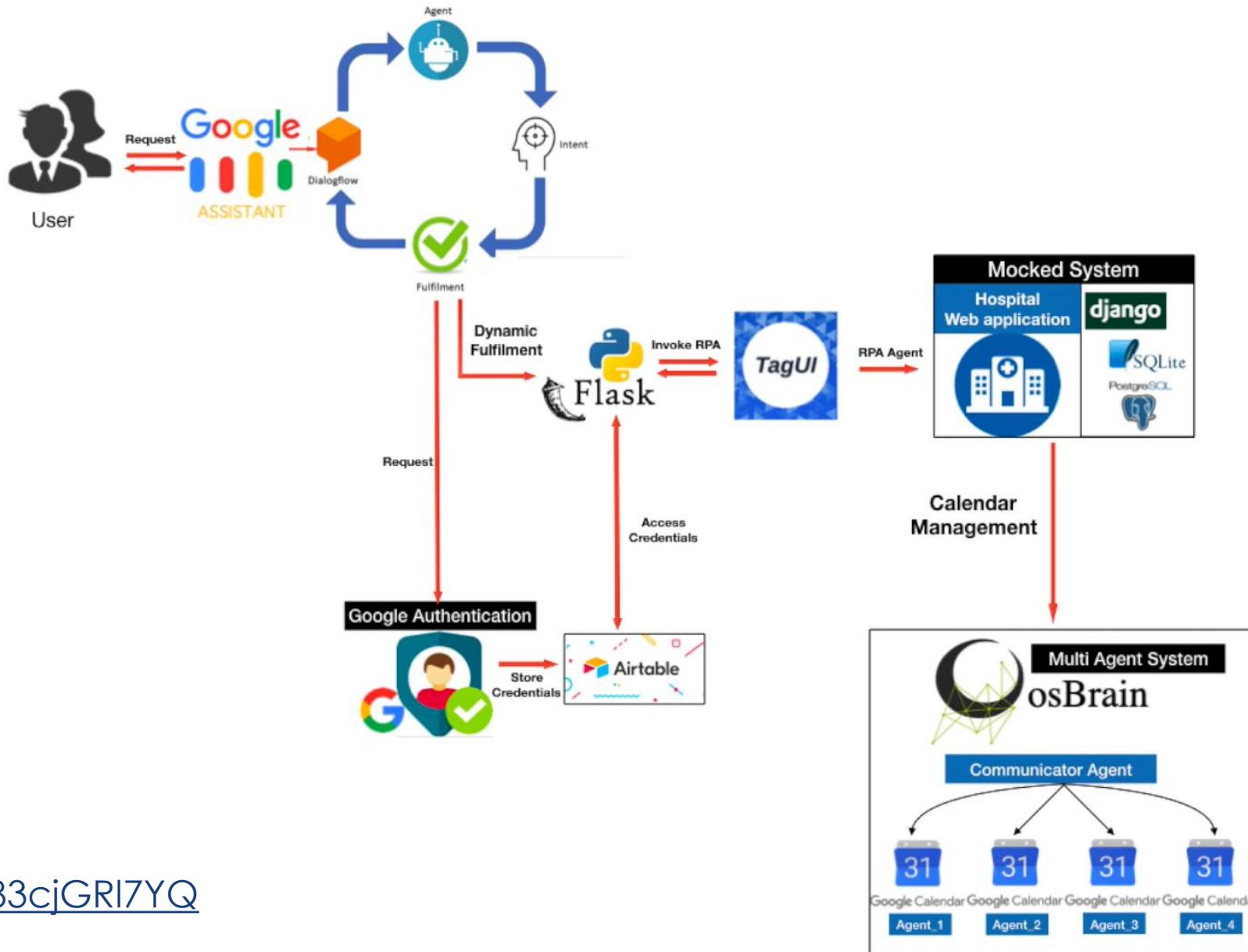
# Shoe Me The Price (SMTP) – Agent for Best Online Shoe Prices

Shoe Me  
The Price



<https://youtu.be/I4g0yPRzXDo>

# CareBot – A companion you deserve!



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**1.5.2 How can I apply AI to my business problem?**

Start

# How can I apply AI to my business problem?

**Define & Quantify** the business problem/opportunity {Goal, KPI}, e.g. {Increase customer satisfaction, Higher rating}; {Get rich fast, More \$ Less time}

Anyone (on Earth) knows how to solve?  
Or known existing/manual approaches?



True  
**Is Reasoning/Inference Task:**  
Use existing knowledge to solve problem at scale and speed.  
(decision automation; optimization)

Is **Learning Task**:  
Acquire new knowledge to solve the problem.

Has relevant data collection?



Is a special learning task:  
**Reinforcement Learning Task**:  
Use generate & test approach.

Can simulate /generate relevant data?  
Or conduct experiment?



True  
Use reinforcement learning algorithms; simulation techniques to acquire knowledge, e.g. best series of actions to achieve goal.

End

Currently not solvable by AI (even human)



# The End