2021 ISSUE # 1
(MONTH: MAY)

WOXSEN UNIVERSITY
SCHOOL OF TECHNOLOGY

TECHZONE

DEDICATED TO...

THE GREAT, GROWLING ENGINE OF CHANGE- TECHNOLOGY

-ALVIN TOFFLER

SELF-BALANCING ROBOT CREATED & PROGRAMMED

AT SCHOOL OF TECHNOLOGY, WOXSEN UNIVERSITY

WOXSEN UNIVERSITY
SCHOOL OF TECHNOLOGY

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SCHOOL OF TECHNOLOGY

EDITORS' NOTE

From disruptive culture to out-of-this-world inventions, this issue celebrates the innovations and their relentless need to question the way things work

The process of editing involves a lot of functions, like correction, organization, summarization, and sometimes even adding new material and many such changes are done to produce a complete work to the reader.

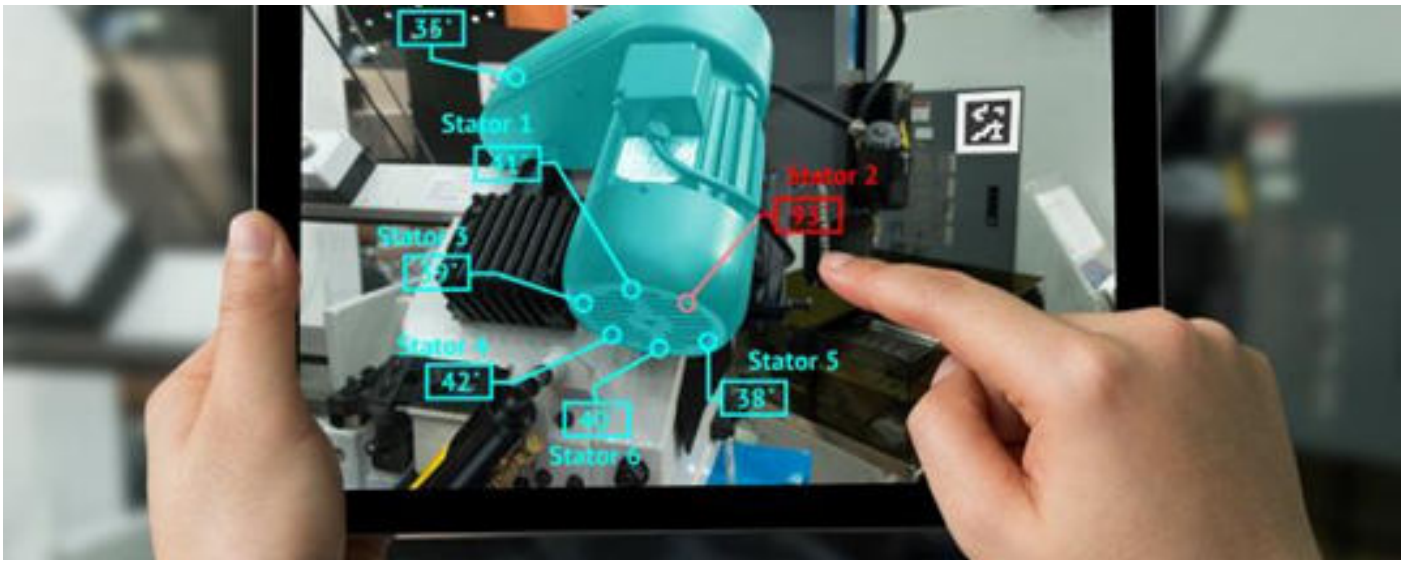
-Adithya Havaldar,
Editor-in-Chief

Editing is said to be the process of killing a story and then slowly bringing it back to life. Sometimes to tell a story, it becomes a necessity to make changes to it, so an experience which most readers will connect to can be provided. In our first issue, you will find stories that amaze and inspire, and we hope you have just as much fun reading it as we did while writing and compiling it.

Vaigarai Sathi,
Editor

AUGMENTED REALITY

By Athrinandan Alimilla



The Research community has a fun word called SLAM, which stands for Simultaneous localization and Mapping.

AR(Augmented Reality) is a digital medium that allows you to overlay virtual content into the physical world in a way that makes it seem like the content is physically there. AR essentially allows us to merge the digital and physical worlds.

This magical technology starts with AR-enabled hardware such as a phone or glasses. Most importantly, AR uses a system of cameras and in some other devices also time-of-flight 3d depth sensors to see and understand the physical world around us.

You look around and make sense of your surroundings. Your mind builds a mental model of the space so that you can memorize it and recall it.

The next time you enter the same space, the processor in your head maps the environment using images from the dual-camera system such as your eyes. Similarly, your phone or glasses also map your surrounding environment and build a model of it using hardware sensors and specialized software, such as computer vision and Machine learning software. Now imagine this room again, when we move around the room, we can pretty accurately estimate our location within it.

This is possible because we take into account our relative position to important features in the room suchas walls, desk etc. In AR this is referred to as tracking or localization. Theresearch community has a fun word called SLAM, which stands for Simultaneous localization and Mapping. This is what your phone or glasses do many times a second. They map your environment but also keep track of where you are in relation to it. Hence it is important to understand and make sure that mapping and localization are working well for a new environment.

When playing AR content, your phone or glasses really place them in the virtual map of the environment. The virtual map, however is invisible. Thus, it looks like a digital content is placed in the physical world. It is therefore really important that our virtual map is accurate and aligned with its physical content.

In addition to mapping and localization AR device also senses other characteristics of the environment, suchas the light intensity and colour temperature. To make things appear as realistic as possible, AR devices sense the conditions of the environment and project that on to our digital content as well. And that's how Augmented Realityworks.

The primary benefit of AR is that it can be used by anyone. It possesses a highly interactive nature, which enables us to assess several instances in advance and it is also used in the field of healthcare which has the potential to increase the accuracy of diagnosis for different diseases. Lack of privacy is a major drawback of AR based application and it cannot be leveraged without appropriate training, thus increasing costs and time involved. It can get extremely costly to develop and maintain an AR based device.

The technology feels magical and AR has true potential to disrupt every type of industry such as shopping, navigation etc. Augmented reality technology has seen unprecedented growth in 2020. Commercial use of the technology has exploded due to use by market leaders like Microsoft, Apple, Google, Facebook, and Amazon. According to "MarketsandMarkets", the market for AR technology is worth $15.3 billion. It's worth exploring the different avenues and trends that drive the surging augmented reality market. By the end of 2020, AR active devices were estimated to rise to 598 millionunits and are projected to grow to 1.73 billionby 2024.

THE POTENTIAL FOR ARTIFICIAL INTELLIGENCE IN HEALTH CARE

By Vasireddy Bindu Hasitha

Artificial Intelligence is increasingly ubiquitous in business and society and is beginning to be appliedin healthcare. AI is resulting in advancements in healthcare treatments, for instance, ameliorating the treatmentplans, analyzing data to bestow better treatment, and monitoring treatments.

AI based technologies used in healthcare:

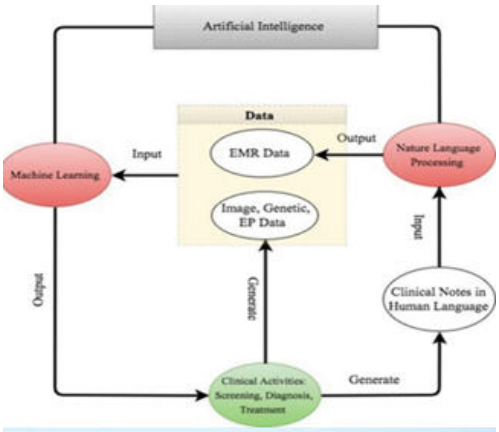
1.Machine learning/ Deep learning.
2.Machine visionand Computer Vision
3.Natural Language Processing.
4.Robotic Process Automation.

Machine learning/ Deep learning

In healthcare, the most prevailing application of Machine learning is accuracy medication -foreseeing what treating conventions are probably goingto succeed on a patientbased on variouspatient attributes and the treatmentcontext.

When we talk about Deep learningover Machine learning; Machine learning cannot handle high dimensional data, while particularly the medical data is of high dimension in character where we are going to have thousands of attributes.

Analyzing this high dimensional data is arduoususing Machine learning,but as soon as Deep learningand Neural networkswere introduced it became facile to analyze the data. The reason behind this is that Deep learning is an unsupervised learning method and it can analyze the structure of the data more dexterously than other Machine learning methods



Machine Visionand Computer Vision

Machine visionhones computer to perceive the environment
and to delineate human sight and apprehend objectsin front of it.
To achieve that, Computer visiongets a whip hand over Artificial intelligence algorithms that process images. The main bourn of Computer vision in medical services is to make a faster and more veracious diagnosis than a physician could make. Broad use cases are identified with the field of:

1.Radiology and imaging.
2.Measuring blood loss accurately duringsurgery.
3.Detecting acute neurological illness.
4.Measures body fat percentage.

Computer vision algorithms are often trainedto employ an enormous measure of information that identify the smallest presence of a condition while a human specialist may handily pass up it due to the tactilerestrictions of the human body.

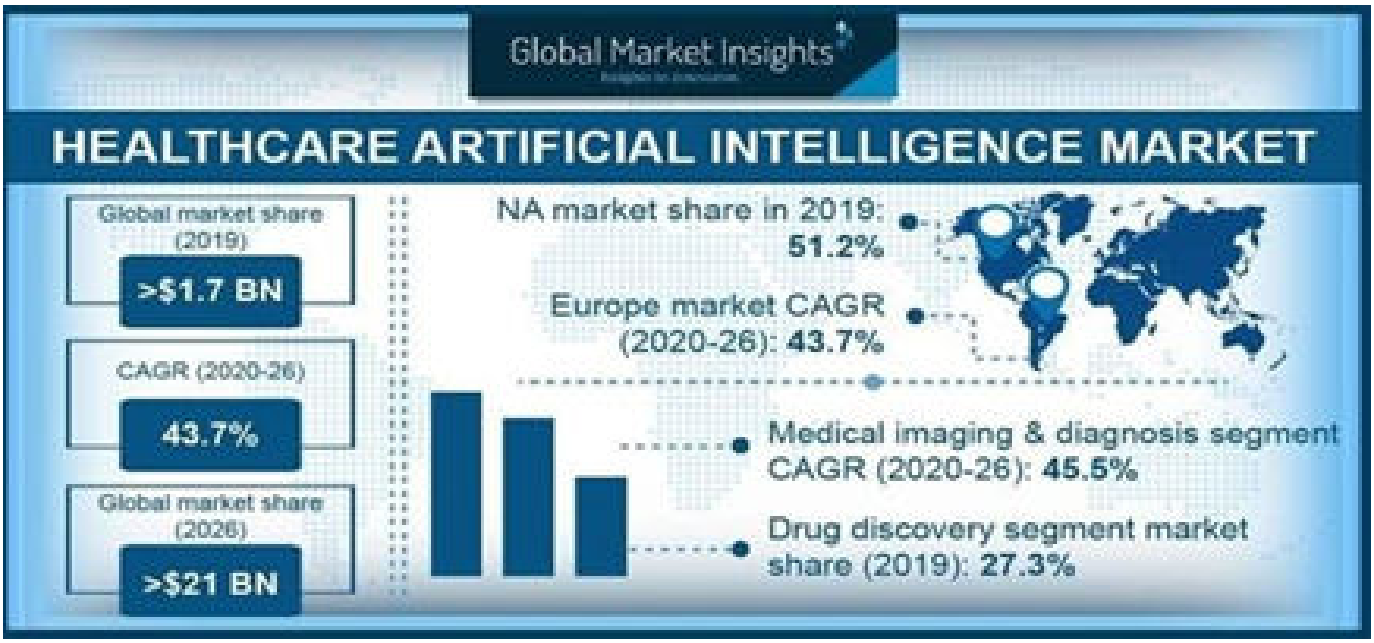
Natural Language Processing

The aim of Artificial intelligence is to allow machines to receive information and interpretit in the same intelligent way that humansdo. Natural language processing is a popular subcategory of AI. NLP is employed to indoctrinate a machine on how to read and understand human languages. The reasonbehind adopting NLP in healthcare is because of its recognized potential to search, analyze and interpret humongous amounts of patientdatasets.

Robotic ProcessAutomation

Robotic Process Automation software robots automates sending emails and follow-ups automatically.
RPA bots automates patient's data collection to help alert patient's unavailability and checking discharge instructions.

The da Vinci surgicalsystem gives surgeonan advanced set of instruments to use in performing robotic-assisted minimally invasive surgery



"Medical imaging and diagnosis powered by AI should witness more than 40% growth to surpass USD 2.5 billion by 2024 -GLOBAL MARKET INSIGHTS."

"IF SEVERAL KEY CHALLENGES CAN BE ADDRESSED IN THE COMINGYEARS, IT COULD PLAY A LEADINGROLE IN HOW HEALTHCARE SYSTEMS OF THE FUTURE OPERATE, AUGMENTING CLINICAL RESOURCES AND ENSURING OPTIMALPATIENT OUTCOMES."

ROBOTIC EXOSKELETONS – A NEW WAY OF LIFE

By Vaigarai Sathi

Sounds like something Arnold Schwarzenegger would say in a Terminator movie, but this is no longerfiction. Reality is catching up to fiction in ways never thought was possible.

THE NEED FOR BETTER MACHINESIN HEALTHCARE:

Seventy-five million people need wheelchairs to go about their daily life right now. Most of these difficulties are unknown to able-bodied people, but thanks to advancements in technology, this may no longer be an issue. Many invertebrates, such as insects,crustaceans, and mollusks,have an exoskeleton, which is also more commonly referred to as a shell. These shells could now be made for humansusing robotics, and hence the name – Robotic Exoskeletons.

THE SCIENCEOF ROBOTIC EXOSKELETONS:

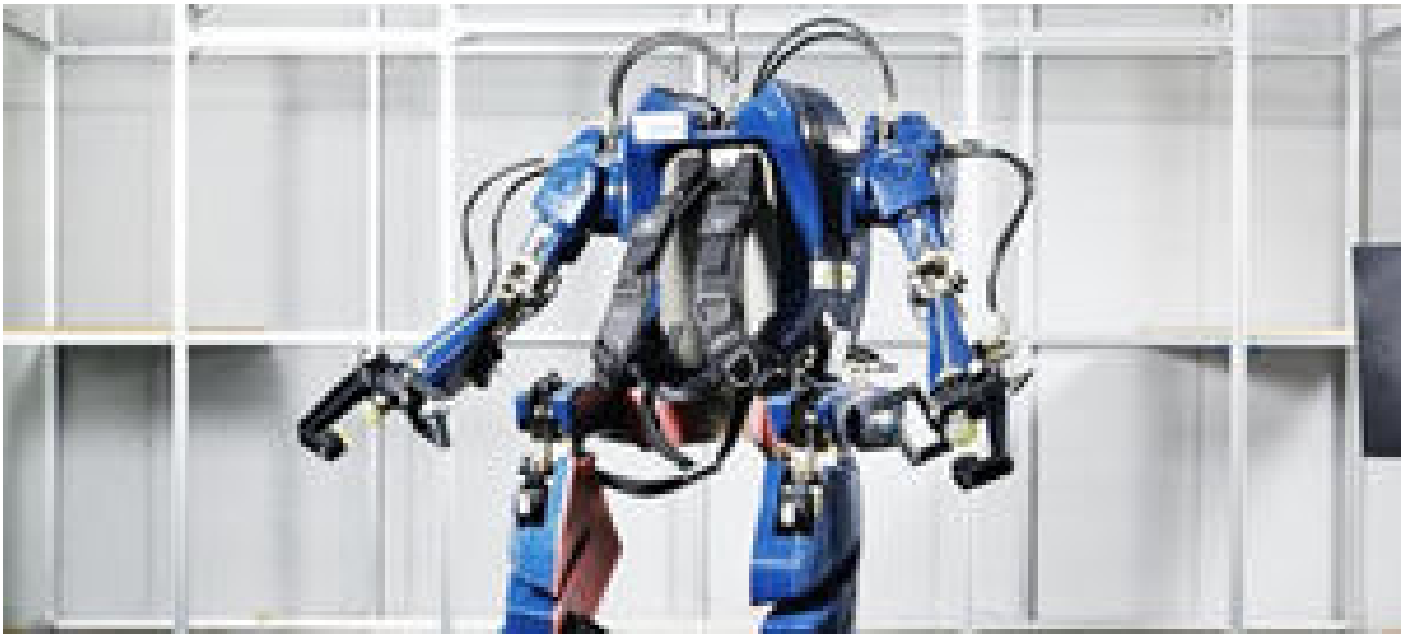
Robotic exoskeletons or powered exoskeletons are considered wearable robotic units controlled by computer boards to power a system of motors,pneumatics, levers, or hydraulics to restore locomotion. The topic of exoskeletons is timely given the number of devicescurrently being studiedas well as purchased by facilities for rehabilitation purposesin medical centers or for home use.

Exoskeletons have emerged as an advantageous rehabilitation tool for disabled individuals with spinal cord injury. Rehabilitation specialists, clinicians, researchers, and patients welcome their use for overground ambulation. When compared with previously used locomotor training paradigms, exoskeletons tend to offer a much higher deal of independence in medical centers and communities as well as improving the level of physical activity. There is a pressing need for this population to improve their levels of physical activity. This feature may encourage continuous usage of exoskeletons in conjunction with wheelchairs.

HOW DOES THIS HELP?

A person who lost his legs may have to spend their life in a wheelchair in the past, but not anymore. With the help of robotic exoskeletons, the person can now find a replacement for their lost limbs and continue to live a normal life like anyone else. And the advancement of robotics is making sure that more people can lead such a normal life despite their physical restrictions. In fact, these exoskeletons, being robotic, would provide the user with more benefits that would not have been possible previously. A human hand can only lift a limited amount of weight, due to physical limitations; but now, thanks to the advancement of robotics, with the help of attached robotic limbs, the load that can be lifted far exceeds what is normally possible – just like in the movies. These advantages would make robotic exoskeletons a valued commodity in the army, where the required strength sometimes exceeds the strengths human can display. Exoskeletons can improve the strength, capabilities, and stability of users,

helping them to tackle heavy physical taskswith less effort or aiding their rehabilitation after accidents.



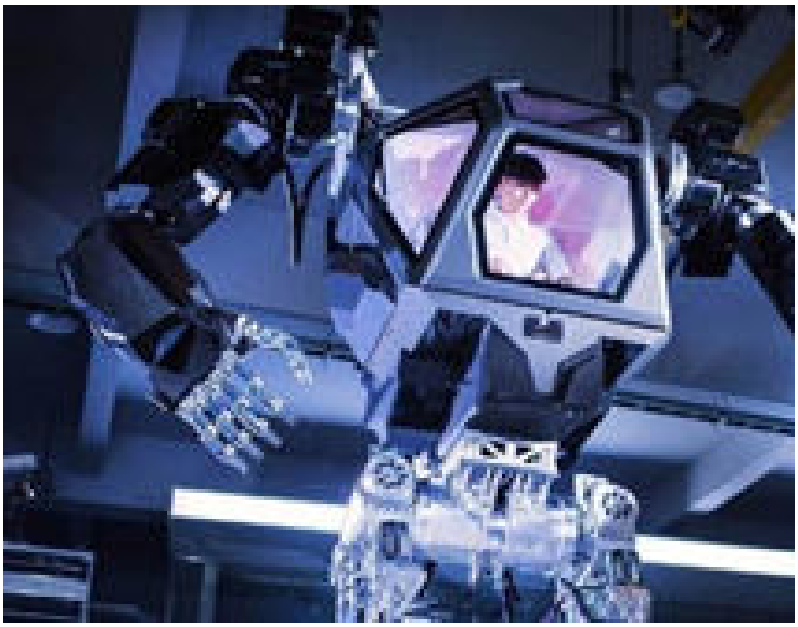
HOW IS THIS MADE POSSIBLE?

Up until now, most of these gadgetshave been created using a model based on a fixed-axis rotating hinge. While this model is simple and effective, it does not reflect the way in which human jointsrotate (i.e., in a polycentric way), which can impair or restrict the movements of those wearingthem. To make up for this disadvantage, a constant effort has been made in the past few years to find more techniques which make these models more effective. One of these techniques entails the use of n-bar linkages to join limb-like components. When executed with precision, these linkages can mirror certain human movements effectively, as they do not present the inconsistencies found within the fixed-axis rotatinghinge design. But even the n-bar linkages are not without their disadvantages, as their excessive use can result in loose and unstable exoskeletal structures. This lack of stability makes the resultingexoskeleton unsuitable for rehabilitating patientswith injured or paralyzed limbs.

CAN IT BE BETTER?

Recently, researchers at Xi'an JiaotongUniversity in China have introduced a new jointmodel that could enable the development of more stable and robust exoskeletons. Their model is inspired by arthropods (a class of invertebrate animals characterized by biological exoskeletons) segmented bodiesand paired jointed appendages.

As the linkagesin n-bar can become too complex, they proposed a joint model based on the anatomy of grasshopper joints that consists of a pair ofconjugate surfaces and a flexible connection body. Their model also effectively replicated the way in which crabsand lobsters move their limbs, which suggests that this model reflects the physical structure of most arthropods.



IS THIS THE FUTURE OF HEALTHCARE?

In the future, this arthropod-inspired joint model could be used to build more effective exoskeletons or other robotic structures for a variety of applications, including rehabilitation or the enhancement of human capabilities, as compared to other exoskeleton designs, it could allow humans to move at ease while not compromising the support of the body.

ROBOTIC EXOSKELETONS ARE AN OPPORTUNITY AT A BETTER LIFE FOR MANY. MACHINESHAVE ALWAYS TRIED TO MAKE THE LIVES OF PEOPLE EASIER, AND IT IS IN LINE WITH THIS PRINCIPLE THAT WE ARE GRACED WITH TECHNOLOGY THAT COULD ALTER THE WAY WE INTERACT WITH OUT SURROUNDINGS. GONE ARE THE DAYS OF STARING AT A THEATRE SCREEN WATCHING A SCI-FI MOVIE, AS REALITY IS CATCHING UP, AND IT IS JUST AS GLORIOUS AS IT WAS PREDICTED TO BE.

COLOUR SORTING ROBOTIC DEVICE

By Er.Rounak B Sanghvi, Er.Sudarshan Mandal, Er.Vishal Kr Sharma

Functioning of Robotic Device

Colour Sorting Robotic Device is used to sort different items according to their colour. In this device with the help of colour sensor first, we have to identify the colour and then we place the identified object on the bar, and to the pre-identified bins according to the program. The objects get separated into specified bins.

Components Used

In this colour sorting device, we have used the following components:

1. Colour Sensor
2. Touch Sensor
3. Motors
4. Connecting Cable
5. Track Belt: It is used to carry the system to pre-defined beans.
6. Different types of gear
7. EV3 Controller Board
8. Rechargeable Battery
9. Different Size of connector Pegs
10. Different types of beams

EV3 Controller

The device is controlled by the EV3 Controller, a programmable electronic programmable controller which is capable of detecting signals based on colour detection and giving instructions to the mechanical assembly to drop objects in the respective bins as assigned by the program. EV3 controller has 4 input and 4 output cable ports.

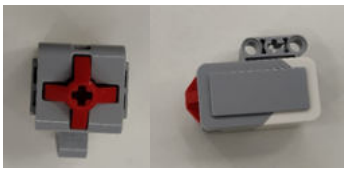
It has 2 USB ports. One USB Port is used for connecting the device to the computer and another normal USB port is used for connecting the EV3 controller board to another EV3 controller board. The device memory may be increased by adding an additional memory card. This controller consists of rechargeable batteries which we can replace with non-rechargeable batteries also.On the front panel, there is a display and 5 buttons for providing commands to the device.

Practical Use

Use for sorting different fruits and grains in the food industry.
Use for sorting pencil according to their colour.
Use for sorting different colour wires in the industry.

Components:

1. Colour Sensor: It is a photoelectric sensor which emits light using transmitter and then detect the reflected light through receiver. It is used for identifying different colour objects.



2.Touch Sensor: Touch sensor is also known as Tactile sensors. It senses the physical touch and convert it to electrical signal. It is used for protecting the robot to not go overlimit on track belt in any case.

3.Motor: A motor is an electrical machine that converts electrical energy into mechanical energy. It is used for driving the track belt.

4.Connecting Cable: it is used for connecting input device (Sensors) and output device (Motors) to the controller.

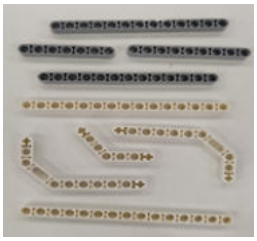
5.Different Types of Gear: It is used for manipulating the speed for the different parts of robot according to the requirements.

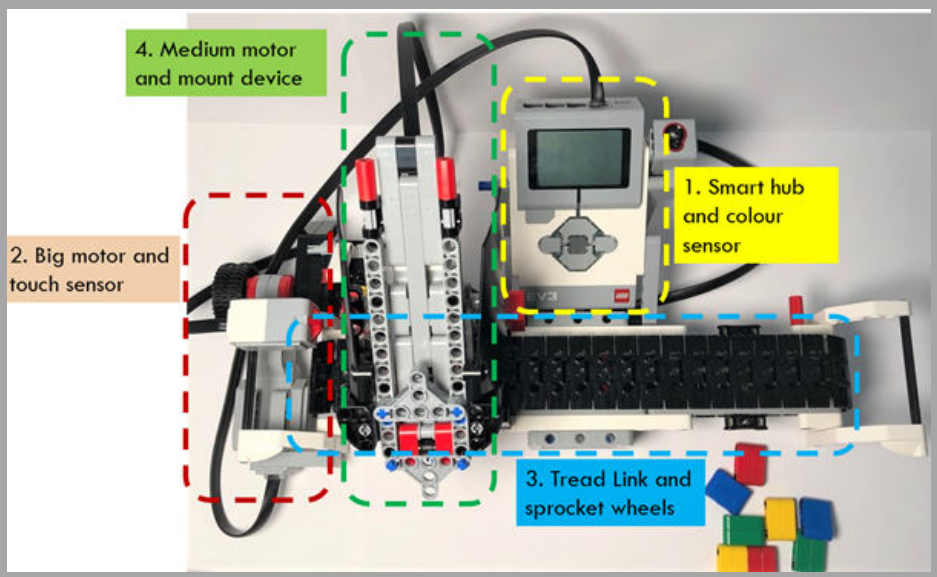
6.Basic blocks for track belt: These blocks are used for making the full-length track belt.

7. EV3 Controller Board

8. Different Size of connector Pegs: These connector Pegs are used for connecting the beams for making specific structure of the robot.

9. Different types of beams: These beams are used for making the structure of the robot.






EV3

SELF-BALANCING ROBOT

By Er.Rounak B Sanghvi, Er.Sudarshan Mandal, Er.Vishal Kr Sharma

Functioning of Robot

The self-Balancing robot is a 2 wheeled robot that can balance itself on toppling. This robot with the help of the gyro sensor is able to find the orientation of its movement, and the motor balances the robot if it falls by counterbalancing the device by rotating in the opposite direction. It has 1 colour sensor and 1 ultrasonic sensor in its arm.
The colour sensor is used for changing the direction of the robot and an ultrasonic sensor is used for obstacle avoiding.

Components Used

In this self-balancing robot, we have used

1. Colour Sensor
2. Touch Sensor
3. Ultrasonic Sensor
4. Wheels
5. Motors
6. Connecting Cable
7. Different types of gear
8. EV3 Controller Board
9. Rechargeable Battery
10. Different Size of connector Pegs
11. Different types of beams

Programming Language

The programming language which we have in this self-balancing robot is building blocks and in this, we have assigned the values for colour threshold and limit distance for object avoiding.

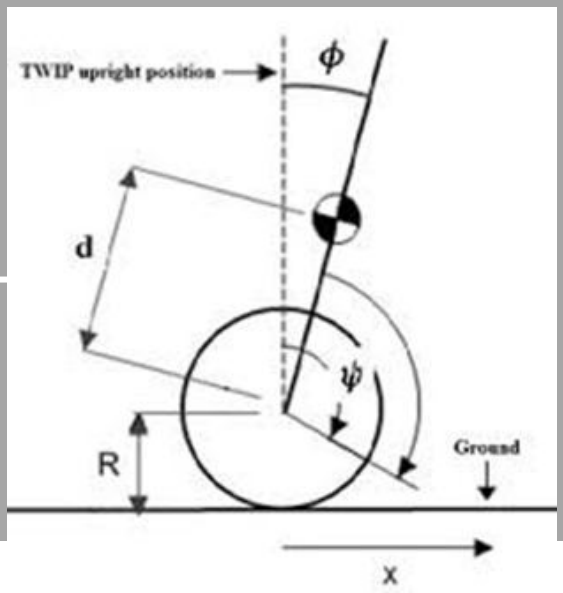
EV3 Controller

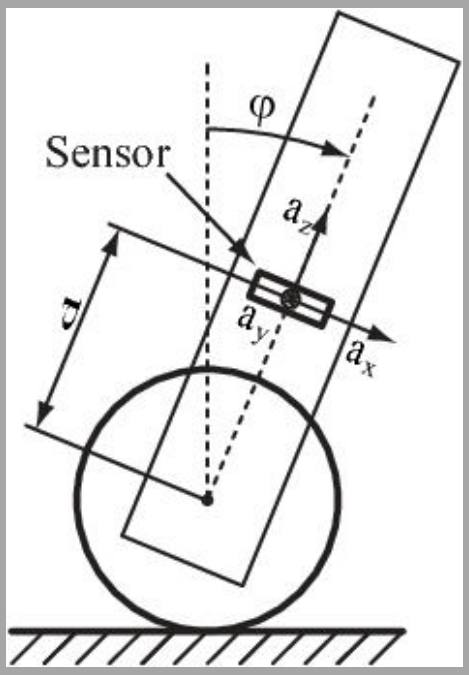
The device is controlled by the EV3 controller, the central processing unit of the device. The EV3 Controller has 4 input, 4 output cable ports.
It has 2 USB ports. One USB Port is used for connecting the device to the computer and another normal USB port is used for connecting the EV3 controller board to another EV3 controller board.

The device memory may be increased by adding an additional memory card. This controller consists of rechargeable batteries which we can replace with non-rechargeable batteries also. On the front panel, there is a display and 5 buttons for providing commands to the device.

Practical Use

To make two-wheel self-balancing vehicle which can carry load and go from one place to another without toppling. The device can be used as a small personal vehicle and also as a vehicle to carry payloads.

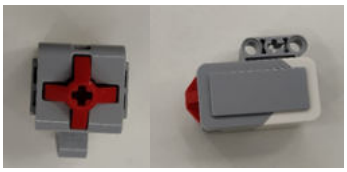




Components:

1. Colour Sensor: It is a photoelectric sensor which emits light using transmitter and then detect the reflected light through receiver. It is used for identifying different colour objects.

2.Touch Sensor: Touch sensor is also known as Tactile sensors. It senses the physical touch and convert it to electrical signal. It is used for protecting the robot to not go overlimit on track belt in any case.



3.Motor: A motor is an electrical machine that converts electrical energy into mechanical energy. It is used for driving the track belt.

4.Connecting Cable: it is used for connecting input device (Sensors) and output device (Motors) to the controller.

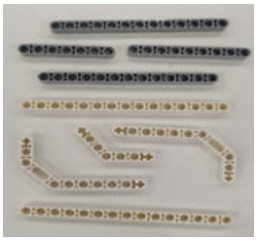
5.Different Types of Gear: It is used for manipulating the speed for the different parts of robot according to the requirements.

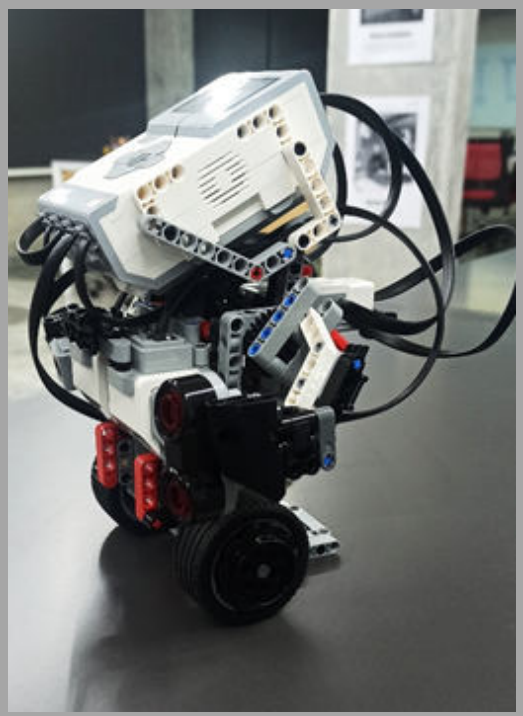
6.Ultrasonic Sensor: It is a device which emits ultrasonic sound waves through transmitter and the receiver receives the reflected waves and determines the distance of the object and convert that distance into electronic signal. It helps to detect the obstacle and to change the route.

7. EV3 Controller Board

8. Different Size of connector Pegs: These connector Pegs are used for connecting the beams for making specific structure of the robot.

9. Different types of beams: These beams are used for making the structure of the robot.






EV3


EV3


EV3

DEAN'S LECTURE SERIES

Achievements:

· First Runners Up at The L'Oreal Brandstorm International Competition

· Winner of Hindustan Unilever Unplugged

Students of the School of Technology had the pleasure of being a part of the Dean's Lecture Series - a program where eminent personalities, speak on topics whicharen't part of a formal curriculum.

We would like to thank Apurva Kenekar, Senior Research Manager and Analyst - Analytics Lead at Protobrand, Massachusetts, the United States for sharing her journey and views in life on multiple topics including values, diversity, and equality. She gave a sight on how one should look at an opportunity which is out of comfort zone to develop an interest for it and become successful.

Qualifications: M.S Business Analytics, UCLA Anderson, MBA(NIMS Mumbai) HBS Online

Take away-

•Leadership qualities
•Do not be dominant over others
•Be bold to achieve big
•Overcoming challenges faced in industry
• Maintaining good mental health
•Need to have good social connections
•Getting recognized in at least one skill

The knowledge and the experience shared by Ms.Pratiti Soumya was inspiring and with the help of this, students would be able to achieve more and great things in their career.

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MAY ISSUE

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