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Babysitter, friend, surgeon: robots wear many hats as investors chase their spectacular growth story

Synopsis

Once restricted to the production lines of factories, robots have stepped out into the world. Their use cases have been on a steady climb, with robots playing an integral role in everything from retail to hospitals to offices and even homes. Thanks to AI, ML, and cloud, experts say soon robots will make their presence felt in our everyday life.

Astro is only about the size of a pup. But it's more capable than a grown up canine. It can bring you a bottle of water when you are thirsty and even guard your home when you are away. Above all, Astro can do what man's best friend can't. It can chat over video calls and play your favourite music.

Armed with its binocular vision and three wheels, Astro can follow you around, switch on the television, and display a visitor's face on its 10-inch screen before you answer the door. It can recognise faces (only if you want it to) and even carry a couple of beer cansin its storage compartment for your guests.

Launched last week, Amazon's first robot pet will go on sale in the US by year end. Priced at USD999, Astro can't cook or do your laundry for the time being, but technology geeks believe that in course of time it will be able to carry out these tasks as well. While the launch of Astro by the e-commerce giant could mark the beginning of the age of robots in our day-to-day lives, back home robots such as Milagrow and Roomba have been mopping and cleaning floors for a while now. Similarly, today thousands of Mikos play with kids today, and the advanced personal robot engages them in conversations in a way that even smart speakers can't.

Clearly, robots are making their presence felt in various avenues of life like never before. From retail outlets to offices and homes to hospitals, robots are now an integral part of several functions. Not surprisingly, the count of startups that make robots is also on a steady climb. Over the last four years, 97 startups engaged in robotics were funded, with total investments into the segment amounting to USD425 million, according to data from deal tracker Tracxn. So far in calendar 2021, 15 robot makers have attracted around USD100 million in funding.

Yearly sales of robots, though still small, are growing at a fast clip. The number of robots sold per year across India (for various uses from manufacturing to offices to homes) jumped from a few hundred in 2010 to close to 3,000 in 2020.

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— Manan Bateriwala, founder, Keepsake Automation

Meanwhile, robots are growing more intelligent, thanks to newer technologies and cloud computing. At e-commerce warehouses, robots help move boxes and manage supply chains while at omnichannel retail outlets they fulfil online orders. At households, they chat with kids and even play hide and seek.

“Functions such as sales, human resources, and finance are frequently using robotic process automation and are depending on chatbots to fetch information. Use of physical robots will increase in sectors like

healthcare. Robots can help improve outcomes by doing very precise activities like alignment in knee replacement surgeries," says Arnab Basu, advisory leader and partner, PwC.

According to Vijay Bhaskaran, AI and intelligent automation expert, EY India, dependency on humans alone limits the ability of businesses to scale. "From the back end, robots are moving to the front end. We see a 10x growth in [sales of] physical robots in the coming years."

Getting smarter with tech

Among the many things that they are capable of, robots can segregate waste smartly. They can not only distinguish dry and wet waste but also identify different kinds of plastics. For example, the kind of plastic used in a mineral water bottle is different from the one from which a bottle of toilet cleaner is made. The robot's ability to distinguish the two makes recycling easier.

These are just some of the new tasks that robots have started doing in the last two years. Thanks to improving technology, the earlier generation of robots, which combine mechanical and software engineering expertise, is getting an upgrade with the use of artificial intelligence (AI), machine learning (ML), and cloud computing. Gaurav Vasu, founder of information services company UnearthInsight sees it as the next stage of evolution for enterprises. "First, it was the implementation of business software like ERP. Then came data connectivity and mobility. Now, robots are getting better by using AI, ML, cloud, and other technologies," he says.

For example, a robotic arm now has a pair of 'eyes' which helps it maneuver better and cover more area. This is helping increase their applications. It's all about bringing in more efficiency, precision, safety, and scale. For example, the cost of human labour to clean manholes is less than USD10 per day in India. A robot is far more expensive, but it ensures that precious lives are not lost. Over the last four years, around 350 people died while cleaning manholes. It also means that by deploying robots for such tasks, humans can take up more socially acceptable jobs or may even supervise the robots cleaning the manholes.

Thiruvananthapuram-based Genrobotic Innovations has sold 70 such manhole-cleaning robots across 14 states in India. These robots, unlike suction pipes and hoses, can see what they are doing and have 'cleaning intelligence'. They also have the flexibility to work like humans. The goal of the startup, founded in 2018, is to eliminate manual scavenging and it expects 30,000 such robots to be deployed in the next three-five years in India. It is also trying to address the skyscraper cleaning market. Once robots take up this function, humans don't have to climb tall buildings to keep them clean by risking their own lives.

Anil Joshi, managing partner, Unicorn India Ventures, says, "Robots will help in improving the quality of life for humans". Genrobotic won the ET Startup Awards 2021 in the social enterprise category.

Beyond factories

Though robots have been around for several decades globally, they entered India only a couple of decades ago. So far, their use was limited mostly to auto manufacturers and some industrial welding jobs. But now, with their enhanced capabilities, robots are taking up new jobs. While large companies such as ABB, Fanuc Corporation, Kawasaki Heavy Industries, Panasonic, and Intuitive Surgical have been making robots for over two decades, startups and niche players are also doing their bit to take robots into newer areas.

Take Chennai-based Fabheads Automation which was incubated at IIT Madras in 2016. It's focused on lightweight manufacturing using carbon-fibre materials that are used across industries from shipping to drones. While the electronic parts of drones are imported, propellers are locally made. Around 90% of them are made manually, resulting in lack of reliability and precision.

Dhinesh Kanagaraj, founder and CEO, Fabheads Automation, points out that 30% of handmade propellers are rejected. Fabheads uses robots and 3D printing to make propellers. Robot-manufactured propeller

blades have less than 5% rejection rate. The startup works with 35 drone companies and a few shipping companies, helping them make carbon-fibre parts.

Ahmedabad-based waste management startup Ishitva Robotic Systems has developed products that help automate the segregation and sorting of waste to improve recycling.

Founded in 2018 by Jitesh Dadlani and Sandip Singh, Ishitva uses AI, ML, and Internet of Things (IoT) to effectively segregate waste to recover recyclables. Ishitva's robots use computer vision to make sorting more efficient at different stages of the process.

The startup's founders wanted to change the way waste sorting was done, which they saw as 'dirty, dull, and dangerous' with mostly women and children doing it. With robots, apart from saving lives of people involved in sorting hazardous materials, the process becomes faster and more accurate. Ten people can segregate one tonne of waste in a day, robots can sort 3.5 tonnes per hour. Ishitva's robots have been trained to detect types of waste and recyclables by using more than five million images.

Another Ahmedabad-based startup, Keepsake Automation, founded in 2017, is trying to expand the use of welding robots into new industries including oil and gas. Manan Bateriwala, its founder, says, "We see dramatic growth in the use of robots. By 2030 India will need 75,000 robots per year (from around 3,000 per year at present). Welding robots cost INR15 lakh and the return on investment is in about three years".

Empowering robotic arms

As an example of robots taking up the tasks earlier done by humans in factories, robotic arms have been in use for quite some time. Now, startups such as CynLr are improving their capabilities by embedding them with eyes.

Co-founded by Nikhil Ramaswamy, CEO and Gokul NA, chief technology officer, CynLr or Cybernetics Laboratory's goal is to enable robots to see, understand, and learn to grasp and manipulate objects. The duo had earlier worked together at NI (formerly National Instruments Corporation), an American test measurement and automation giant before turning consultants on machine vision and robotics for a few years. In 2019, they set up CynLr backed by Speciale Invest, IIM Ahmedabad's CIIE (a startup incubator), Delhi-based GrowX Ventures, and others.

Robotic arms cost around USD20,000 each, but can work only in a limited area with ability to, say, pick up nuts and bolts only if they lie in a certain orientation. Considerable human labour is involved in ensuring that parts to be used by robotic arms are kept in the right way. To solve for this, the Bengaluru-based startup's team took standard camera lenses and wrote the code to empower robotic arms with vision. This way, they eliminate the need for human assistance by placing parts (like nuts, bolts, and welding equipment) in a particular way. Robots are able to see and grasp objects in any orientation, improving their capability. "We built a vision and manipulation hardware and software stack to enable robot arms to grasp objects even if they are in unpredictable or random environments. It's object intelligence for robots," says Gokul NA.

The duo believes this will enable robotic arms to be used in more places other than automobile plants. Ramaswamy says, "Vision expands the capability of pick-and-place robots and these can be deployed in e-commerce warehouses, logistics companies, and others."

Vishesh Rajaram, co-founder, Speciale Invest says, "Work that manual labour cannot do will be done by robots. Giving vision capabilities to robots expands their use in newer sectors as well." Speciale Invest evaluated two dozen robotic ventures before investing in CynLr.

GreyOrange, founded in 2012, is trying to improve efficiencies of supply chains, warehouses, and even omnichannel retailers where robots can fulfil orders that come from online shoppers. It doesn't see robots taking jobs from humans, but expects them to help improve efficiency and accuracy. "It's hard to 'implement

algorithms' on people, but we can implement them across a fleet of robots so that humans can focus on more intelligent jobs rather than repetitive chores," says Akash Gupta, chief technology officer, GreyOrange.

Flipkart, Myntra, and Jabong are among GreyOrange's major customers in the country. Gupta says companies using robots in India have moved to level 2 automation from level zero in 2012-13 and level 1 later — which is basically conveyor belts. It goes up to level 5, or dark warehouses where robots do everything from sorting products to shipping, a stage not yet achieved globally.

On the other end of the spectrum, startups such as Miko are making robots to engage, educate, and entertain kids aged five to 10 years. When a child returns from school and talks to Miko about a football game, the robot can engage in a conversation by asking questions including the number of goals scored by both teams.

"In voice-activated devices (smart speakers like Alexa), when you ask a question, it's the end of the session. Miko engages in more natural conversations," says Sneh Vaswani, cofounder and CEO, Miko. Vaswani and two others from IIT Bombay founded Miko in 2015. The founders had earlier worked in robotics and AI in oil and gas and defence sectors and felt that the consumer space remained untouched by robots.

Miko is backed by YourNest Venture Capital, IvyCap Ventures, and others. Priced at INR25,000, the robot is sold in more than 100 countries with 15% of the sales coming from India. Though smart speakers, too, have similar conversational capability, they can't match a robot in other things. "Imagine a game of hide and seek. A child is hiding and a robot is searching. None of the smart speakers are going to do that." Smart speakers eliminate the need to type and bring about interactions via voice while robots can engage somewhat like humans, an aim that Amazon's Astro also hopes to achieve.

Apoorva Sharma, partner at Stride Ventures which is an investor in Miko, says, "There's a huge growth opportunity for robots at homes that use conversational AI. Miko is constantly learning and has collected two-and-a-half years of data to answer queries and talk to kids". Quoting industry data, she says, the personal robotics market globally was at USD22 billion in 2019 and it will grow to USD34 billion in 2022.

Robots everywhere

While startups are exp loring new areas, the big boys of robotics are also scaling up their game. Honda Cars India factory in Tapukara in Rajasthan has about 180 robots that perform a broad range of tasks in different processes such as spot welding, hemming, part handling, sealer dispensing, and painting. In its welding operation, more than 60% of spot welds (a type of welding process that focuses heat on a small area and needs high accuracy) are done by the robots. At Maruti Suzuki India, robots do routine pick-andplace jobs and also carry out welding and sheet-metal stamping as well.

According to Panasonic India, which uses robots in its manufacturing units and also sells them, the pandemic has prompted consumers and enterprises to adopt contactless, automated, digitised solutions and this has led to the rise of robots. Masafumi Himeno, divisional managing director, smart factory solution Panasonic India, says, "This year we plan to expand our strategic focus from auto to non-auto segments like construction equipment, agricultural implements manufacturing etc." He sees robots addressing problems of skills gaps and offering competitive advantage while enabling safe operations with quality and consistency.

Walmart-owned e-commerce major Flipkart started a Center of Excellence for Robotics and Automation in 2018. The aim was to manage movement of goods, do quality checks, and take repetitive jobs in an error-free way that humans might get tired of doing. Also, on days like big sales, currently robots are better at managing surge than humans. Often, humans and robots work together or 'cobots' execute jobs. For instance, a robot can carry boxes to a destination once humans pile them up so that the robot can take them, sort them, scan products and pin codes, and drop them off at the right place for shipping. Today,