REVIEW ON ROBOTIC VEHICLE

B.Sushma[1], Aman kumar singh [2], Ch.Pavan kumar [2], D.Vikas reddy[2], G.Venu madhav[2]

[1]Assistant Professor, [2]UG Scholar

[1,2]Department of Mechanical Engineering, Guru Nanak Institute of Technology, Rangareddy, Telangana, India

ABSRTACT

A Robot is a reprogrammable, multifunctional manipulator designed to move material, parts, tools and specialised devices through variable programmed motion for variety of task. Robotics deals with the design, construction, operation, and use of robots, as well as computer systems for their control, sensory feedback, and information processing. The goods loading vehicle is used for loading and Unloading of goods by using lead screw mechanism, Lift and Rail carriage mechanism by inducing a set of instructions which will be given to the Robot. Earlier, this process used to be carried out Manually but by using this vehicle, process is done easily. We have built a prototype of goods loading vehicle by inducing set of instructions to it. We can control it by giving instructions through phone by connecting it to Bluetooth.

I. INTRODUCTION

Robotics is a branch of engineering and science that includes electronics engineering, mechanical engineering and computer science and so on. This branch deals with the design, construction, use to control robots, sensory feedback and information processing. These are some technologies which will replace humans and human activities in coming years. These robots are designed to be used for any purpose but these are using in sensitive environments like bomb detection, deactivation of various bombs etc. Robots can take any form but many of them have given the human appearance. The robots which have taken the form of human appearance may likely to have the walk like humans, speech, cognition and most importantly all the things a human can do. Most of the robots of today are inspired by nature and are known as bio-inspired robots.

Robotics is that branch of engineering that deals with conception, design, operation, and manufacturing of robots. There was an author named Isaac Asimov, he said that he was the first person to give robotics name in a short story composed in 1940's. In that story, Isaac suggested three principles about how to guide these types of robotic machines. Later on, these three principles were given the name of Isaac's three laws of Robotics. These three laws state that:

- Robots will never harm human beings.
- Robots will follow instructions given by humans with breaking law one.
- Robots will protect themselves without breaking other rules.

Characteristics:

There are some characteristics of robots given below:

- **Appearance:** Robots have a physical body. They are held by the structure of their body and are moved by their mechanical parts. Without appearance, robots will be just a software program.
- **Brain:** Another name of brain in robots is Onboard control unit. Using this robot receive information and sends commands as output. With this control unit robot knows what to do else it'll be just a remote-controlled machine.
- **Sensors:** The use of these sensors in robots is to gather info from the outside world and send it to Brain. Basically, these sensors have circuits in them that produces the voltage in them.
- **Actuators:** The robots move and the parts with the help of these robot's move is called Actuators. Some examples of actuators are motors, pumps, and compressor etc. The brain tells these actuators when and how to respond or move.

- **Program:** Robots only works or responds to the instructions which are provided to them in the form of a program. These programs only tell the brain when to perform which operation like when to move, produce sounds etc. These programs only tell the robot how to use sensors data to make decisions.
- **Behaviour:** Robots behaviour is decided by the program which has been built for it. Once the robot starts making the movement, one can easily tell which kind of program is being installed inside the robot.

Types of Robots:

These are some types of robots given below:

- **Articulated:** The feature of this robot is its rotary joints and range of these are from 2 to 10 or more joints. The arm is connected to the rotary joint and each joint is known as the axis which provides a range of movements.
- **Cartesian:** These are also known as gantry robots. These have three joints which use the Cartesian coordinate system i.e. x, y, z. These robots are provided with attached wrists to provide rotatory motion.
- **Cylindrical:** These types of robots have at least one rotatory joint and one prismatic joint which are used to connect the links. The use of rotatory joints is to rotate along the axis and prismatic joint used to provide linear motion.
- **Polar:** These are also known as spherical robots. The arm is connected to base with a twisting joint and have a combination of 2 rotatory joint and one linear joint.
- **Scara:** These robots are mainly used in assembly applications. Its arm is in cylindrical in design. It has two parallel joints which are used to provide compliance in one selected plane.
- **Delta:** The structure of these robots is like spider-shaped. They are built by joint parallelograms that are connected to the common base. The parallelogram moves in a dome-shaped work area. These are mainly used in food and electrical industries .

Brief History

Origins of "robot" and "robotics": The word "robot" conjures up a variety of images, from R2D2 and C3PO of Star Wars fame; to human-like machines that exist to serve their creators (perhaps in the form of the cooking and cleaning Rosie in the popular cartoon series the Jetsons); to the Rover Sojourner, which explored the Martian landscape as part of the Mars Pathfinder mission. Some people may alternatively perceive robots as dangerous technological ventures that will someday lead to the demise of the human race, either by outsmarting or outmuscling us and taking over the world, or by turning us into completely technology-dependent beings who passively sit by and program robots to do all of our work. In fact, the first use of the word "robot" occurred in a play about mechanical men that are built to work on factory assembly lines and that rebel against their human masters. These machines in R.U.R. (Rossum's Universal Robots), written by Czech playwright Karl Capek in 1921, got their name from the Czechwordforslave.

The word "robotics" was also coined by a writer. Russian-born American science-fiction writer Isaac Asimov first used the word in 1942 in his short story "Runabout." Asimov had a much brighter and more optimistic opinion of the robot's role in human society than did Capek. He generally characterized the robots in his short stories as helpful servants of man and viewed robots as "a better, cleaner race." Asimov also proposed three "Laws of Robotics" that his robots, as well as sci-fi robotic characters of many other stories, followed:

Definitions of "robot"

So, what exactly is a robot? This actually turns out to be a rather difficult question. Several definitions exist, including the following:

"A reprogrammable, multifunctional manipulator designed to move material, parts, tools, or specialized devices through various programmed motions for the performance of a variety of task" said by Robot Institute of America, 1979.

"An automatic device that performs functions normally ascribed to humans or a machine in the form of a human" said by Webster's Dictionary. “a reprogrammable manipulator device" said by British Department of Industry. "Robotics is that field concerned with the intelligent connection of perception to action" said by Mike Brady **Early Conceptions of Robots**

One of the first instances of a mechanical device built to regularly carry out a particular physical task occurred around 3000 B.C.: Egyptian water clocks used human figurines to strike the hour bells. In 400 B.C., Archytus of Taremtum, inventor of the pulley and the screw, also invented a wooden pigeon that could fly. Hydraulically-operated statues that could speak, gesture, and prophecy were commonly constructed in Hellenic Egypt during the second century B.C.

In the first century A.D., Petronius Arbiter made a doll that could move like a human being. Giovanni Torriani created a wooden robot that could fetch the Emperor's daily bread from the store in 1557.

Robotic inventions reached a relative peak (before the 20th century) in the 1700s; countless ingenius, yet impractical, automata (i.e. robots) were created during this time period. The 19th century was also filled with new robotic creations, such as a talking doll by Edison and a steam-powered robot by Canadians. Although these inventions throughout history may have planted the first seeds of inspiration for the modern robot, the scientific progress made in the 20th century in the field of robotics surpass previous advancements a thousandfold.

The first modern robots:

The earliest robots as we know them were created in the early 1950s by George C. Devol, an inventor from Louisville, Kentucky. He invented and patented a reprogrammable manipulator called "Unimate," from "Universal Automation." For the next decade, he attempted to sell his product in the industry, but did not succeed. In the late 1960s, businessman/engineer Joseph Engleberger acquired Devol's robot patent and was able to modify it into an industrial robot and form a company called Unimation to produce and market the robots. For his efforts and successes, Engleberger is known in the industry as "the Father of Robotics."

Academia also made much progress in the creation new robots. In 1958 at the Stanford Research Institute, Charles Rosen led a research team in developing a robot called "Shakey." Shakey was far more advanced than the original Unimate, which was designed for specialized, industrial applications. Shakey could wheel around the room, observe the scene with his television "eyes," move across unfamiliar surroundings, and to a certain degree, respond to his environment. He was given his name because of his wobbly and clattering movements.

Modern robots are not unlike toddlers: It's hilarious to watch them fall over, but deep down we know that if we laugh too hard, they might develop a complex and grow up to start World War III. None of humanity's creations inspires such a confusing mix of awe, admiration, and fear: We want robots to make our lives easier and safer, yet we can't quite bring ourselves to trust them. We're crafting them in our own image, yet we are terrified they'll supplant us.

But that hesitation is no obstacle to the booming field of robotics. Robots have finally grown smart enough and physically capable enough to make their way out of factories and labs to walk and roll and evenleap among us. The machines have arrived.

You may be worried a robot is going to steal your job, and we get that. This is capitalism, after all, and automation is inevitable. But you may be more likely to work alongside a robot in the near future than have one replace you. And even better news: You're more likely to make friends with a robot than have one murder you. Hooray for the future!

R.U.R. would establish the trope of the Not-to-BeTrusted Machine (e.g., Terminator, The Stepford Wives, Blade Runner, etc.) that continues to this day—which is not to say pop culture hasn't embraced friendlier robots. Think Rosie from The Jetsons. (Ornery, sure, but certainly not homicidal.) And it doesn't get much family-friendlier than Robin WilliamsasBicentennial Man.

The real-world definition of "robot" is just as slippery as those fictional depictions. Ask 10 roboticists and you'll get 10 answers. But they do agree on somegeneral guidelines: A robot is an intelligent, physically embodied machine. A robot can perform tasks autonomously. And a robot can sense and manipulate its environment.

Think of a simple drone that you pilot around.
That's no robot. But give a drone the power to take off and land on its own and sense objects and suddenly it's a lot more robot-ish. It's the intelligence and sensing and autonomy that's key.

But it wasn't until the 1960s that a company built something that started meeting those guidelines. That's when SRI International in Silicon Valley developedShakey, the first truly mobile and perceptive robot. This tower on wheels was wellnamed—awkward, slow, twitchy. Equipped with a camera and bump sensors, Shakey could navigate a complex environment. It wasn't a particularly confident-looking machine, but it was the beginning of the robotic revolution.

Around the time Shakey was trembling about, robot arms were beginning to transform manufacturing. The first among them wasUnimate, which welded auto bodies. Today, its descendants rule car factories, performing tedious, dangerous tasks with far more precision and speed than any human could muster. Even though they're stuck in place, they still very much fit our definition of a robot— they're intelligent machines that sense and manipulate their environment.

Robots, though, remained largely confined to factories and labs, where they either rolled about or were stuck in place lifting objects. Then, in the mid-1980s Honda started up a humanoid robotics program. It developed P3, which could walk pretty darn good and also wave and shake hands, much to the delight of aroomful of suits. The work would culminate in Asimo, the famed biped, which once tried totake out President Obamawith a wellkicked soccer ball. (OK, perhaps it was more innocent than that.)

Today, advanced robots are popping up everywhere. For that you can thank three technologies in particular: sensors, actuators, and AI.

So, sensors. Machines that roll on sidewalks todeliver falafelcan only navigate our world thanks in large part to the 2004 Darpa Grand Challenge, in which teams of roboticists cobbled togetherselfdriving carsto race through the desert. Their secret? Lidar, which spews lasers to build a 3-D map of the world. The ensuing private-sector race to develop self-driving cars has dramatically driven down the price of lidar, to the point that engineers can create perceptive robots on the (relative) cheap.

Lidar is often combined with something called machine vision—2-D or 3-D cameras that allow the robot to build an even better picture of its world. You know how Facebook automatically recognizes your mug and tags you in pictures? Same principle with robots. Fancy algorithms allow them topick out certain landmarks or objects.

Sensors are what keep robots from running us down.
They're why a robot mule of sorts can keep an eye on you, following you andschlepping your stuff around; machine vision also allows robots toscan cherry trees to determine where best to shake them, helping fill massive labor gaps in agriculture.

Within each of these robots is the next secret ingredient: theactuator, which is a fancy word for the combo electric motor and gearbox that you'll find in a robot's joint. It's this actuator that determines how strong a robot is and how smoothly ornot smoothly it moves. Without actuators, robots would crumple like rag dolls. Even relatively simple robots like Roombas owe their existence to actuators. Self-driving cars, too, are loaded with the things.

Actuators are great for powering massive robot arms on a car assembly line, but a newish field, known as soft robotics, is devoted to creating actuators that operate on a whole new level. Unlike mule robots, soft robots are generally squishy, and use air or oil to get themselves moving. So for instance, one particular kind of robot muscle uses electrodes to squeeze a pouch of oil, expanding and contracting totug on weights. Unlike with bulky traditional actuators, you could stack a bunch of these to magnify the strength: A robot named Kengoro, for instance, moves with 116 actuators that tug on cables, allowing the machine to dounsettlingly human maneuvers like pushups. It's a far more natural-looking form of movement than what you'd get with traditional electric motors housed in the joints.

And then there's Boston Dynamics, which created the Atlas humanoid robot for the Darpa Robotics Challenge in 2013. At first, university robotics research teams struggled to get the machine to tackle the basic tasks of the original 2013 challenge and the finals round in 2015, like turning valves and opening doors. But Boston Dynamics has since that time turned Atlas into a marvel that cando backflips, far outpacing other bipeds that still have a hard time walking. (Unlike the Terminator, though, it does not pack heat.) Boston Dynamics is also working on a quadruped robot called SpotMini, which can recover in unsettling fashion when humans kick ortug on it. That kind of stability will be key if we want to build a world where we don't spend all our time helping robots out of jams. And it's all thanks to the humble actuator.

At the same time that robots like Atlas and SpotMini are getting more physically robust, they're getting smarter, thanks to AI. Robotics seems to be reaching an inflection point, where processing power and artificial intelligence are combining totruly smartenthe machines. And for the machines, just as in humans, the senses and intelligence are inseparable—if you pick up a fake apple and don't realize its plastic before shoving it in your mouth, you're not very smart. This is a fascinating frontier in robotics (replicating the sense of touch, not eating fake apples). A company called SynTouch, for instance, has developed robotic fingertips that canpick up a range of sensations, from temperature to coarseness.

As sensors are getting cheaper, the superpowered processors required for AI are doing the same. Thanks to advances in gaming and VR—graphics processing units, or GPUs, are helping mobile robots to perform complex computations right onboard the machine, as opposed to in the cloud, which means they can still operate if they lose their connection. This is particularly important for powering that machine vision, which allows a robot like Kuri torecognize your face. To help you, by the way, not hunt you or anything.

The Future of Robots

Increasingly sophisticated machines may populate our world, but for robots to be really useful, they'll have to become more self-sufficient. After all, it would be impossible to program a home robot with the instructions for gripping each and every object it ever might encounter. You want it to learn on its own, which is where advances in artificial intelligence come in.

Robotic engineers are designing the next generation of robots to look, feel and act more human, to make it easier for us to warm up to a cold machine.

Realistic looking hair and skin with embedded sensors will allow robots to react naturally in their environment. For example, a robot that senses your touch on the shoulder and turns to greet you.

Subtle actions by robots that typically go unnoticed between people, help bring them to life and can also relay nonverbal communication.

Artificial eyes that move and blink. Slight chest movements that simulate breathing. Manmade muscles to change facial expressions. These are all must have attributes for the socially acceptable robots of the future .

II. LITERATURE SURVEY

There are numerous ways for controlling the robots with unique methods and design criteria exist. Robots are most often controlled using tether (wired), wirelessly or autonomously. Some of the traditional wireless controlling methods are using mobile phones, joysticks, keypad, computer terminal, even interfacing with the internet so that they can be controlled anywhere. The following are some of the widely used controlling methods for the robotic vehicle as well as the robotic arm. A microcontroller based system which can be operated by android application. The user's friendly interface present on the operator's mobile phone can be used to control the robotic vehicle as well as its robotic arm. A Bluetooth module acts an interface between the mobile phone and robotic vehicle. This sends proper motional commands to the motors interfaced with the robot according to the signal received. This framework can be employed in chemical industry for handling of hazardous chemicals like sulfuric acid, nitric acid, sodium cyanide etc and prevents humans from inhalation, absorption through skin and ingestion. They can also be used for the movements of heavy objects in any industry [1].

A robotic arm integrated with microcontroller, LCD, DC motors and RF video camera controlled by Internet/LAN connection which is mainly used for patient operation. A proper averaging algorithm is used to reduce the amount of noise coming from the output of the sensors. The Ethernet adapter configured with particular IP address can receive the data from the particular computer. The adapter will send the received data to the microcontroller through serial port. After receiving the data, the microcontroller sends appropriate signals to the DC geared motors to control the robotic arm. This framework is mainly used to cut the skin of the patient using the high-speed blades which is nothing but the robotic arm [2].

The vehicle movement can be controlled based on the detection of motion of hand and refrains the movement of the vehicle if any obstacle is detected in its path. The user can make the vehicle to move around in all possible four directions by simply moving his hand in the desired directions. So that the user doesn't need to press any buttons. The gesture commands can be captured by a simple inertial navigation sensor called Accelerometer. This system also includes ultrasonic sensor which can be helpful to prevent the robotic vehicle colliding with any obstacle. The signals from the sensors are forwarded to the microcontroller and encoder circuit. The encoded signal is transmitter through RF transmitter. RF receiver receives the signal and decodes it. Finally the microcontroller gives appropriate signals to the motors to change the movements of the robots. This system can be used in the field of construction, hazardous waste disposal and field survey near borders [3].

The robotic platform and the robotic arm can be controlled by two separate accelerometers. One accelerometer is mounted on the human hand and another one mounted on the leg of the user capturing its gestures and postures and thus the robotic arm and the platform moves accordingly. The motions performed by the platform are forward, backward, right & left and the operations performed by the robotic arm are pick & place/ drop, raising and lowering the objects. The RF Module is used to transmit the different hand and leg gestures made by the user. The system is also equipped with an IP based camera which can stream real time video wirelessly to any Internet enabled device such as Mobile phone, Laptop, Tablet etc. The biggest advantage of this kind of robotic arm is that it can work in hazardous areas and also in the area which cannot be accessed by the human and also used to implement highly precise medical treatments [4].

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[11]https://doi.org/10.1504/IJVSMT.2015.073042Giovanni Gerardo Muscolo Related information
[1]Department of Mechanics and Machine Design, Polytechnic School, Università degli Studi di Genova, Genova, Italy, Luis Miguel De Leonardo Related information[2]Department of Mechanics and Machine Design, Polytechnic School, Università degli Studi di Genova, Genova, Italy
[12]https://www.geeksforgeeks.org/roboticsintroduct ion/