TechSee
Intelligent Visual Assistance

# The Use of Augmented Reality, Machine Vision and Deep Learning Tools to Enhance Technical Visual Support Services


**Gabby Sarusi**

***TechSee Ltd. & Ben-Gurion University of the Negev***

***gabby@techsee.me***
***www.techsee.me***


IMVC 2018

SMART ASSISTANCE FOR THINGS

# Outlines

- Introduction:
  - TechSee Ltd. - a Company Overview in a Glance
  - Technical Visual Support - Opportunity and Motivation
  - Customer Service Challenge – The roll of Visual Support – “TechSee Live”
- How AI can improve customer support services? “TechSee Smart” Road Map and Approach
  - Augmented Reality
  - Machine Vision
  - Deep Learning
- Technology drill down: Minimizing the network training cycles
  - Artificially increases of the training data base using smart augmentation
  - The use of transfer learning to minimized the required training data base size
  - Segmentation – Identifying objects in object
- Summary and Conclusions

# TechSee Ltd. In a glance

- Founded in 2015 By Eitan Choen (CEO), Amir Yoffe (COO) and Gabby Sarusi (CSO)
- Located in Herzeliya (HQ), Madrid and New-York
- Fund raising 7.5M$
- 30 workers (in Israel and abroad)
- Solid basis of IP
- First time single digit (in M$) sales in 2017 (“TechSee live” product)

# Featured Customers and Partners – Market Traction

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vodafone
orange
LIBERTY GLOBAL
Telia
Ziggo
altice
BYTES TECHNOLOGY GROUP
TIM
achmea
NESPRESSO
SAMSUNG
innogy

accenture
High performance. Delivered.
Teleprformance
NetCracker
Transforming the Service Layer
COMDATA
HITACHI
csg INTERNATIONAL
ProCom
Cartesian
amdocs
imagineX consulting
ADTECH GLOBAL

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# Customer Service Challenge – The Roll of Visual Support
# “TechSee Live”

# The Mega Opportunity & Challenge

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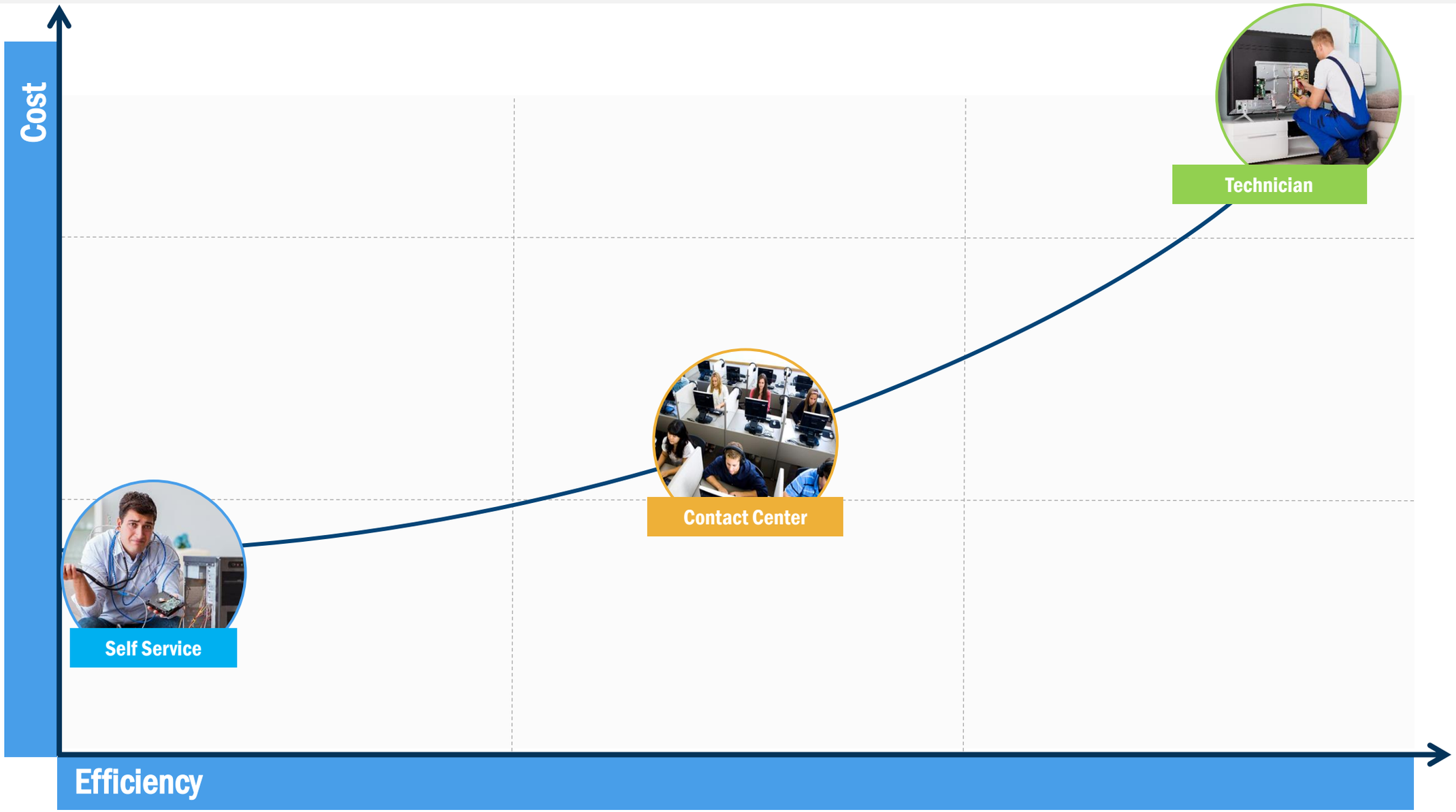
## THE CHALLENGE:

# Billions of new requests

## Every year, for installation & support

Source: Park Associates

# Support Delivery Model



# The Visual Gap

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What the **CUSTOMER** Sees

What the **Contact Center Agent** Sees

# Our Mission

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## Transform Customer Support Inquiries into a

# Virtual

## Technician Visit

## or

## Full Visual Support

# Key Capabilities (As of today – "TechSee Live")

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## CALL CENTER

- SaaS Plug & Play, No integration
- Launch from any browser
- Over 90% Mobile Device Compatibility
- Fast implementation, 2 hours training


## CUSTOMER

- No App Download
- Simple to use
- Low data consumption
- Non-intrusive solution

# “TechSee Live”: Visual Engagement Platform

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## Bringing VISION to every customer interaction

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# NEXT GENERATION Visual Customer Assistance **POWERED BY AI** (Machine Vision and Deep Learning)

**"TechSee Smart"**

# We Believe that AI is the Future of Customer Care

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## REDUCING COSTS

**75%**

Reduction of service costs
When automation through RPA

*Source: KPMG

## ENHANCING CX

**85%**

of the customers will manage their brand interactions without a human
By the year 2022

*Source: Gartner

## AGENT PRODUCTIVITY

**80%**

of executives believe that AI will improve worker performances

*Source: Narrative Science

# “TechSee Smart” roadmap in AI based support follows autonomous car roadmap

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## Driver Only

Driver undertakes lane holding, system collects data and performs learning

## Assisted Driving

Driver handles lane holding, the system performs other aspects, **“feet free”**

## Partially Automated

System handles lane holding, driver should be able to take over in case of emergency, **“Mind off”**

## Driver Less

System handles all driving aspects, **“hands-off”**

## Highly Automated

System handles the driving automatically, the driver’s presence is necessary, **“eyes off”**

# Autonomous Visual Support – A Roadmap to Automation

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## Agent Only

Remote visual support done by an Agent.
**Manual Analysis and Troubleshooting**

## Agent Assistant

Decision support tool for agents – device recognition and Next Best Action – recommendations
**Automated Analysis**

## Agent Advisor

Automated issues detection, automated Analysis and Suggestion
**Automated Recommendations**

## Agent Less
**Autonomous Bot**

Fully automated self service: installation & troubleshooting
**Consumer Virtual Technician**

## Virtual Agent
**Semi Autonomous Bot**

Virtual assistant for consumer's self service activities: device recognition and augmentation
**Consumer Virtual Assistant**

# Tech Support Assistant - How does it Work?

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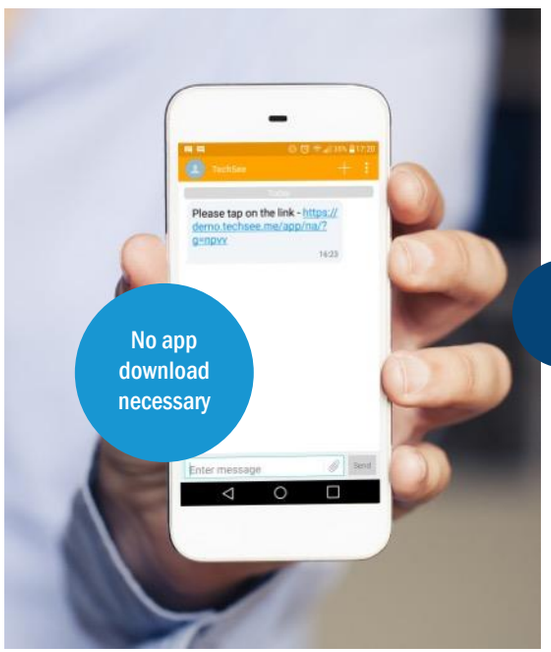
## 1 CONNECT




## 2 SEE

## 3 GUIDE


## 4 VALIDATE

Deep Learning

# The Largest Repository in the World of Visual Tech Tings and Issues

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## Generating the Largest Repository in the World of Visual Tech Things and Issues

# Tech Tings, Issues & Resolutions

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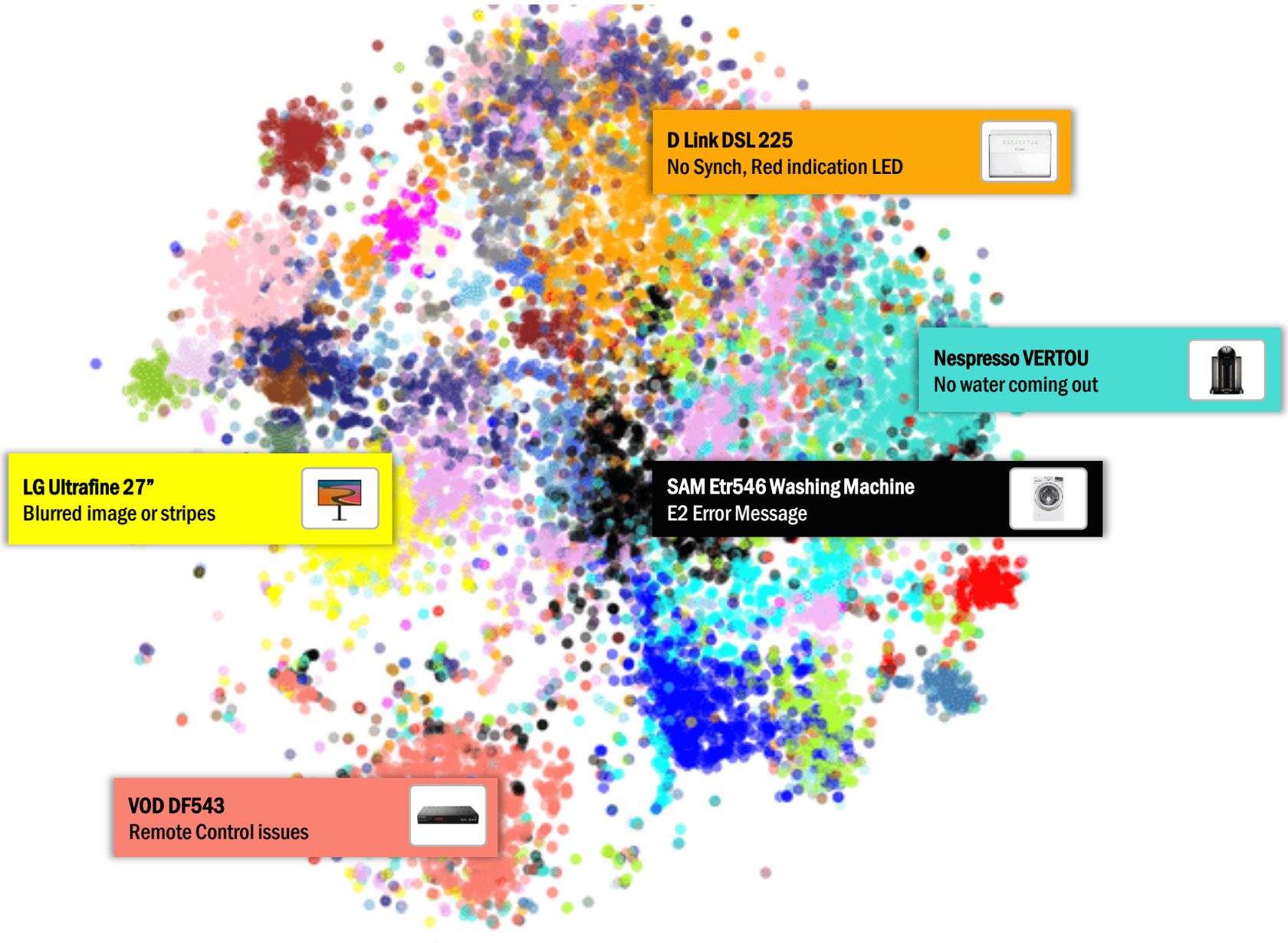

# Autonomous Support - Roadmap to Automation

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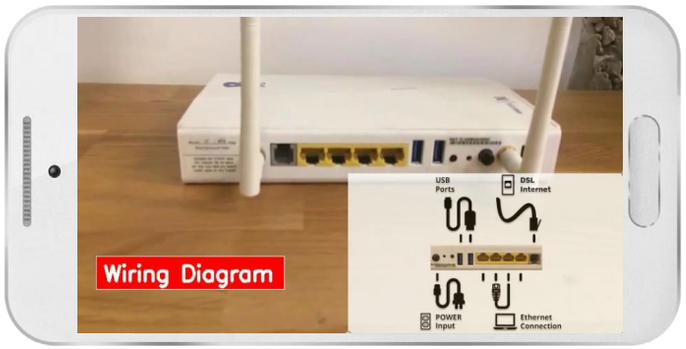
# Virtual Agent






## DEVICE ANALYSIS

Automatically recognize device type and model, and display contextual help

## DISPLAY ANALYSIS

Automatic recognition of device & textual strings (e.g. Error messages, Programs) and overlaying them with relevant content

## AUGMENTED MANUAL

Automatic recognition of device specific components upon user request (e.g. Error messages, Buttons, Leds) and overlaying them with relevant content

# Augmented Manual

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# Self Installation – Agent Less

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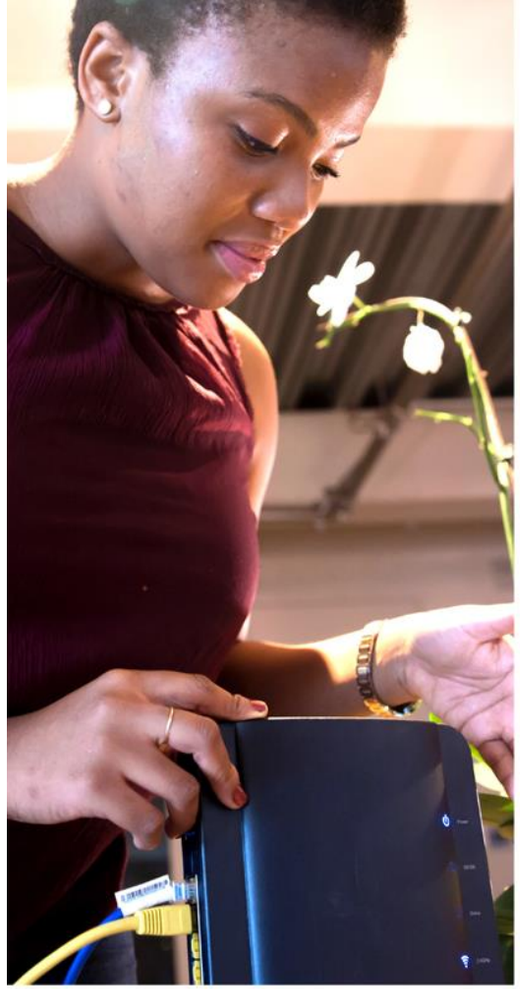
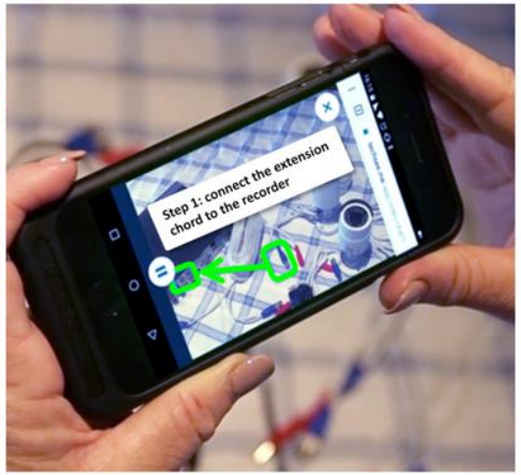
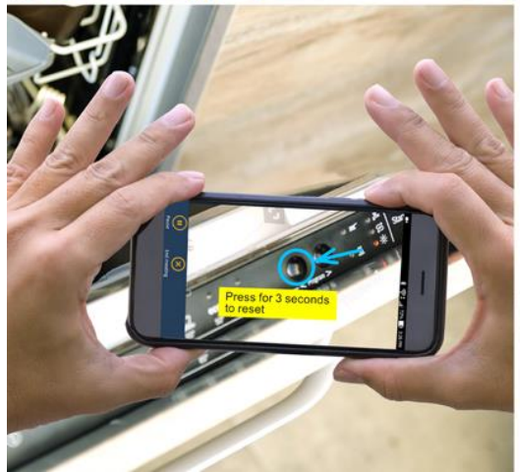
## TechSee Smart

# Technology Drill Down






# Device Accurate (95%) Identification by Deep Learning (without using 30,000 images)

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**Deep Learning** platform which can learn independently to handle **any type of device**

Optimal **object identification** for multiple positions, lightnings & qualities

Achieve **high accuracy** of 95%

**Proprietary Trained Network** to handle specifically tech devices

# Challenges in Implementing Deep Learning

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1

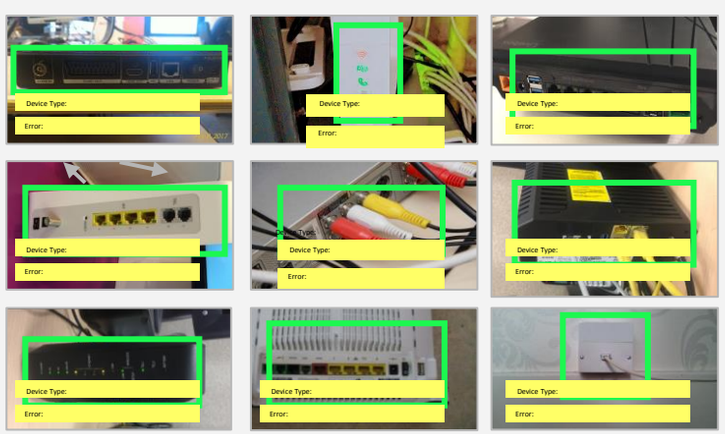
## DATA ACQUISITION

Deep learning requires large amounts of data to train the network for each device, including different backgrounds, angles, lighting, shading etc.

2

## DATA SUPERVISION

Unlabeled images from the video support stream must be classified and tagged, a laborious and time-consuming activity.



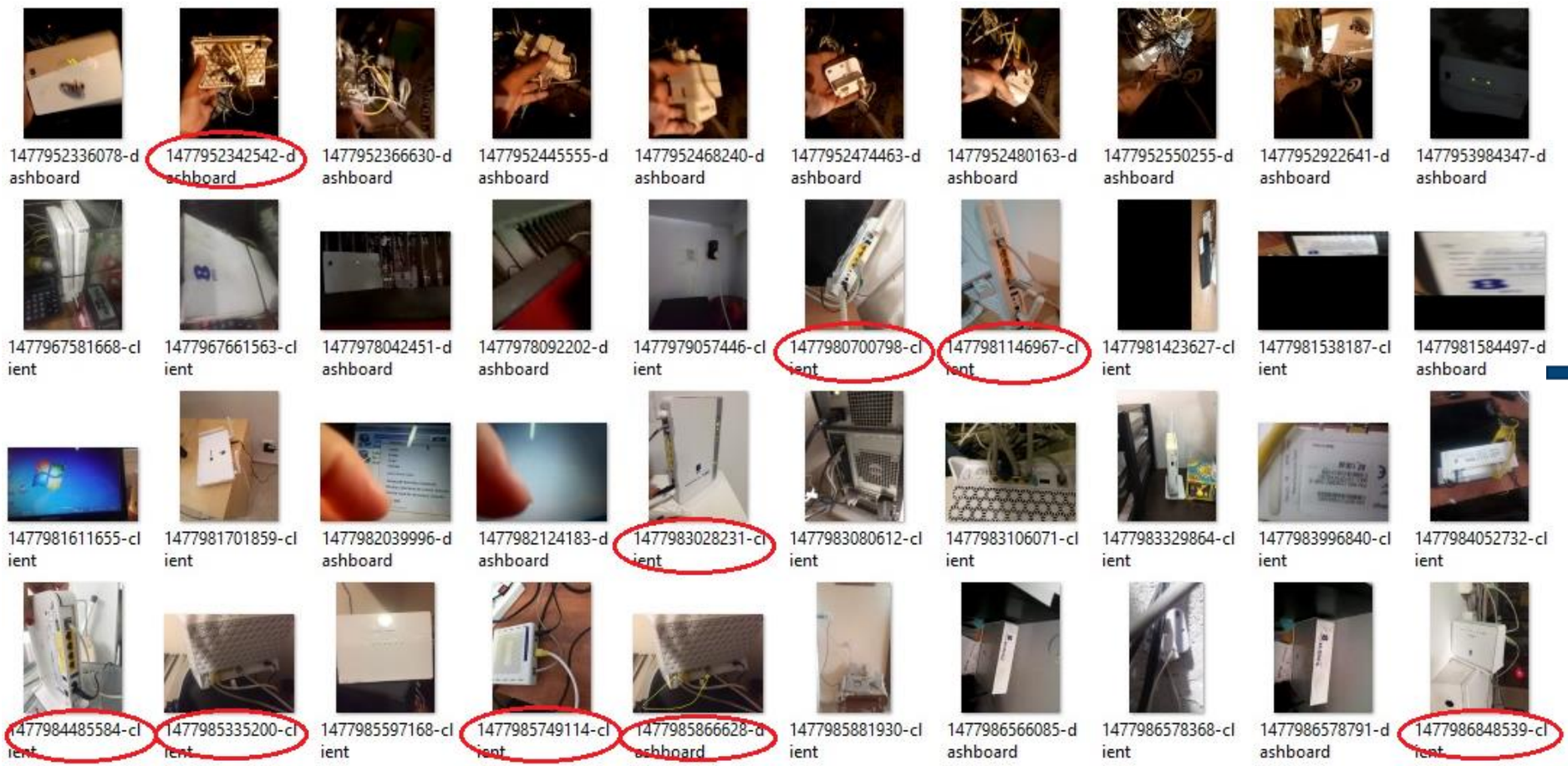

3

## VARIETY OF OBJECTS

Every type of device must be labelled as a 'class,' requiring massive data sets, as well as algorithmic work.

# TechSee Deep Learning Process – Use Real-Life Images from TechSee Repository (or from Customer if TechSee not Deployed)

## 1. Obtain the images:

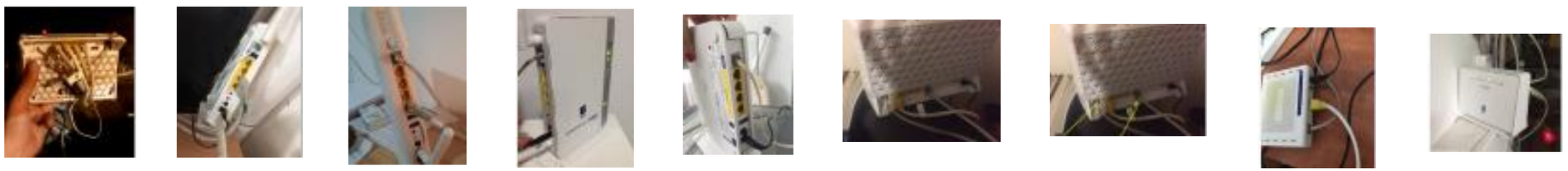



Usually it is needed about 30,000 “raw images” for a group of 6-8 device types.

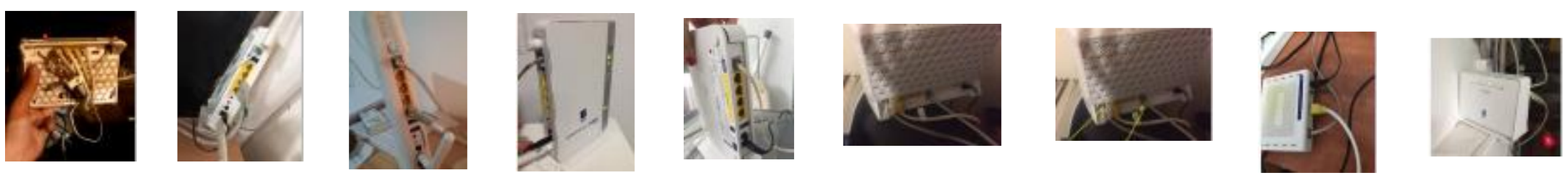
The majority of these images are not useful: noisy; repeating; showing non relevant views.

# TechSee Deep Learning Process – Use Real-Life Images (cont.)

2. Extract the “good” images (about one out of 5-10):



3. Verify the images labeling/tagging:



vtech NB403

D-Link 6850U

D-Link 2760U

.....

A total of 500-600 images per device type

# TechSee's Deep Learning Process (Device Identification)

1. Obtain reference clips from "TechSee live", 3-4 minute long per device type:

(Click the above image to run a short clip segment)

2. Extract about 50-100 distinct frames per device type:



....

3. Augment frames – background, size, angle, blur (about 5X):



....

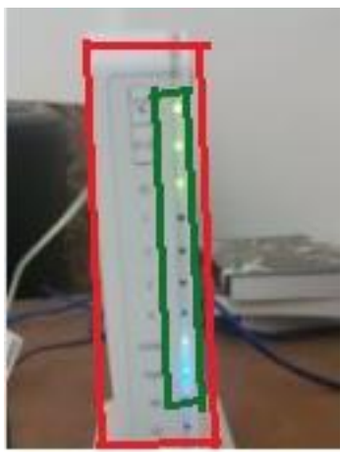
**A total of 300-400 images per device type**

# Leveraging “Transfer Learning”

- “Transfer Learning” allows reusing a learning network that was trained on a set of devices (“customer A”), for training another set of devices (“customer B”) that have common visual features
- In subsequent cycles with new sets, the training focuses mainly at unique features (eg., logo, shape) and at the composition of the common visual features
- Over time we can use less images and less time, assuming that you deal with products belonging to similar domain – eg., communication devices, home appliances, etc.

# “Transfer Learning” – Common Visual Features

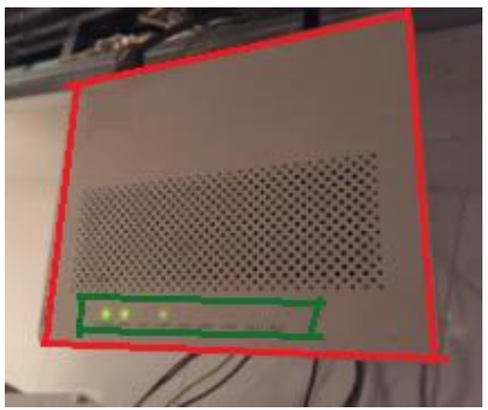
## Customer #1



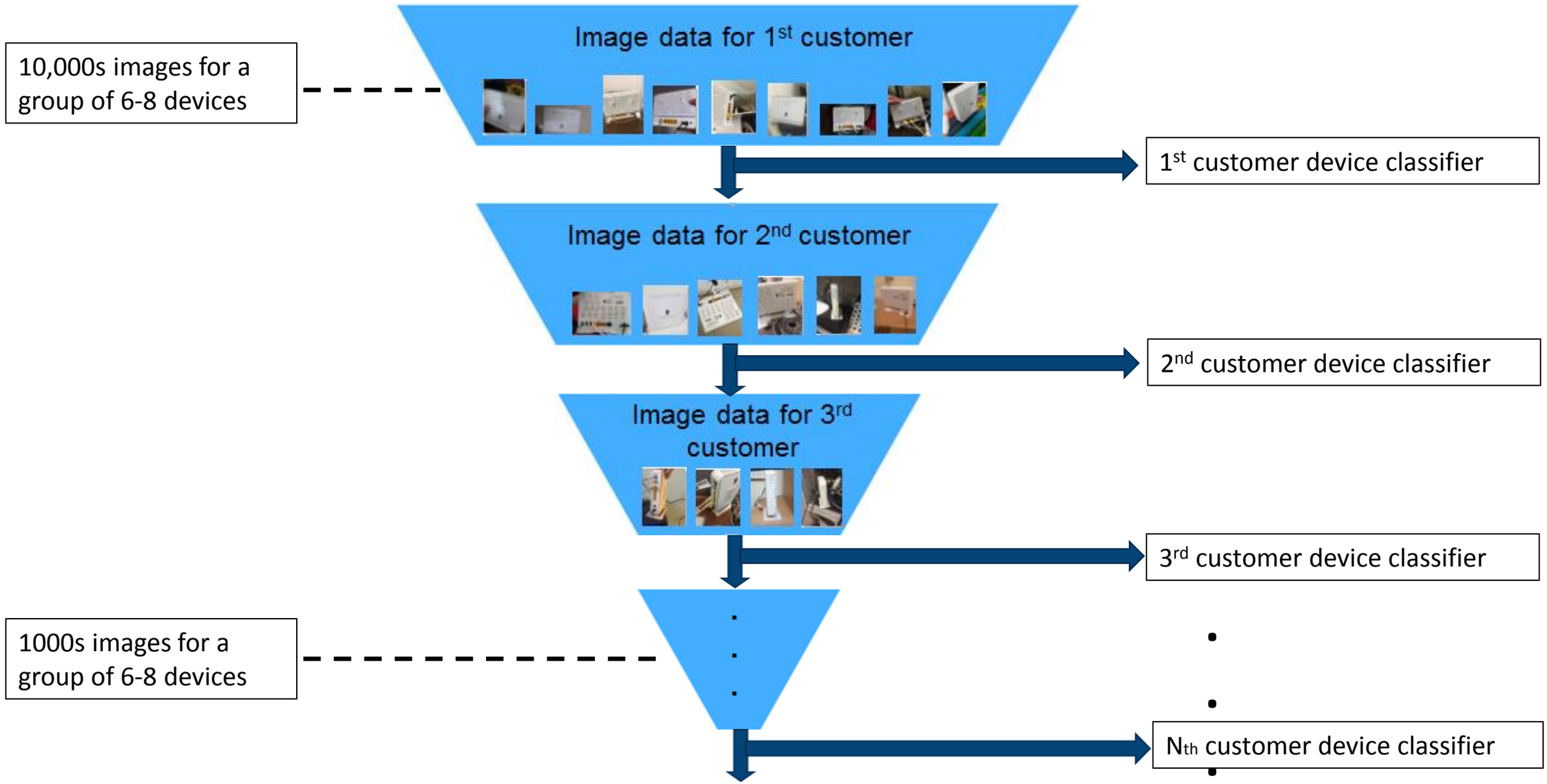
Device contour
Connectors & buttons
LEDs

## Customer #2

## Customer #3



# Deep Learning Process Convergence



# Recognition Benchmark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**TechSee Smart:**

D-link: 6850u: 95%

amazon web services™

**Amazon Recognition:**

Modem: 83.6%

Router: 83.6%

Computer: 78.5%

Google Cloud Platform

**Google Vision:**

Technology: 93%

Electronic Device: 92%

Product: 79%

Gadget: 76%

IBM Watson

**Watson Visual Recognition:**

Modem: 59%

Computer: 73%

Machine: 73%

Personal Computer: 57%

# TechSee Segmentation and Object Recognition Capabilities

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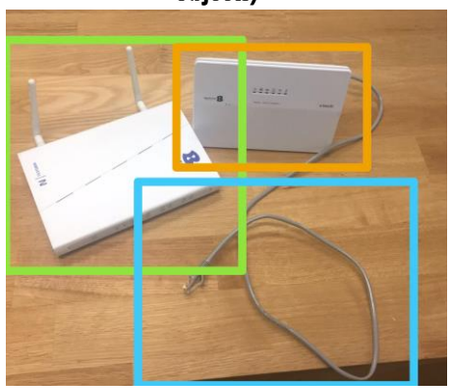
## Classification

VTECH 142 Modem

## Localization

VTECH 142 Modem

## Localization (Multiple Objects)



VTECH 142 Modem

ADSL Cable

DULINK 2764

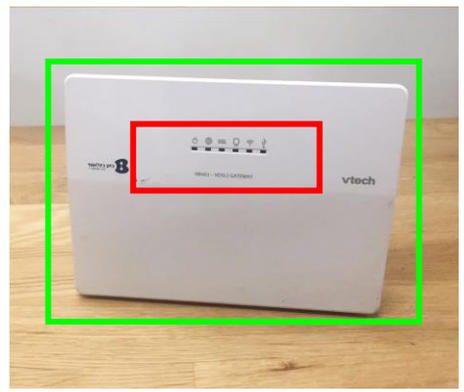
## Segmentation

VTECH 142 Modem

ADSL Cable

DULINK 2764

## Parts Recognition



VTECH 142 Modem

LED indication panel

# Segmentation of objects within an object – Different types of sockets

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# Summary and Conclusions

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- Tech service support requirements will increase exponentially in the near future due to IoT
- “TechSee live” concept shows dramatic increases of the tech support centres performances
- “TechSee smart” is the new platform aiming toward full self service using intelligent bots
- Implementing data based multiplication powered by augmentation techniques can artificially increases the data based size and simplify the training process
- Additional techniques such as **transfer learning** will further increases the efficiency of network training

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# THANK YOU

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