Autonomous Things

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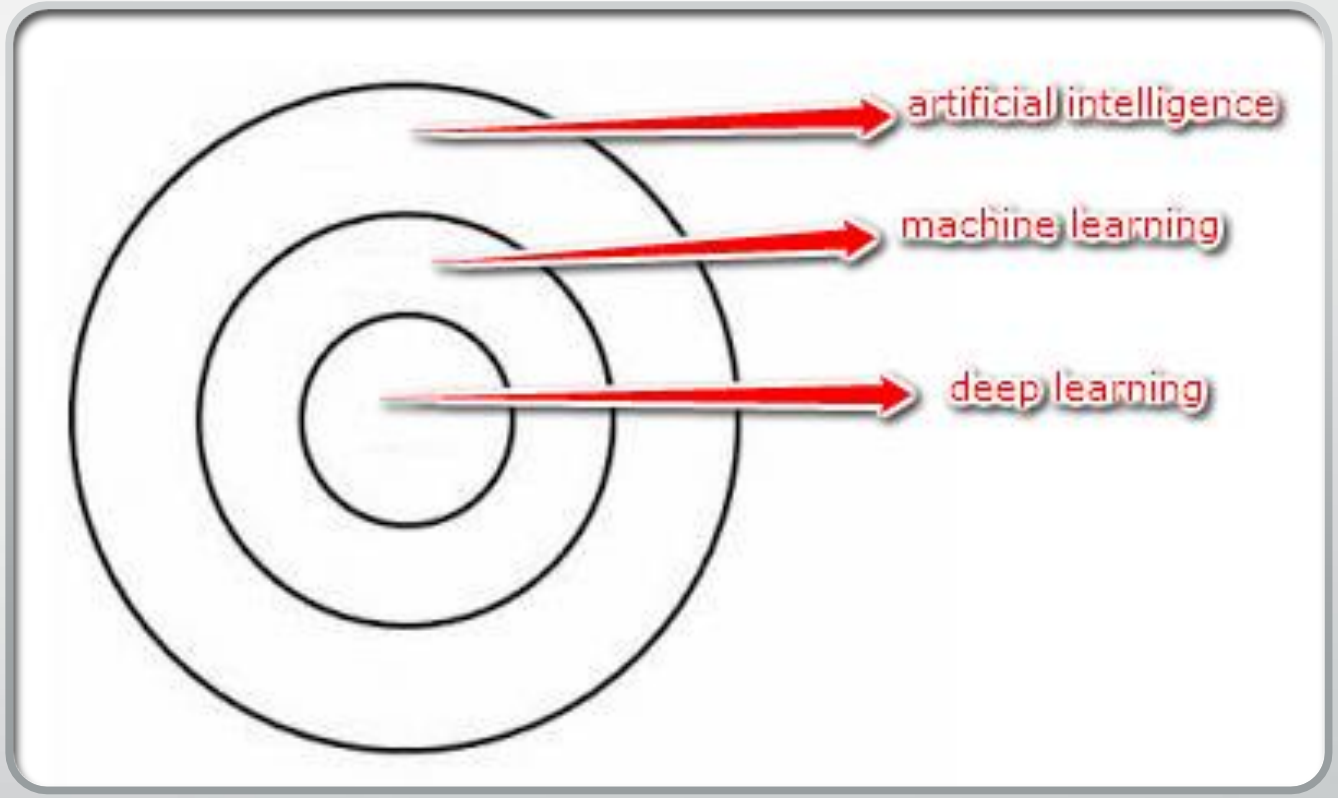
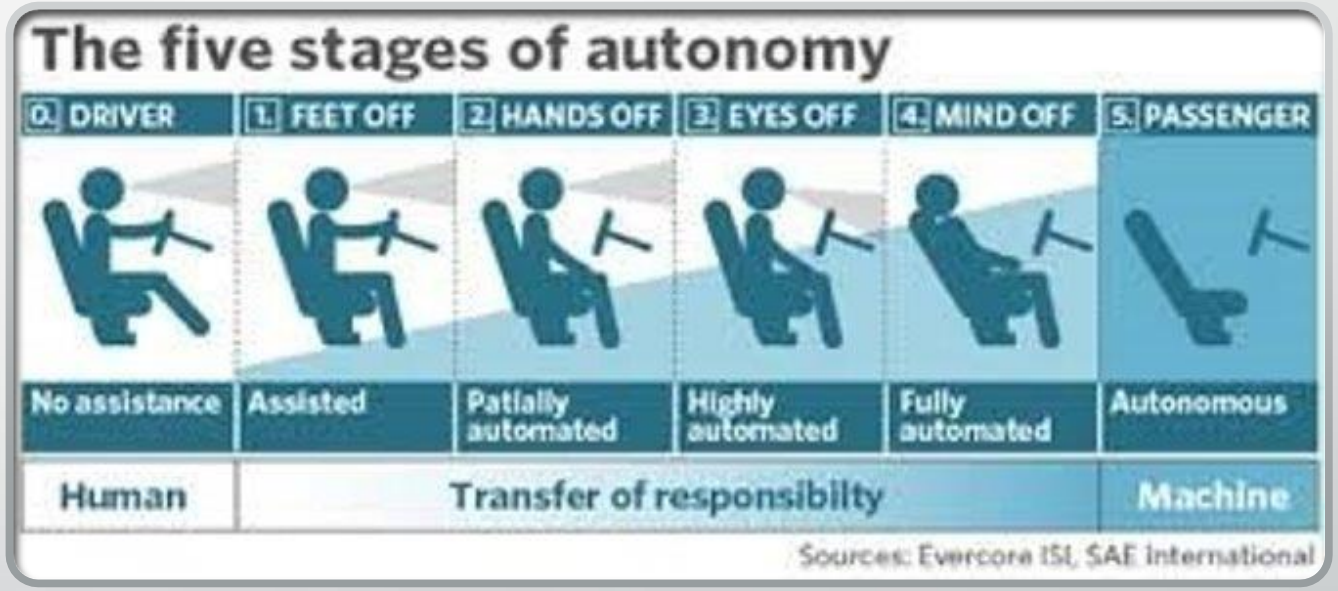
What are they?

- Abbreviated AuT
- AI to automate functions previously performed by humans
- AI, ML, DL
  - Autonomous vehicles and robots
  - Consumer products
  - Virtual assistants
- Consumer and Non-consumer
- Nearly every field



Autonomous Vehicles

- One of the most recognizable forms of autonomous technology
- Use sensors and software to drive, navigate, and direct the vehicle
- Create and maintain an internal map of their surroundings
- Currently at stage 2 but could reach stage 3
- Rely on 5G data



Mining

- Improve mining safety
- Resolute, Vale, Autonomous Solutions, ETF
- Current problems:
  - Pricing
    - Dissuade smaller companies even if BHP and Rio Tinto can afford it
  - Distribution
    - Many global mining companies overall
    - Autonomous tech part of larger vehicle

Agriculture / Smart Farming

- Geomapping and IoT sensor data
  - Driverless tractors
  - SubSurface Drip System (SDI) with IoT sensors
  - Drones
  - Robots
    - Crop maintenance
    - Harvesting
  - Benefits
    - Greater yields + less manual labor
  - Drawbacks
    - Growth/intro stage

Consumer Application

- Drive.AI, Navya, Optimus Ride
- Autonomous shuttles running predetermined routes
- Las Vegas, Denver, Columbus, Detroit
- Embark, TuSimple
  - Platooning in commercial trucking

Optimus Ride

THE FUTURE OF TRANSPORTATION STACK

COMET LABS

SERVICES

ROUTE PLANNING
SPATIAL, CITIViZ, waze, CommuteMaster, X, moovit, Citymapper

PARKING
Waypals, Cloud Parc, Aware, VoicePark, SpotHero, PEARL, seevider, Parko, FenSens, LUXE, ParkSys

CAR HAILING + POOLING
TESLOOP, lyft, RideCell, 滴滴

OTHER: AFTERMARKET, REPAIR, RENTAL
CARVUE, upshift, WRENCH PATROL, zipcar, Getaround, URGENTLY, Tantalum, bitkar

SAFETY & SECURITY

PHYSICAL CAR & DRIVER SAFETY +ACCIDENT DETECTION
drivebetter, splitsecnd, nexar, GUARDIAN Optical Technologies, phrame, LyfeLens, SMART AUTOLABS, tourmalinelabs, iproc, eLSYS, FORESIGHT

EMOTION, FATIGUE & ALCOHOL DETECTION + DISTRACTION AVOIDANCE
CORTEXLABS, eyeris, ALMA care, CARMA, saverone, SMART wheel, Radiomize, EASYC, carvi

CYBERSECURITY
CYMOTIVE, cognomotiv, VisualThreat, ARGUS, Olympus Sky, Karamba Security, TrAllium, Arilou

INTRUSION, TRACKING & RECOVERY
tracknstop, nonda, gmt Connect, ROADEYE, caruma

IN-CAR INTELLIGENCE + ASSISTANCE

VEHICLE DIAGNOSTICS & PREDICTIVE MAINTENANCE + SENSOR-BASED VEHICLE SAFETY
TrueMotion, BRAIQ, IQ, metromile, LIGHT METRICS

PASSENGER-FOCUSED SENSORS (INCLUDING USAGE-BASED INSURANCE)
cartics, Zubie, nauto, SONICLUE, PREDICTSYSTEMS, NEBULA, engie

INFOTAINMENT + DISPLAY
link motion, HUDIFY, CARROBOT, FoninCar, swedspot, OverDrive, ROAV, FICONIC SOLUTIONS, RIGHTWARE, PELAGICORE, CLOUDCAR

PERSONAL / VOICE ASSISTANCE
navideck, AUTOMATIC, dash, GRIN, cariq

NAVIGATION ASSISTANCE + PEDESTRIAN ANALYSIS & COMMUNICATIONS
WAYRAY, PERCEPTIVE AUTOMATA, navdy, hudly

AUTONOMY

AUTOMATION SYSTEM
AutoX, drive.ai, POLYSYNC, OXBOTICA, oryx, ARGO AI, AIMOTIVE, PILOT, cruise, nuTonomy, Vector.ai, BWV, MOMENTA, cognivue, AIDRIVING

MAPPING, SIMULATION, & IMAGE RECOGNITION / ANNOTATION
ivi, minds.ai, NOMOKO, Mapper.ai, CARMERA, TOMTOM, IMPROBABLE, UDACITY, DEEPMAP, understand.ai, Civil Maps

AUTONOMOUS VEHICLE MAKER + TOOLS
nuro, WAYMO, ZOOX, FARADAY FUTURE

INFRASTRUCTURE + CONNECTED CAR

SENSOR NETWORKING INFRASTRUCTURE (V2V, V2X) - LPWA, CELLULAR, WIFI
DIGIMONDO, U, SAVARI, ZiFiSense, EVVOS, Actility

CONNECTED CAR - DATA, PLATFORM, SOFTWARE
ACTIVESCALER, INRIX, SPARC, mobiliuz, carvoyant, vinli, otonomo, bright box, VEHICLE DATA SCIENCE, mojio

FLEET + TRAFFIC MANAGEMENT
BESTMILE, Cloud Your Car, synovia, Fleetmatics, urban engines, Motionlogic, Travelai, Automile, Zendrive, GLYDEL, locoNav, Immense Simulations, MOTORWAY BUDDY, mentis services, FR, Brisk Synergies

OTA CAR SOFTWARE UPDATION + SMART PHONE ENABLEDTELEMATICS
FIXD, DRIVEBOT, VOYOMOTIVE, ZENE, aryaa

INTELLIGENT MANUFACTURING

NEW/ADVANCED MATERIALS
AQUARIUS, NAWA TECHNOLOGIES, SIRRUS, NANOSTEEL

RAPID PROTOTYPING - 3D PRINTING, MODULARIZATION, OPEN SOURCE
Carbon, nanocore, DIVERGENT, OSVehicle, stratasys, VADER

ADVANCED / AUTOMATED ASSEMBLY LINE
Grabit, SYMBIO, CLEARPATH, ROBOMOTIVE, rethink robotics.

MATERIAL CHARACTERIZATION & TESTING
SynTouch, SASTRA, VIDI, OPTOFIDELITY

ONBOARD SENSORS

LOCATION - GIS, PRECISION POSITIONING, PATH PLANNING
swift NAVIGATION, radiosense, EXO TECHNOLOGIES

VISION / CAMERA
DEEP VISION, Carnegie Robotics, machines with vision, ROADSENSE, DEEPSCALE, Chronocam, VAYAVISION

LIDAR
faceI, INNOVIZ, PHANTOM INTELLIGENCE, VOYAGE, QUANERGY, AEYE, TRILUMINA, LeddarTech, Velodyne LiDAR, STROBE

RADAR
OCULii, TOPOSENS, RFISEE, 6TH SENSE, SDS

SPECIALTY VEHICLES

2-WHEELERS
mooike, smarthalo, superpedestrian, Zagster

PUBLIC TRANSPORT
nauya, Varden Labs, AURO, EASY MILE

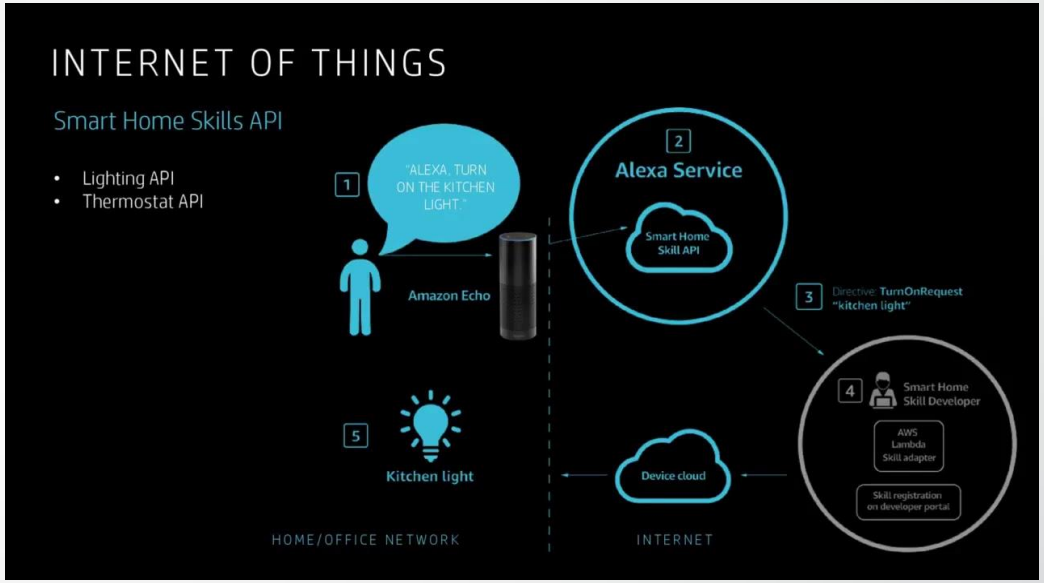
TRUCKS / FREIGHT
JAYBRIDGE ROBOTICS, OTTO MOTORS, PELOTON, TESLA, FLEXPORT, TRUELITE TRACE, STARSKY ROBOTICS

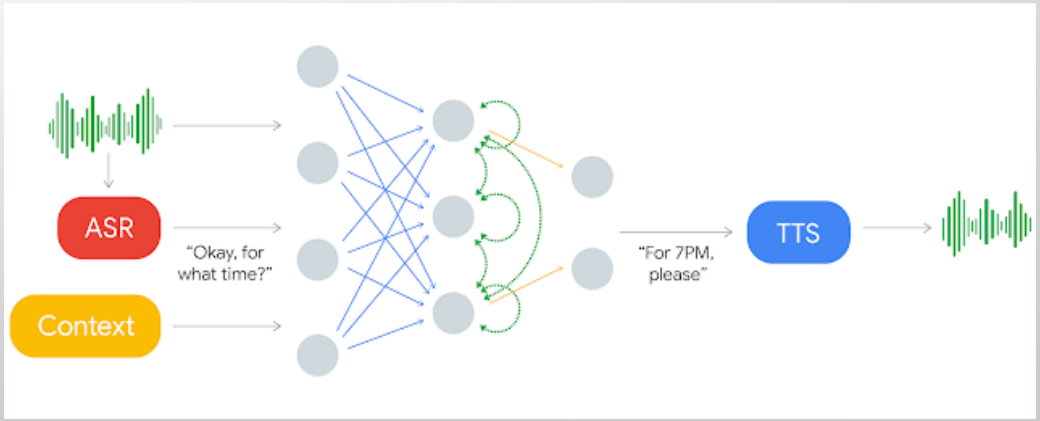
FLIGHT
WRIGHT ELECTRIC, ZUNUM Aero, ZEE, JOBY, Kitty Hawk, LILIUM AVIATION, AEROMOBIL

OTHER: HYPERLOOP, PERSONAL MOBILITY
hyperloop one, ninebot, WHILL

Virtual Assistants

- Amazon's Alexa/Echo
  - Home automation via a smart home hub and smart devices
    - Machine Learning
    - Grouping
- Google Assistant
  - Google Duplex, an extension
    - Deep Learning



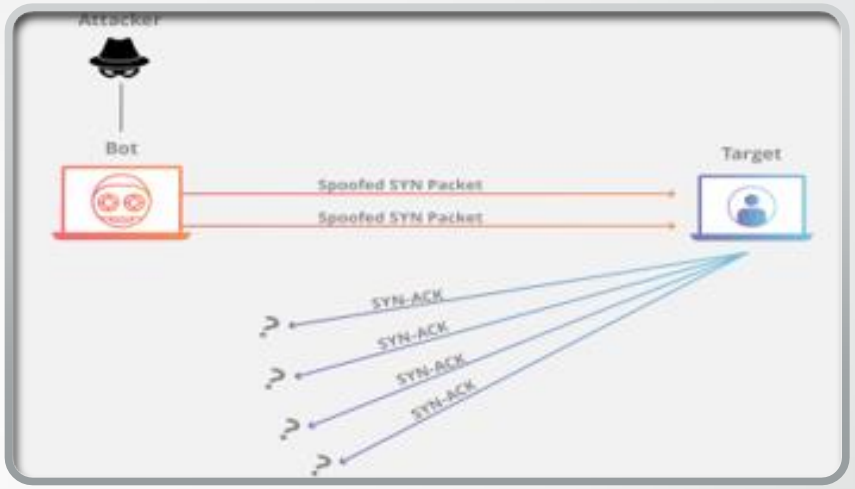


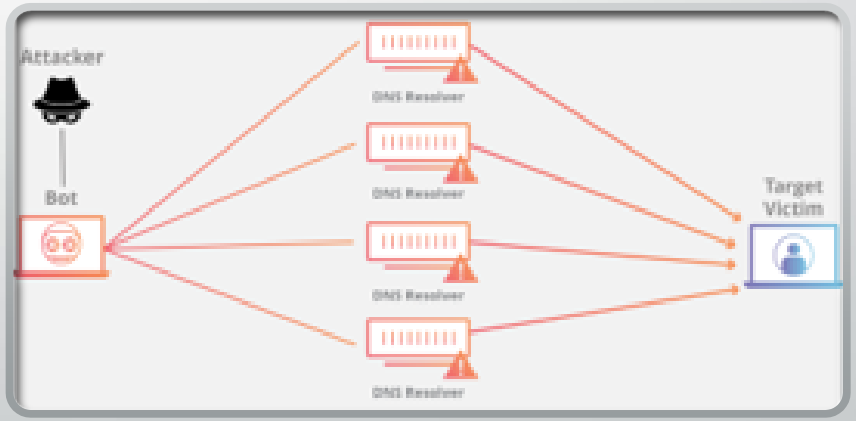
Household Products

- Roomba
- Samsung Smart Refrigerator
- Nest Smart Thermostat
- Smart plug
- Home Security Systems
- Toyota and Honda (Innovative Mobility Robot)

Security Challenges

- Security
  - IoT vulnerable to threats and attacks
  - DDoS attack - Distributed Denial of Service
    - Overwhelm networks
    - Network floods can be from more than one source



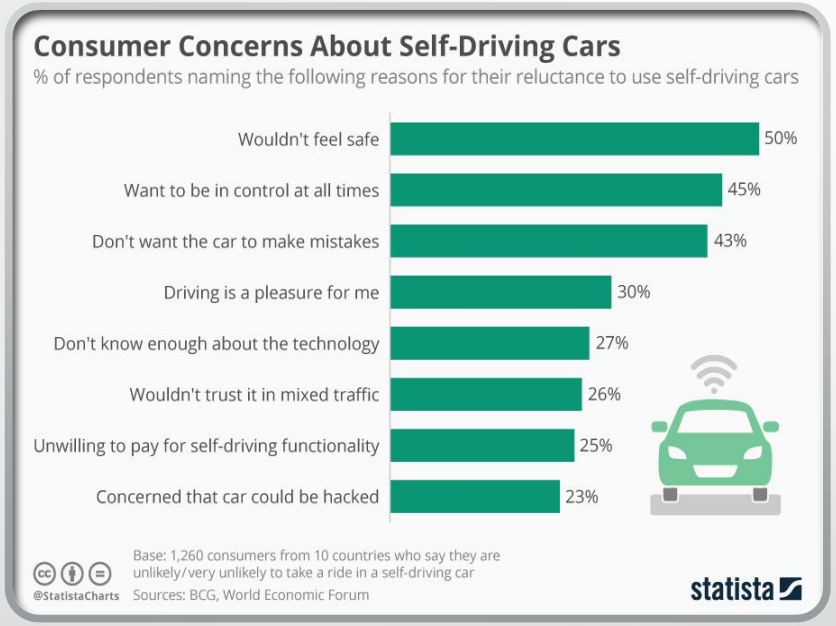


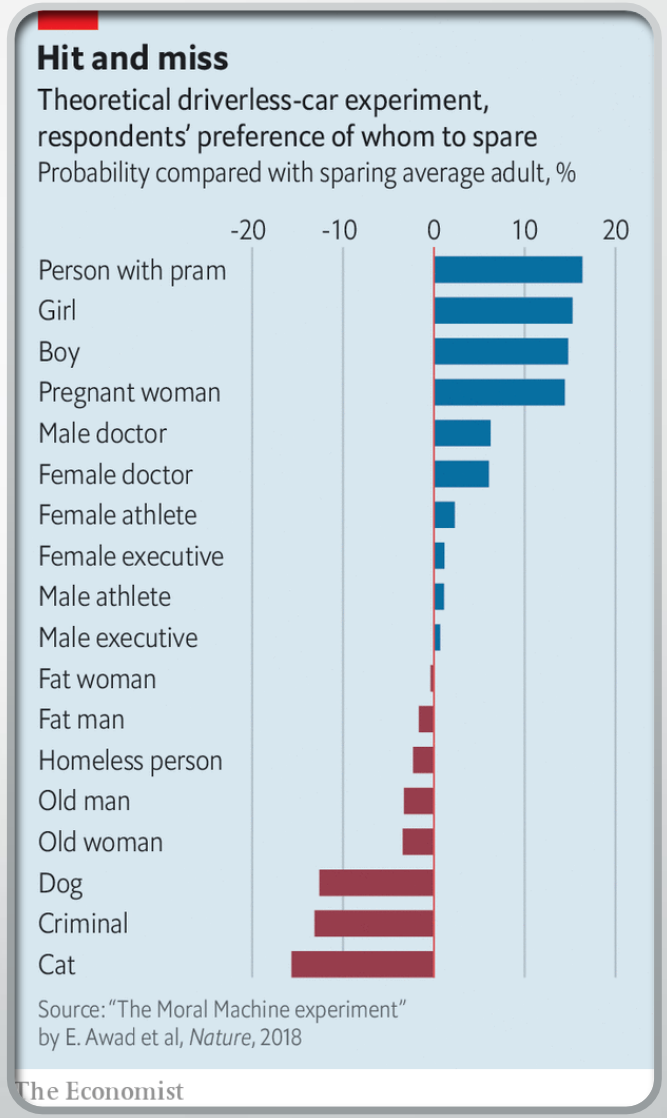
Technological Challenges

- Current technology insufficient
  - Dangerous weather
  - Unpredictable roads
  - Human interaction
  - Incomplete Network

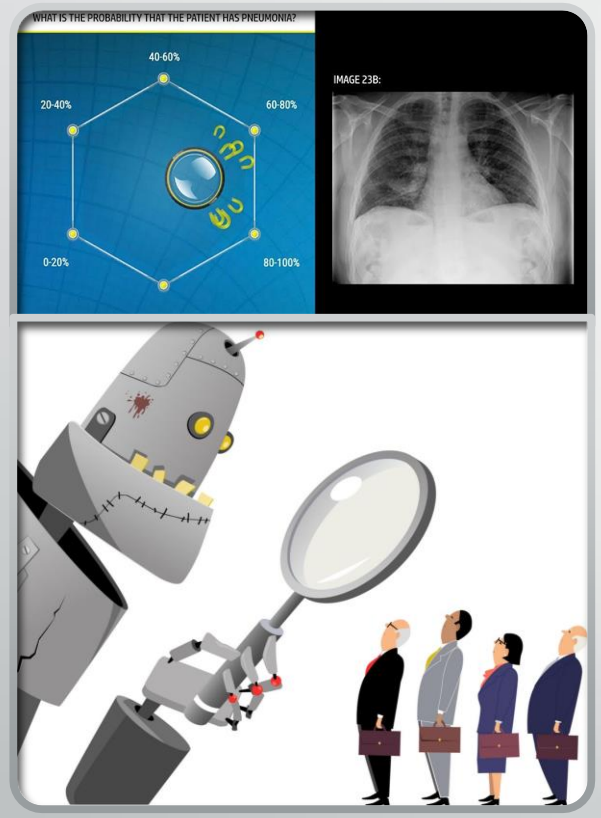
Perception Challenges

- Public Acceptance
  - Mainly safety issues
  - Identification
  - Excess labor





AuT'S BIAS PROBLEM



- A.I's decisions are only good to the ability that humans feed them.
- Professor Deirdre Mulligan, a specialist in AI, said that, "they have been optimized to do a task… and in many cases the data isn't fair."
- Today's A.I is used to make significant legal decisions such as X-ray that scans for tumor.

Key Takeaways

- The way of the future using AI, ML, and DL
  - Expected to be safer
  - Minimizes the need for human interaction
  - Effectively cuts down time and costs in the long run with automation
- Faces criticism from the public and potential government regulation
- Requires further innovation in AI and the internet before more developments

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