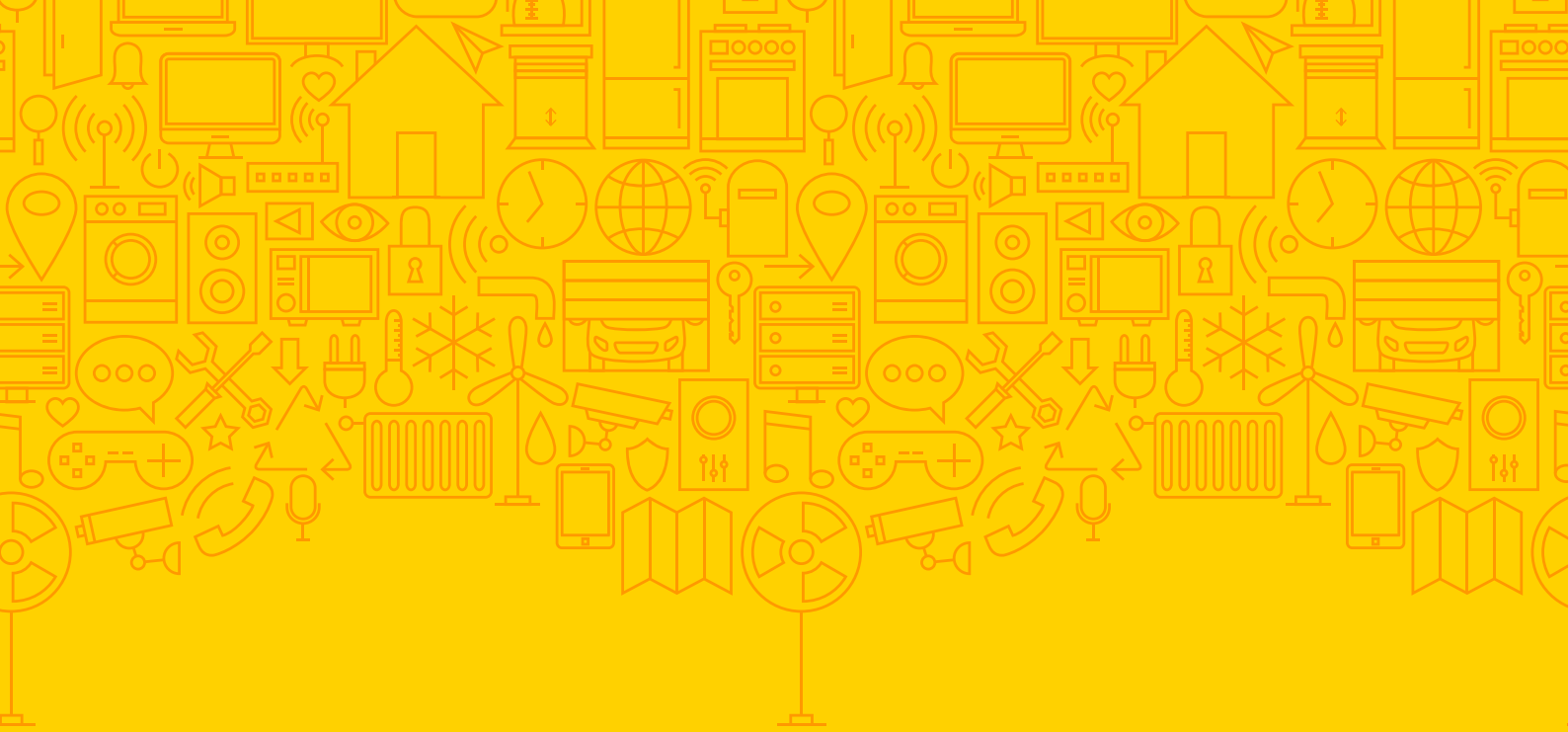




Smart Homes

Future of Robots as Household Consumer Devices





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“improvement in robots
leveraged by digital
technologies such as artificial
intelligence,
big data and IoT”

Introduction

According to a research report by Tractica, a global leader in emerging technology market research, the market for consumer robots is expected to increase from USD 5 billion in 2018 to USD 19 billion by 2025. In volume terms, the same is expected to increase from 15 million to 66 million units in the same period (2018-2025). [1]

Until now, most of the robot sales has been concentrated on robotic vacuum cleaners. Although, robots have been manufactured to reliably perform other tasks such as cleaning windows, swimming pools and even mow the lawn, the price of these products far outweigh the cost of the products.

With changing demographics, the number of older people per working person is higher than ever before in many of the developed economies such as Japan, and United States. This is expected to contribute to a gradual increase in of robots adoption. The challenges associated with robots adoption broadly classified

under technological, social, and ethical considerations have prevented their widespread adoption in homes. Besides these, the challenges associated with manufacturing highly reliable and sufficiently available robots such as short battery times, high cost of components, and inability to make robot manipulators anywhere close to the performance of human hands are inhibiting the rapid growth of the market.

Notwithstanding the manufacturing and consumer-related challenges associated with the adoption of robots, factors such as the below have triggered the growth in adoption of robots at house holds

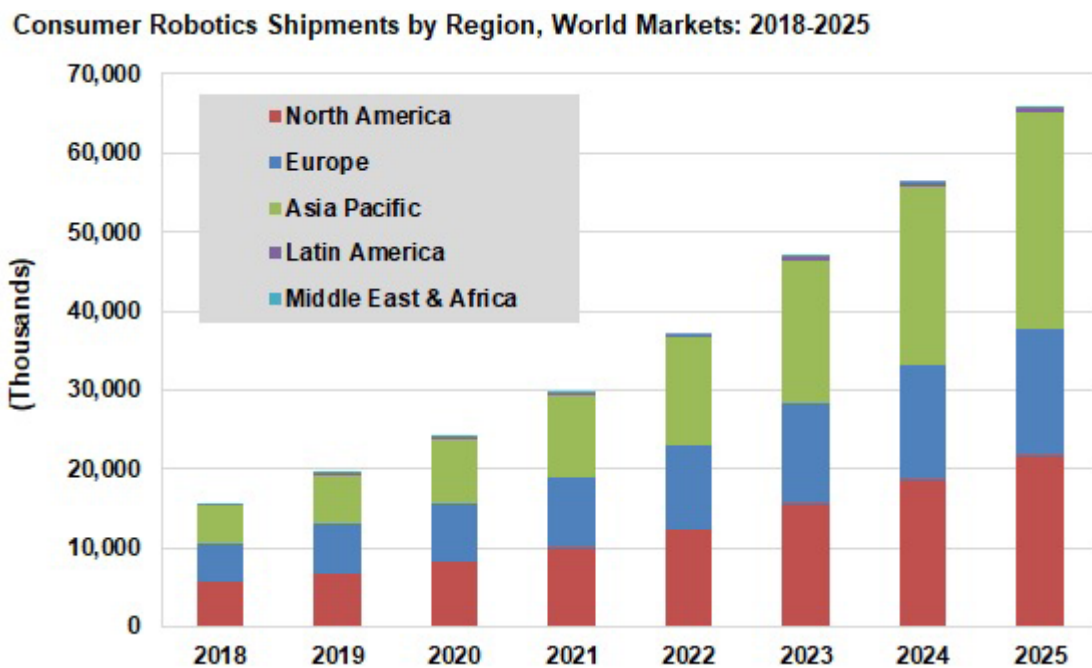
- ***Servant/caregiver issues***
- ***Lack of motivation to perform household chores***
- ***Increasing cases of loneliness***
- ***Increasing technical literacy among the elderly***
- ***Rise in disposable income***

[1] Chuck Martin (2019). Consumer Robots On The Rise.

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In addition to these consumer specific reasons, improvement in robots leveraged by digital technologies such as artificial intelligence, big data, and IoT, and adoption of new business models is set to expand the consumer robotics market at a rapid pace in the years to come.

Figure 1 | Consumer robots market (2018-2025). Tractica. (2019). Consumer Robot Shipments Will Surpass 65 Million Units Annually by 2025. [2]



[2] Tractica. (2019). Consumer Robot Shipments Will Surpass 65 Million Units Annually by 2025.

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Top 3 Challenges in the Adoption of Consumer Robots

Although consumer robots have been in market for over two decades, their adoption has been rather sluggish due to a multitude of reasons that could be grouped under three main categories.



1) Technological ^[3]

Cost | The purchase decision for a novel product is made primarily based on two factors: quality of output and cost. Both factors are considered in comparison to the status quo. The current generation of robots performs pretty decently, however, they are prohibitively expensive for purchase in consumer households. Compared to performing house chores by household members or employing a servant, these robots require a steep upfront cost. The cost of these devices are high predominantly due to the cost of sensors and motors that control their movement. As these sensors have become more affordable with the advancement in electric autonomous cars, the mass production of robots is becoming increasingly viable. ^[4]

Adaptability to the house setting changes | As against an industrial setting, where robots have found acceptance and are present ubiquitously, every house is different from the other. Moreover, the placement of products varies within a house on a daily basis. This is attributed to the lack of order, lack of hierarchy and varied preferences among the family members. This poses a huge technological challenge in designing robots that can adapt to house setting changes as against customizing a robot to a house as there is a high chance of robot becoming useless due to change in the placement of objects in the house.

[3] Dave Coplin. (n.d). The Good Robot Report: The robot revolution is coming.

[4] Frugal Entrepreneur. (2019). Smart Homes Are Increasing the Demand in Consumer Robotics.

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Dexterity of manipulators | The skill which is considered a granted in human beings like the ability to pick up a variety of objects is not yet within the reach of robots. The manipulators that act like hands and fingers in human beings do not have the dexterity required to perform multitude of functions performed by human hand. This depends, in addition to the movement of fingers harmoniously, also on the texture of human skin which enable it to grip the products firmly.



2) Social

Technological singularity | Aversion to using robots can in partly be explained by the fear of being taken over by robots. Singularity is a hypothetical point in future when the technological growth results in machines that are far more intelligent than humans. This is feared to lead to a situation which would result in irreversible changes to the human civilization. The belief that machines would overpower humans resulting in human being becoming servants to machines or possibly extinction of human species at a subconscious level is impeding adoption of robots at homes.

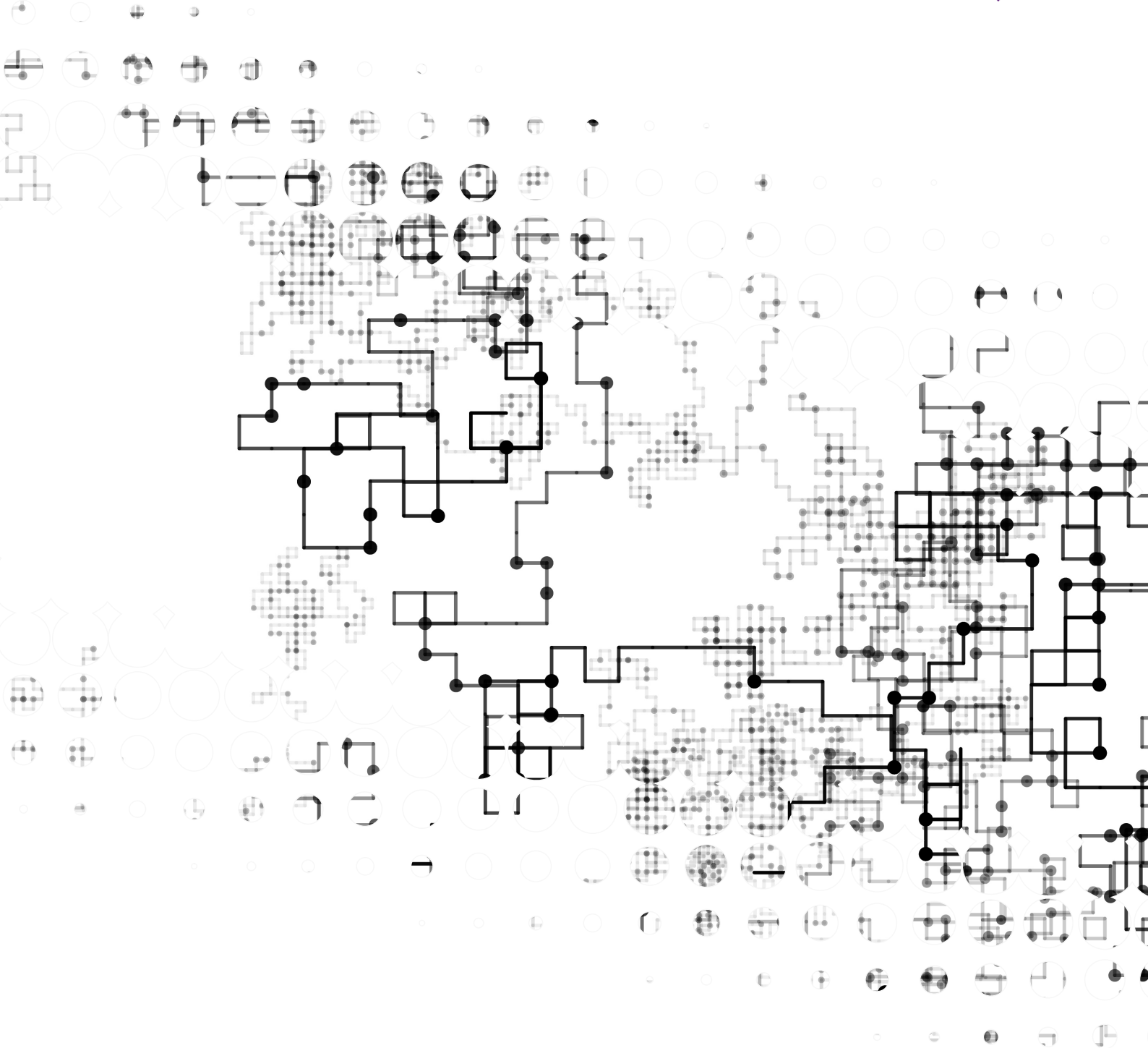


Security | Unlike smart devices like mobile phones and smart speakers, robots are physical devices that have the ability to move and perform task with its manipulators. This expose humans to harm either due to malfunction or in the worst case by being hacked by unscrupulous criminals. Increase in the number of hacking activities unleashed on highly secure organizations such as Google, NASA, US National Security Agency, and financial institutions have only increased the fear of owning robots at homes. Considering the cost of these robots, the affluent who can afford these machines are the primary target of hackers resulting in fears over the adoption of robots.

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