

# Basic Robotics

– Robotics Engineering Certification

Let's Start the Robotics Journey

# Course Outline

Introduction to Robotics and Arduino	Arduino Programming- 7
Introduction to Arduino	Arduino Programming- 8
Arduino Programming-1	Analog Sensor Reading
Arduino Programming - 2	Digital Sensor Reading
Arduino Programming- 3	Project 1 - Home Automation System
Arduino Programming- 4	Part 01
Arduino Programming- 5	Project 1 - Home Automation System
Arduino Programming- 6	Part 02
	Project 2 - Soccer Robot 1 (Building)
	Project 2 - Soccer Robot 2 (Coding)

# TIPS!

1. Take **notes** during class
2. **Revise** your notes after each class
3. Complete your **daily task**
4. Build “**Searching on Google + ChatGPT/Gemini**” habit
5. Any Doubt! **Search first**, then ask your Mentor
6. **Practice , Practice & More Practice!**

Build your **GitHub** portfolio and maintain your repository.  
You may learn about **GitHub** from **this video**: [click here](#)

# Your Mentor



**Shafayetul Islam**  
Robotics Instructor  
DIP Foundation

## Professional Experiences:

- Senior Robotics Instructor and Researcher , DIP Foundation
- Robotics Research Assistant, Robotics and Mechatronics Department, University of Dhaka
- Robotics Engineer, Unipolar Automation Technology
- Robotics Instructor, Apar's Classroom

## Educational Background:

- Completed BSc in Computer Science and Engineering (CSE) from Military Institute of Science and Technology (MIST)

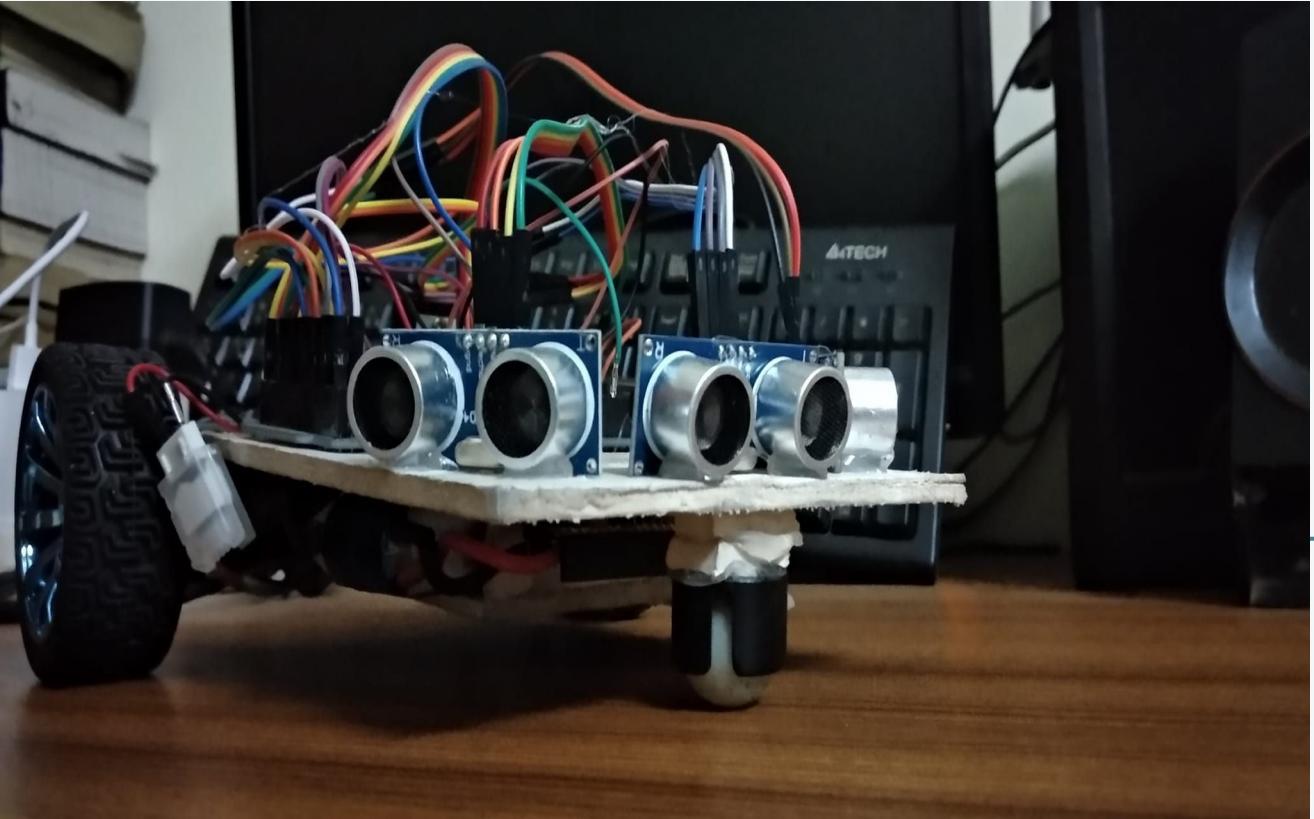
## Notable Activities in Robotics:

- Team Leader, MIST Mongol Barota - 2022
- Electrical Team Lead, MIST Mongol Barota - 2021
- Electrical Team Lead, UVC Purge- 2020
- Vice President- Technical, MIST Robotics Club - 2021
- Mentor, Adamjee Cantonment College Robotics Club - 2022

## International Achievements:

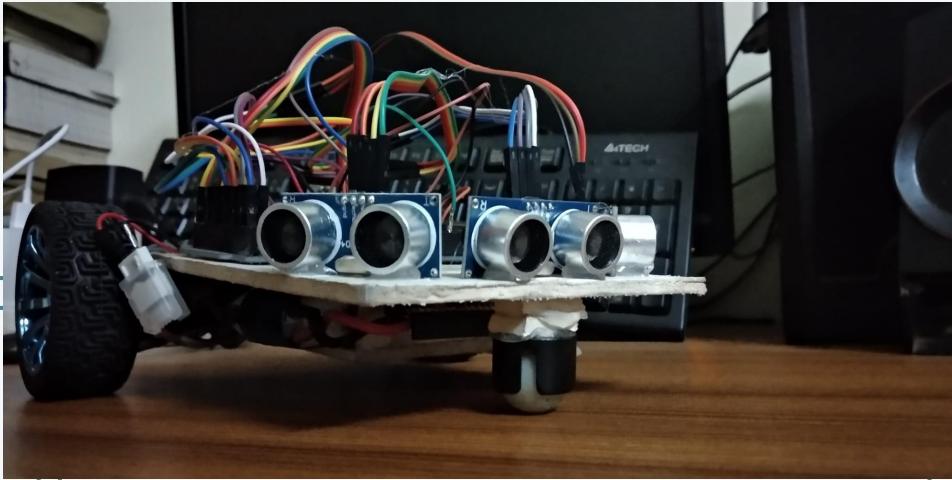
- Champion of Medical Robotics for Contagious Diseases Challenge 2020 by Imperial College of London, UK Robotics and Autonomous System (UK-RAS) Network
- GLOBAL CHAMPIONS IN UNIVERSITY ROVER CHALLENGE (URC)-2021
- 2nd Runner-Up in Anatolian Rover Challenge 2022 org by Space Exploration Society (UKET), Istanbul, Turkey

From this



To This





- Started with making Line Follower and obstacle-avoiding Robots



- Built RC Robot and Participate in BUET RC Car Competition.



- Took more than a year to build a perfect Battle Bot



ডিজিটাল  
বাংলাদেশ  
দিবস

১২ ডিসেম্বর  
২০১৮

DIGITAL BANGLADESH DAY 2018

ডিজিটাল বাংলাদেশ  
বন্ধবস্থুর সোনার বাং

১২ ডিসেম্বর

তথ্য ও যোগাযোগ প্রযুক্তি বিষয়ে

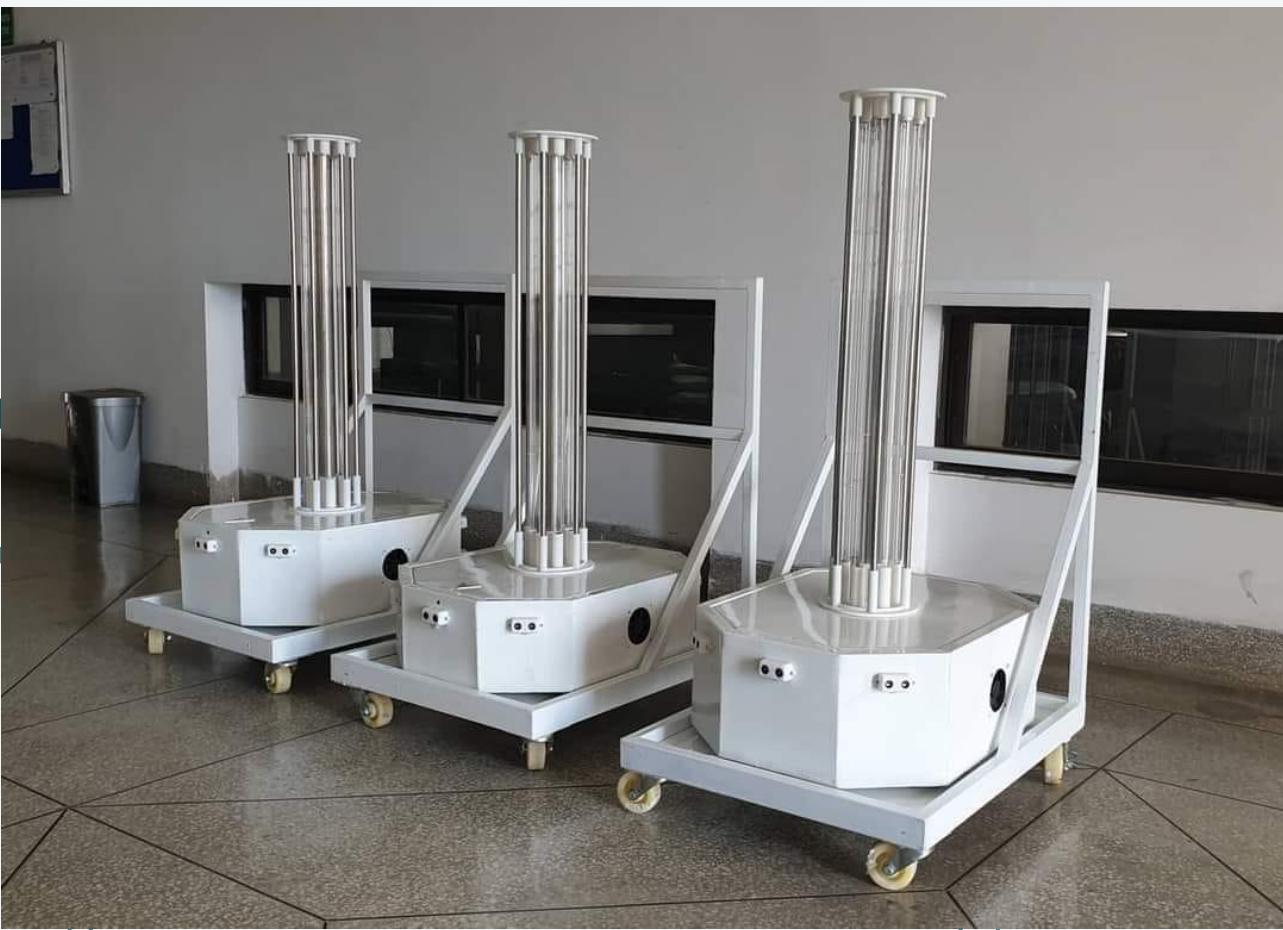
BANGLADESH  
INNOVATION  
CONFERENCE

CCA

১২

ডিসেম্বর

- Champion of Medical Robotics for Contagious Diseases Challenge 2020 by Imperial College of London, UK Robotics and Autonomous System (UK-RAS) Network





- **GLOBAL CHAMPIONS IN UNIVERSITY ROVER CHALLENGE (URC)-2021**



# আন্তর্জাতিক অঙ্গনে রোবোটিক্সে MIST এর সাফল্য



Medical Robotics Challenge 2020  
CHAMPION in Application

UVC PURGE

Organized By :  
UK Robotics and Autonomous  
Systems (RAS)



University Rover Challenge 2021  
GLOBAL CHAMPION

MIST MONGOL BAROTA : PHOENIX

Organized By :  
MARS Desert Research Station  
(MDRS)



- 2nd Runner-Up in Anatolian Rover Challenge 2022 org by Space Exploration Society (UKET), Istanbul, Turkey





Visited  
**Istanbul** to  
Represent  
Bangladesh  
on  
Annatolian  
Rover  
Challenge

**MIST  
MONGOL  
BAROTA  
SECURED**

**3RD POSITION IN  
ARC'22**

MIST MONGOL BAROTA

ANATOLIAN ROVER CHALLENGE

uket Space Exploration Society

## ● অর্জন

## ভার্চুয়াল ইউনিভার্সিটি রোভার চ্যালেঞ্জ ২০২১

## এমআইএসটি মঙ্গলবাতা এনেছে জয়ের বাতা

ଆଜିମୁଖ୍ୟାନ

বিজ্ঞানীদের পরিকল্পনা অনুযায়ী আগমণী কলকাতা দর্শনের সময় কম হতে পারে যাচ্ছে বর্ষা দর্শনে মাঝুরের সময়টি আসে। কিন্তু এখন কালীটা আধুনিক প্রযোজনের সৈতে ভোজন, যেখানে লাল প্রাণকে মাঝুরের বাস্তুগত পথে সহায় করবে। এখন গোপন ও তরীক দর্শনে বিশ্বাসপূর্ণ প্রযোজন করা হচ্ছে কিন্তু কৃষ্ণ হৃষিকেল আঙ্গুলিকে প্রযোজন করা উচিত। ইউনিভার্সিটি কলেজের ঢাক্কেল (ডিটার্মিনিজ)। দৃষ্টিরাষ্ট্রে মহাকাশ ঘৰের বেশ সমস্যা সমাপ্ত আলোকন্ধন করেছে তাত্ত্বিক দল মার্স সেপ্টেম্বর এবং অক্টোবর।

এ বছরের ভার্ত্যায় ইউরোপিসিতে বিশেষ  
বড় ও বিশ্বাসীয়াকরণে প্রেরণ করেন সেরা  
হয়েছে বালান্সের মিলিটারি আইনিষ্টিউট ও  
সামুদ্রিক অল্যাং টেকনোলজি এম্বা আইনিষ্টিউট  
দল "মার্মগুরুত্ব"। বিশেষ নাম প্রাপ্ত থেকে দু  
সহ বাছাইলব্র শেষে চৰি দশের ১৫টি দল  
নিয়ে মূল পর্দে প্রতিযোগিতার তৃতীয় হয়ে  
দায়িত্ব ও বালান্সের শিক্ষাজীবন দল—ঠা  
ক্ষেত্রে প্রতিযোগিতা "রাজকুইচ মার্মগুরুত্ব"।

ପ୍ରକାଶକ ଅଧ୍ୟାତ୍ମିକ

ତ ଥେବେ ଏ ଜ୍ଞାନ ଇତିହାସର ଅଭିଶ୍ଵାସ  
ଇତିହାସ ପେଜେ ସରାସରି ମୂଳଚାର କରା ହୁଏ  
ଭାର୍ତ୍ତ୍ୟାଳ ଇତିହାସିକ ରୋଭର ଚାଲେସ ୨୦୧୧ ।  
ଏବାରେ ତାଙ୍କେ ଛିଲ, ‘ପରମ ପ୍ରାଣୀରେ ମାର୍ଗ  
ନେତାରା ମରଶ ଓ ତୈରି ଯା, ଯା ମାନୁଷେର ସହାୟକ  
ହିସେବେ ମରିଥିଲୁ ଆଜି କରନ୍ତି’ ।

এমহাইভিয়েল ম্যাসেরার্ড দলে হিলেনে  
লেপিটেড এবং প্রোটেইন বিভাগে  
ক্ষেত্রে আবির্ভাব আসেন। শান্তিকে উদ্বোধন  
ইশ্বরের শাশ্বত, শোভের অভয়েন, ফরারেন  
অশ্বরের এবং যুগ্মের বিপ্রে প্রেরণের অভয়েন  
নির্মিত। মানুষের জাতকর্তা, ওলিভার জা-  
ম্বু প্রতিষ্ঠিত ইস্কোন, আবিষ্কৃত মাধুরূ, সার্কুলেট  
শাস্ত্রের ও মার্কফ মোরেসেস। সর্বাধি জাতক  
বেরে দেখিবার এই ছাত্র সংবিধানের প্রতিক  
বরেকে বিশিষ্ট বিভাগের চিঠী ও তৃতীয় চিঠী  
চিঠিশৈলী। পুরু মাত্রিক তৰাব্ধানে হিলেন-  
নেলেনে শান্তিকে মার্জি।

ମନ୍ତ୍ରବାରୀରେ ଦଲର ରୋଭାରେ ନାମ ଦେଖୁଣ୍ଡ ହୁଏ  
ଫିନିଙ୍କୁ। ଚାପୁ ପରେ ଟୁଟୁଟ୍ଟିଗମେ ସାର୍କିସ ମିଶନ,  
ଅଟୋମୋବିସ ନେତ୍ରିକେଶନ ମିଶନ ଓ ଏଜାଟିମ୍  
ରିଟ୍ରାଇଭଲ ଡେଲିଭାର ମିଶନ ଜୟି ହେବ ହେବେ  
ଫିନିଙ୍କୁରେ ଟୁଟୁଟ୍ଟିଗମେ ସାର୍କିସ ମିଶନ ଯାନ୍ତି

মানুষের পক্ষে করা সহজ, এবং কিছু কাজ করে দেখাতে হচ্ছে যে মার্স অন্তর্ভুক্ত। মেরে একটি ঝুঁতুরে পোকোয়া, তার দেহের একটি ঝুঁতুরে পোকোয়া, আর একটি পোকোয়া বেশ করে দেওয়া। কিন্তু মেরে নিশ্চিন্ত করা তাই হলুয়া, কোথায় এসে আসে এই পোকোয়া? ১০ টকে ১০০ টকে ১০০০ টকে এই পোকোয়া একটি মুক্তির পথে এগিয়ে আসে এবং মুক্তির পথে এগিয়ে আসে।

## সাধন্য একমাত্র নয়।



ମେସଟି ମେସଟି ମହାଲକ୍ଷ୍ମୀରୁ ମଧ୍ୟରେ ମଦ୍ଦମାର୍ଦ୍ଦା । ଛନ୍ଦି : ମାତ୍ରମିଳିତ

## ଏମାଟେସଟି ମନ୍ଦିରାର୍ଥ

তিনি জালে বিলো সব লকে পেছে  
মাঝে ১০ মুখ দিয়ে ভূর্ণুল ইন্দ্ৰিয়াটি  
জোড়াৰ দালো তৰুণৰ এক জালুনিৰ হয়  
আজীবন এগৰণ কৰিব। এই অৰ্জন নিয়ে  
পৰিষেবাৰ আৰিক ব্রহ্মণ বলেন, “এই অৰ্জন  
শুধু আমৰাব একৰ বৰা। বৰা আৰ কৰোৱা  
পৰিচীনতত্ত্ব আমৰাব প্ৰতিক্রিয়া খালু দেখেৰে  
কৰিব।” আৰিক আৰ পৰিষেবাৰ কৰিবলৈ  
মৰ্ম জোৱাশে আমৰা শুন ন হৈতে পালেও,  
আমৰা দেশৰ কৰোৱা, প্ৰিয়সন্তু মানা  
দেৱা আৰু বৰাবৰ কৰা সম্ভৱ।

কলেজ পর্যায়ের শিক্ষার্থীদের রোভার



12 THE DEFINITIVE YOUTH MAGAZINE  
**SHOUT**

# Inspiring Interest in Science

*Adamjee Cantonment College hosts science festival*

MALEVAT ANGUS NOOTJE

The Prawn Mango Fruit Drink Science Festival turned Adiamjee Cantonment College (ACC) into a science hub between September 16 and 17, long banners of the festival decorated the buildings and posters with tidbits of scientific knowledge dotted the corridors. The campus was abuzz with young science enthusiasts exhibiting their ideas through wall magazines and projects.

The festival was organised by the Neutrino ACC Science Club (NASC). Its title sponsor was Pran Mango. Fruit Drink magazine sponsors were Kishor Alo and SHOUT; and radio partners were Radio Shadhar and Latafon.net.

On the first day, students from education institutions in Dhaka took part in project display, wall magazine display, Olympiads on various subjects, quizzes and Rubik's cube competitions. Visitors thronged the classrooms and listened with keen interest to the students' presentations.

The grand prize giving ceremony, held on the second day, brought the festival to a close. The chief guest was

Brigadier General G.S.M. Hamidur Rahman, Commander of Airforce Wing Aviation Group and Chairman of the ACC governing body. The special guest was writer Anisul Haque. In their speeches, both guests appreciated the endeavour. They said events like this helped students apply their classroom learning and therefore were very important. The Principal of the college, Brigadier General Tameem Ahmed Chowdhury DSC, NDC, PSC expressed his joy at

being able to host the festival at ACC and thanked everyone for their cooperation. Then, they gave away the prizes. The winners were given crests and certificates.

Saving Electricity using DTMS: won the first prize among the IT projects. It showed how electricity could be turned on or off via phone calls. 'Algae to Bio-Fuel' was awarded first prize among non-mechanical projects. It demonstrated the cultivation of algae which could use the carbon dioxide gas produced by brick factories to produce bio-fuel. The mechanical project 'Match

used everyday items like pencils and erasers.

Behind the scene, NASC put in a lot of effort to make the event a success. Club Moderator and Assistant Professor of the Physics Department, Mizanur Rahman, inspired ASC students to be participants and organisers. Support from the Principal also proved invaluable. Lastly, it was the students of the executive panel of NASC, led by their President Wasif Ahmad Ananto, who ensured that the festival progressed smoothly.

beginning its journey on February 16, 2014. NASC has since then had its members participate in various events across Dhaka and organised international Maths Week and a number of seminars with Muhammed Zafar Iqbal and Dipen Bhattacharya in attendance. NASC is dedicated to generating knowledge among science students and hopes to arrange more events like this in the near future.

*Malliput is an ergophilyic self-proclaimed sociopath. But she'll be nice enough, if you send her intelligent commentary at [socialnormalityat@gmail.com](mailto:socialnormalityat@gmail.com).*

Class 01-

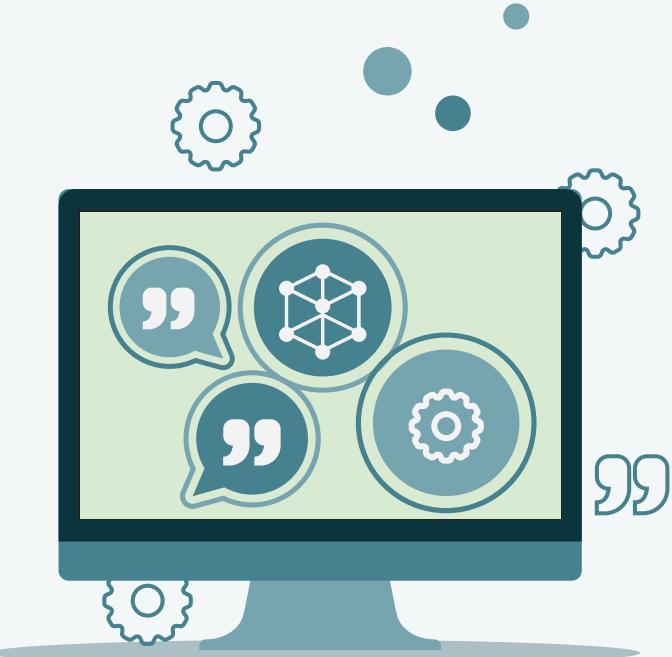
# Introduction to Robotics

01

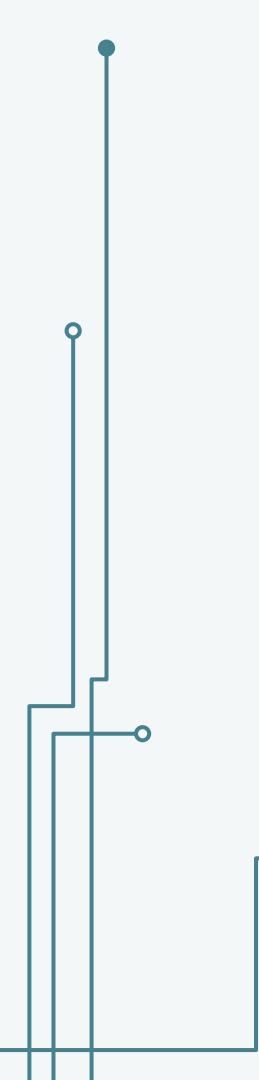
# What is Robot and Robotics?

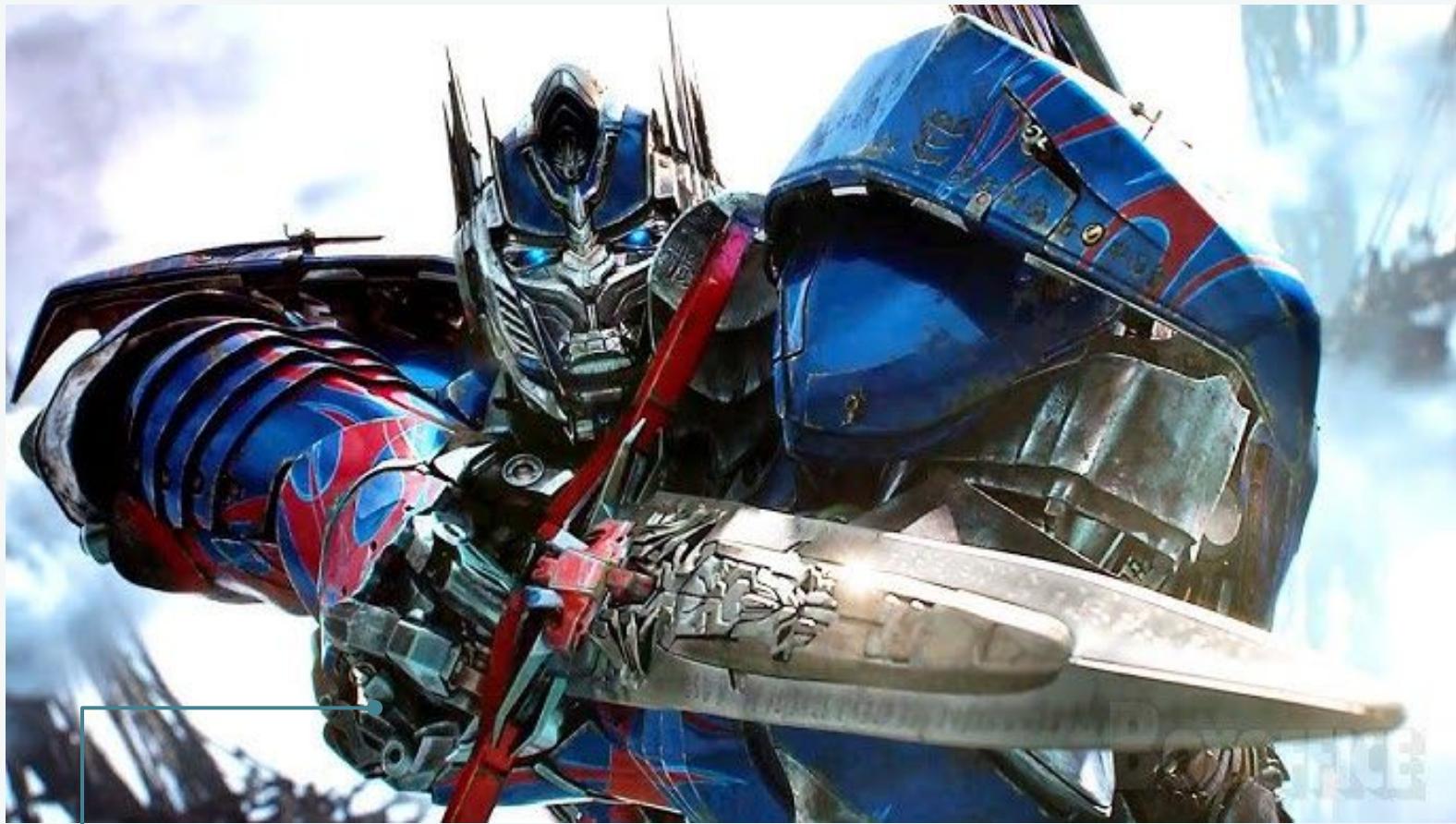
01

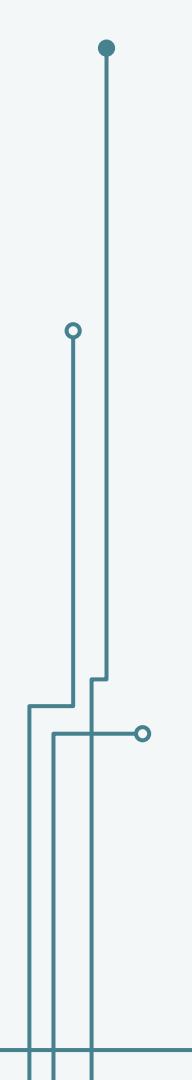
# What is a Robot?



**বাস্তাকালে যা জানতাম.....**



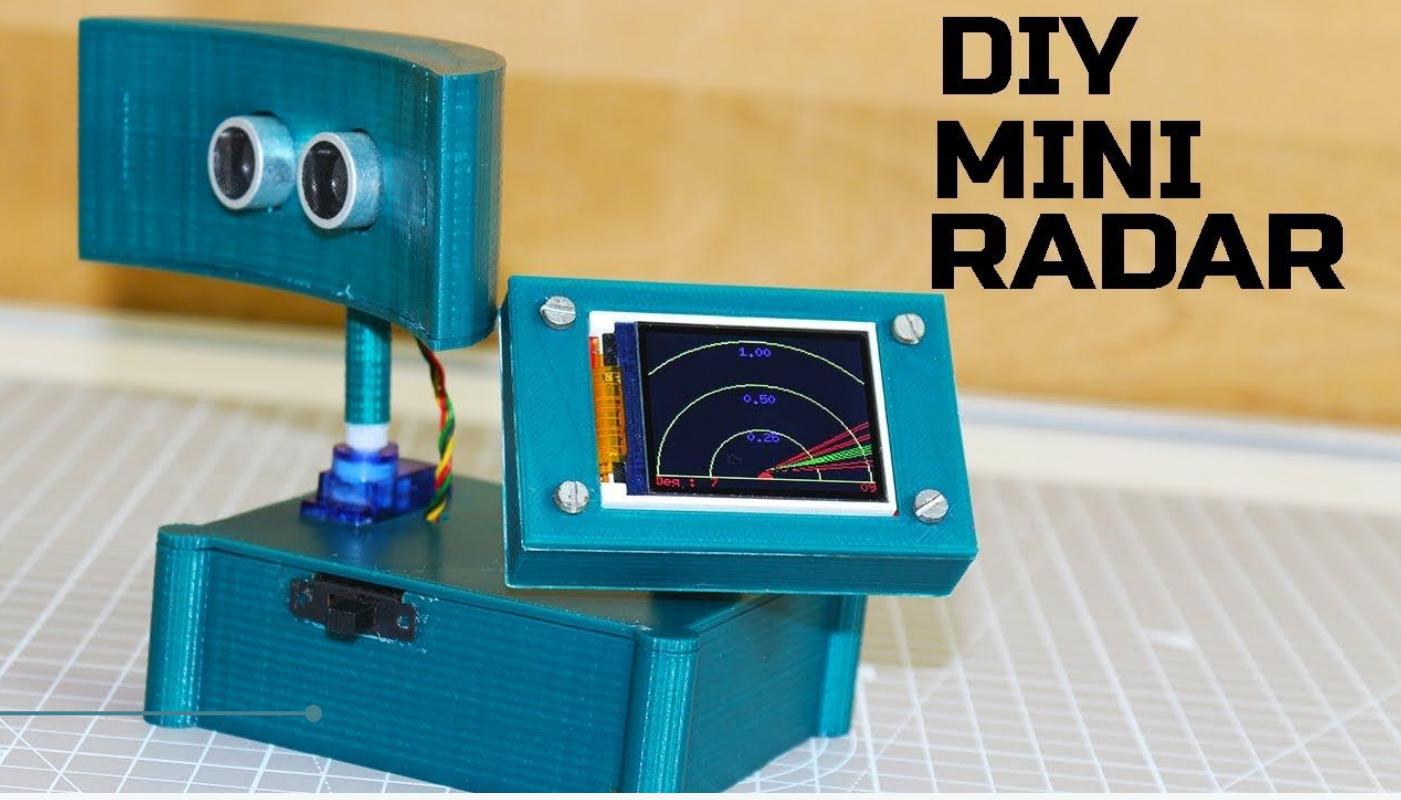




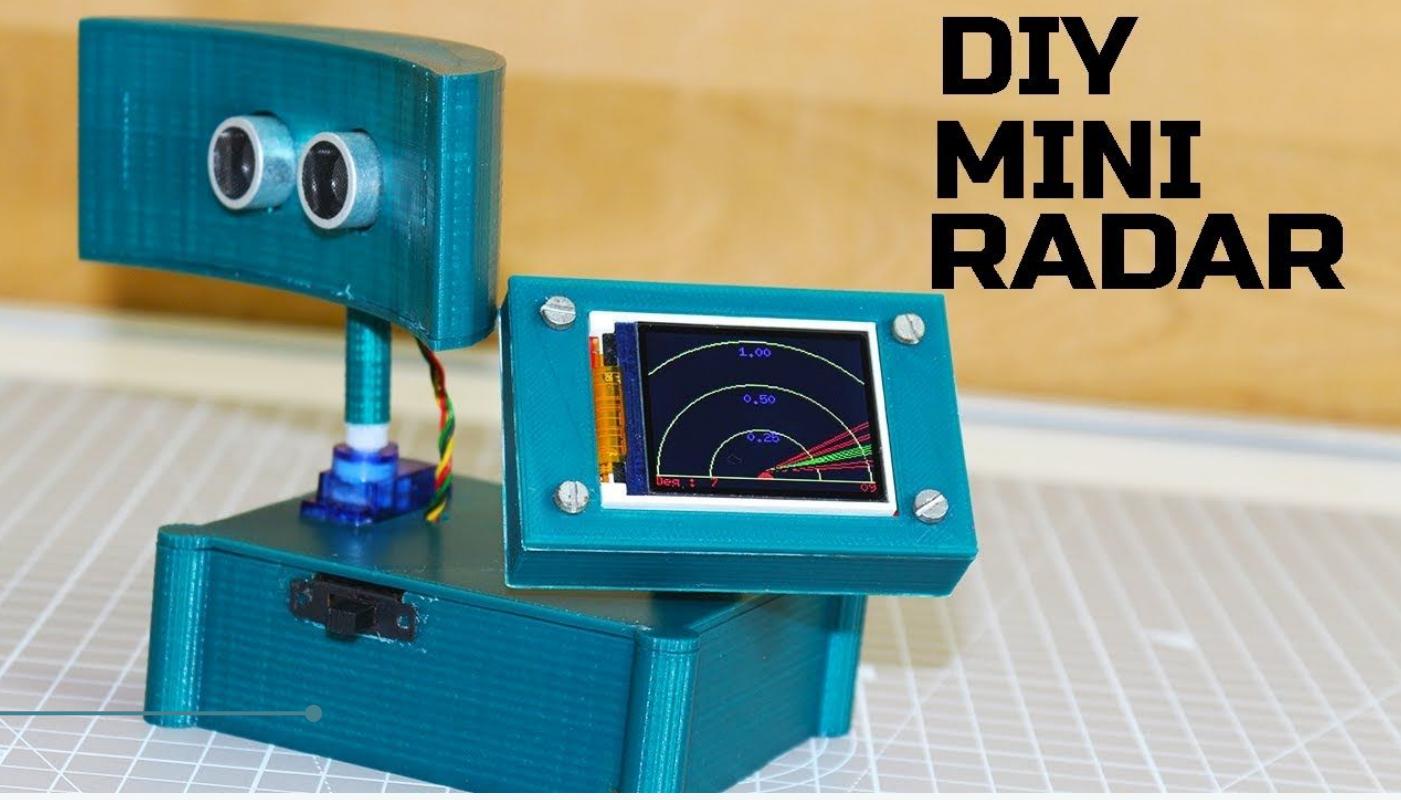
**ତାରପର... ଏକ୍ଟୁ ବଡ଼ ହୟେ ଯା ଦେଖିଲାମ...**



**SMART  
DUSTBIN**



# DIY MINI RADAR

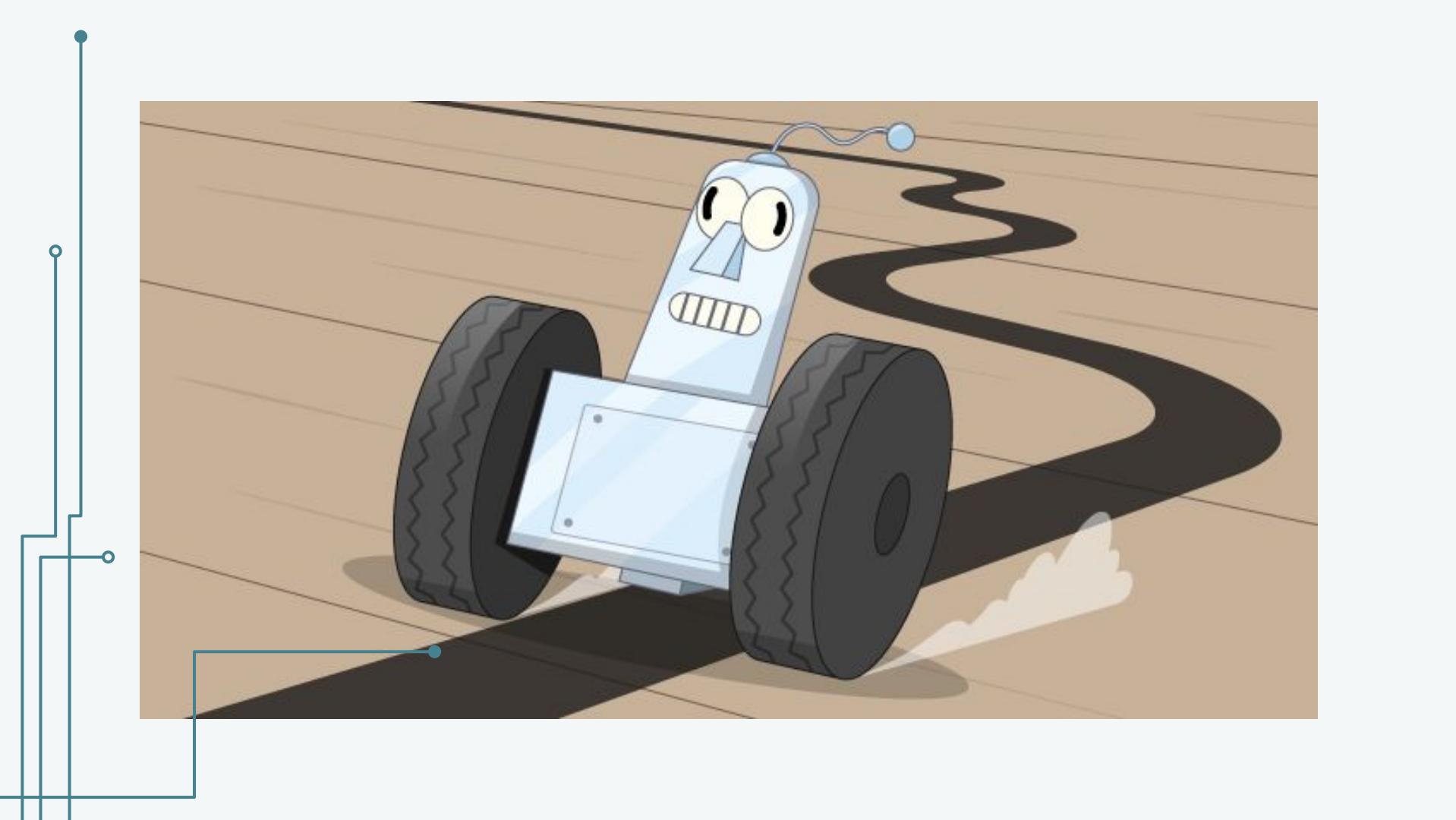
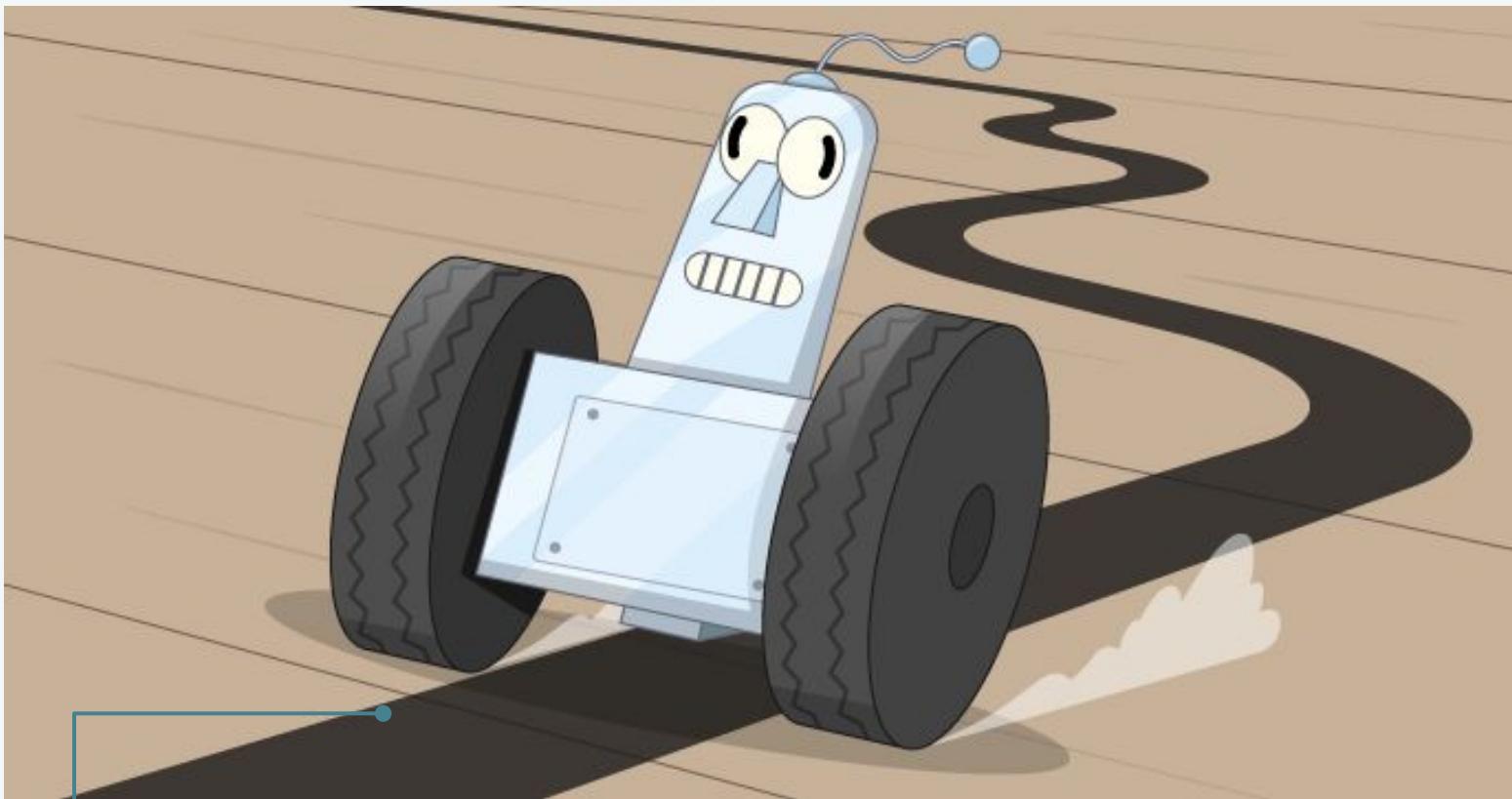


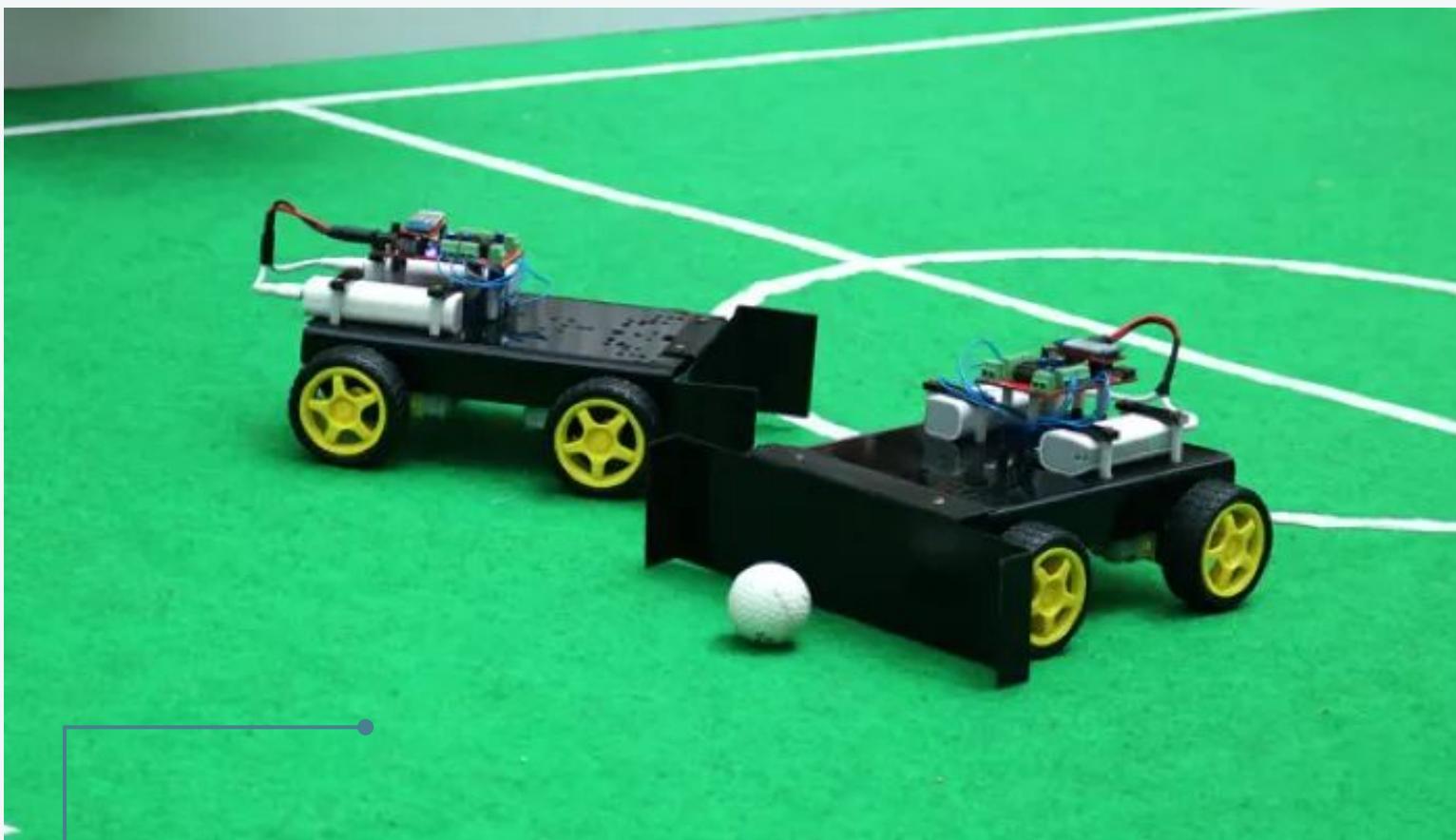
# Smart Home

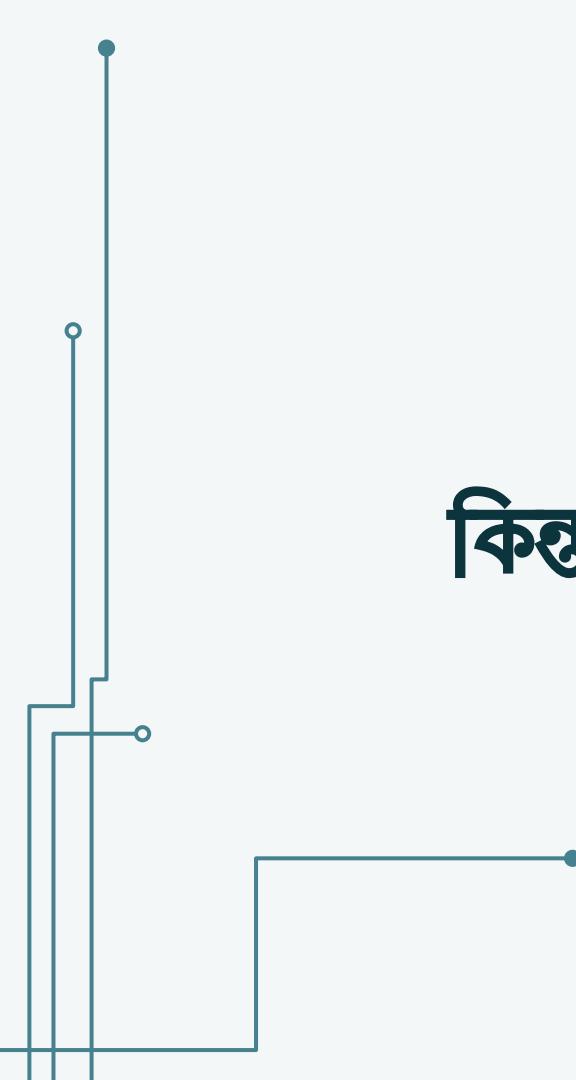


# OBSTACLE AVOIDING ROBOT









**কিন্তু আসলে Robot যা...**



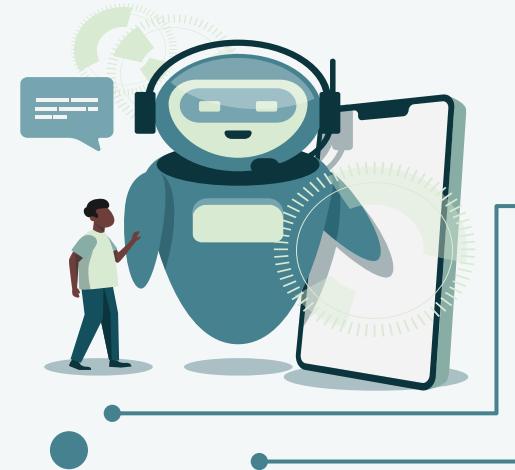


Let's Start our journey of  
**ROBOTICS!**

# What is a Robot?

A robot is-

- A Machine
- Able to sense and manipulate their environment
- Programmable
- Able to process data
- Autonomous or semi-autonomous
- Intelligent behavior



# Types of Robots:

## Industrial Robots



# Types of Robots:

## Service Robots



# Types of Robots:

## Mobile Robots



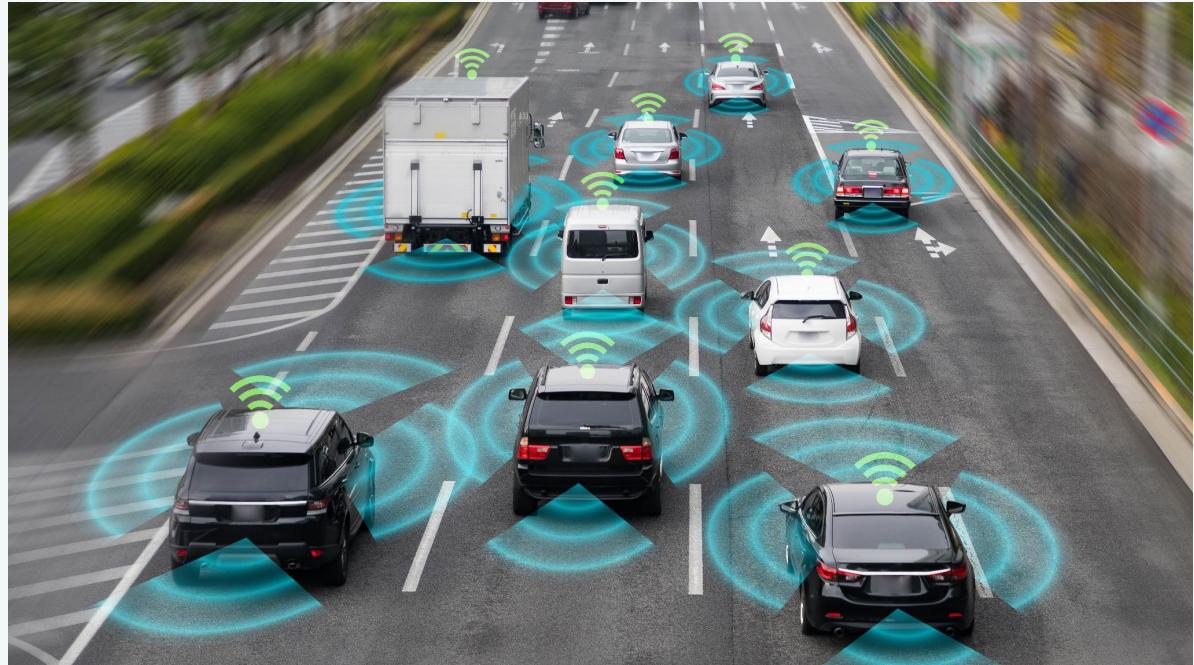
# Types of Robots:



## Humanoid Robots

# Types of Robots:

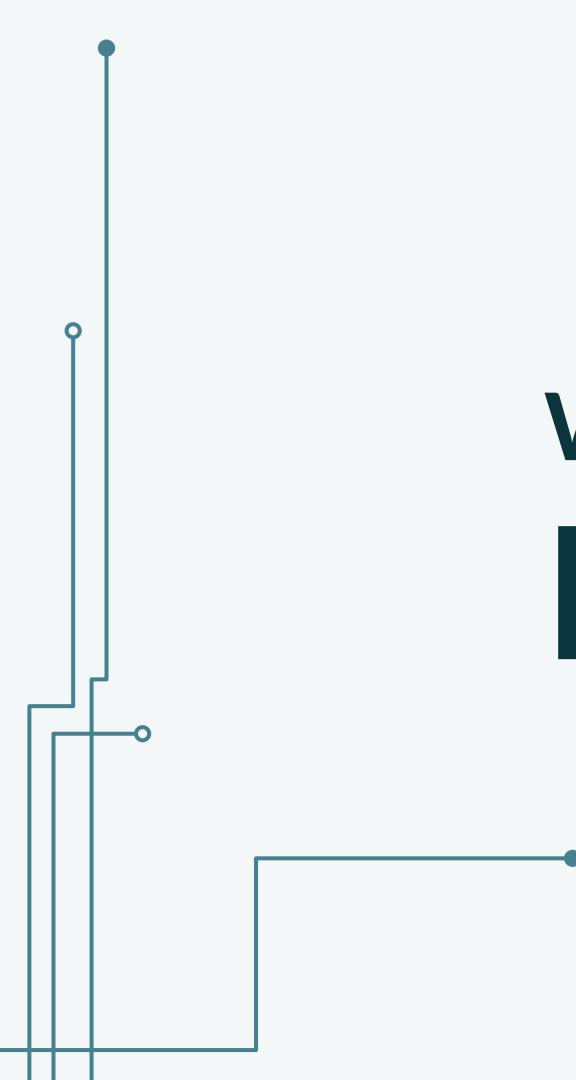
Autonomous  
Robots



# Types of Robots:

Exploration Robots



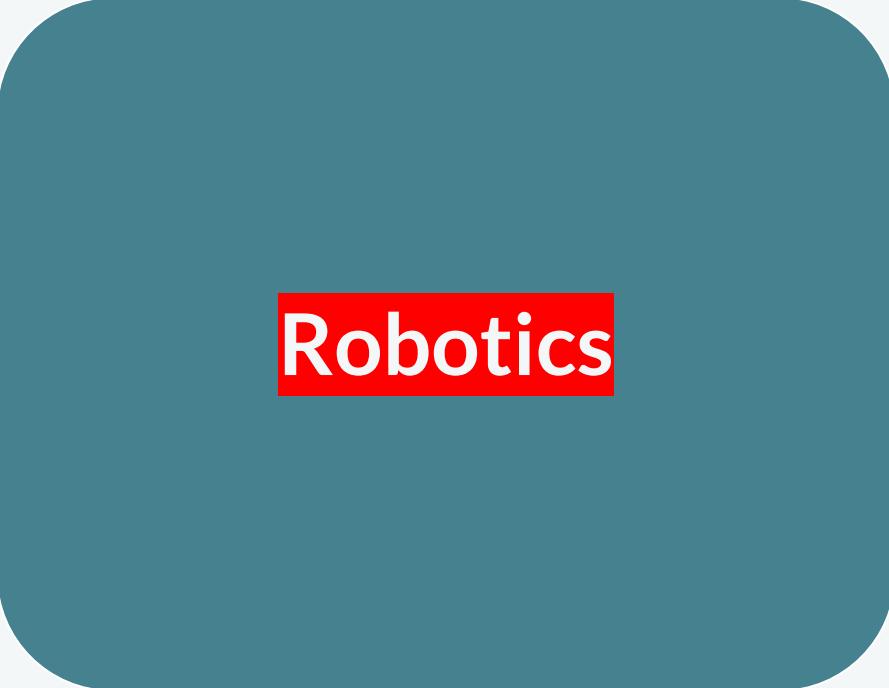


**What is  
Robotics!**

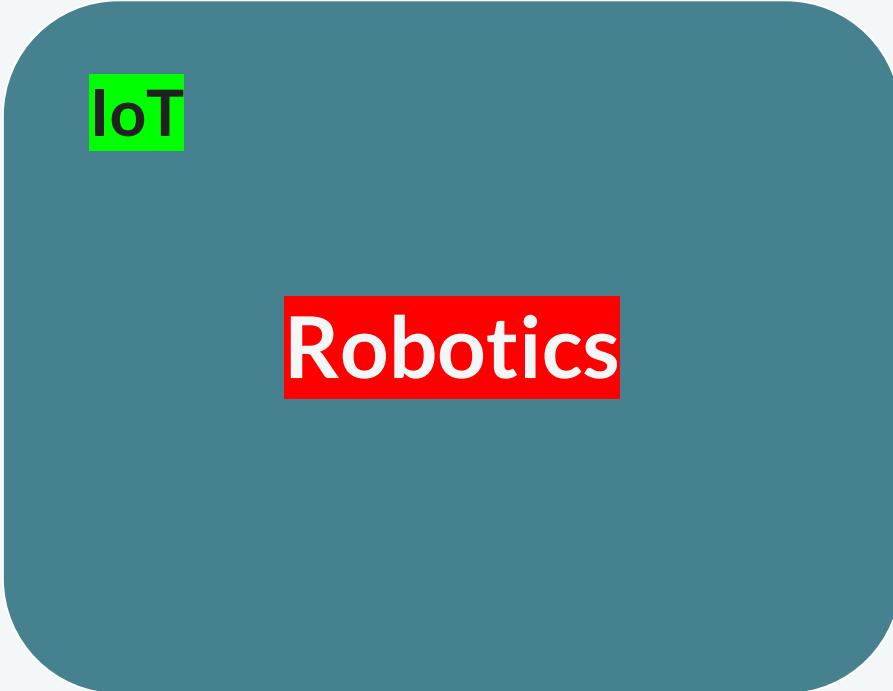
# **Robotics:**

**Robotics is-**

- **Interdisciplinary Branch of Science and Engineering**
- **Deals with the design, construction, operations, and use of robots.**



**Robotics**



**Robotics**

**IoT**

IoT

Automation

Robotics

IoT

Automation

Robotics

Embedded System

IoT

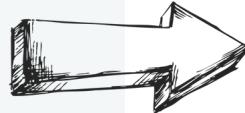
Automation

Embedded System

# How does a machine work?



INPUT

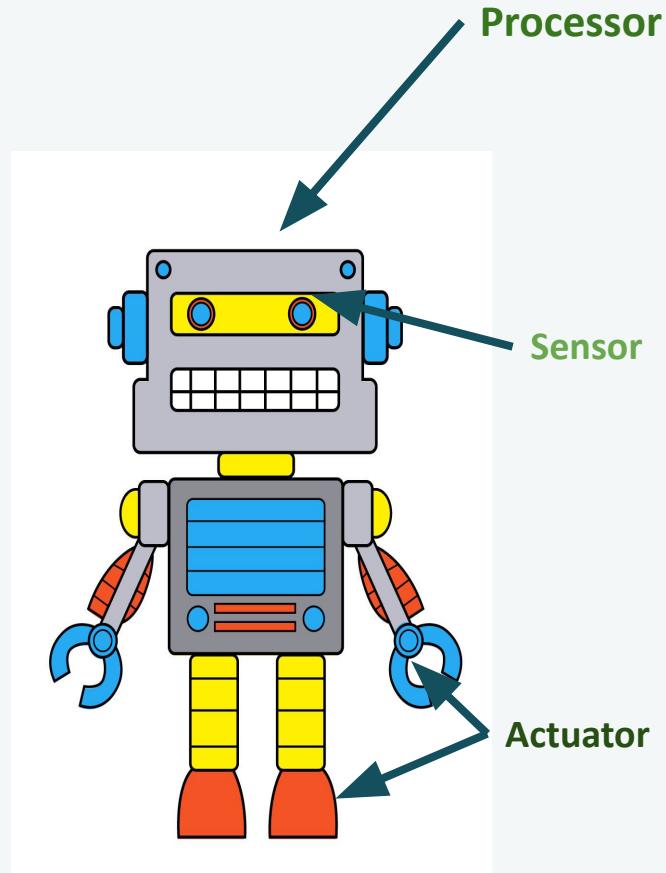
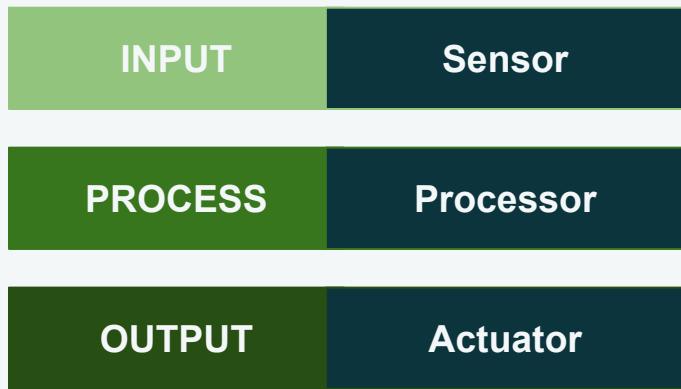


PROCESS



OUTPUT

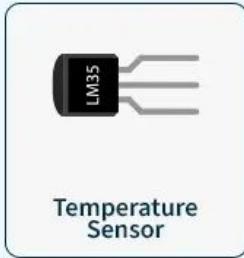
# A Typical Robot - core components



# Sensor - senses the data



Proximity Sensor



Temperature Sensor



Ultrasonic Sensor



Vibration Sensor



Tilt Sensor



Level Sensor



Touch Sensor



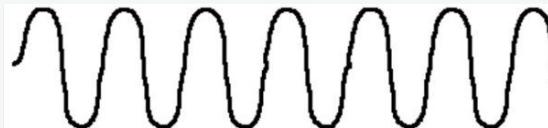
Soil moisture Sensor



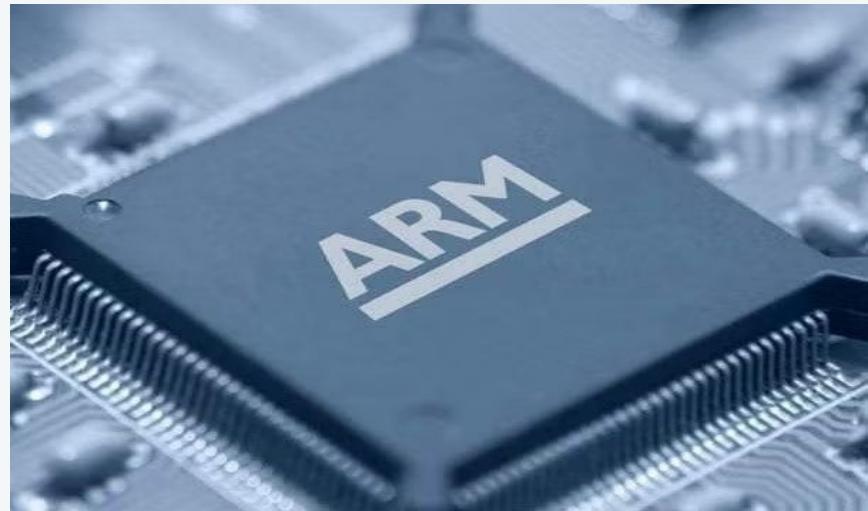
Gyroscopic Module

# Types of Sensors

Feature	Analog Sensor	Digital Sensor
Signal Type	Continuous	Discrete (0/1)
Accuracy	High, but prone to noise	Less precise but noise-resistant
Processing	Requires ADC for microcontroller use	Directly processed by microcontrollers
Examples	LDR, Thermistor, Pressure sensor	Ultrasonic, PIR, Digital temperature sensor



# Processor - processes the data



# Processor - processes the data

Feature	Microprocessor (MP)	Microcontroller (MCU)
Components	CPU only	CPU + RAM + ROM + I/O
Memory	Requires external	Built-in memory
Processing Power	High (multi-core)	Moderate (optimized for tasks)
Power Consumption	High	Low (ideal for battery-powered devices)
Operating System	Runs OS (Windows, Linux)	Runs firmware (bare metal)
Cost	Expensive	Affordable
Applications	PCs, Laptops, Servers	IoT, Robotics, Home Automation



# Microcontrollers



Arduino

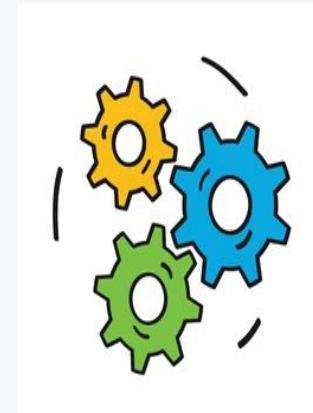
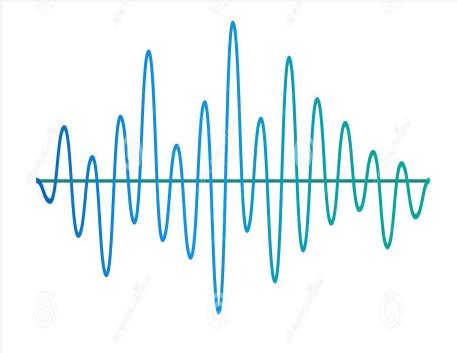


Raspberry Pi



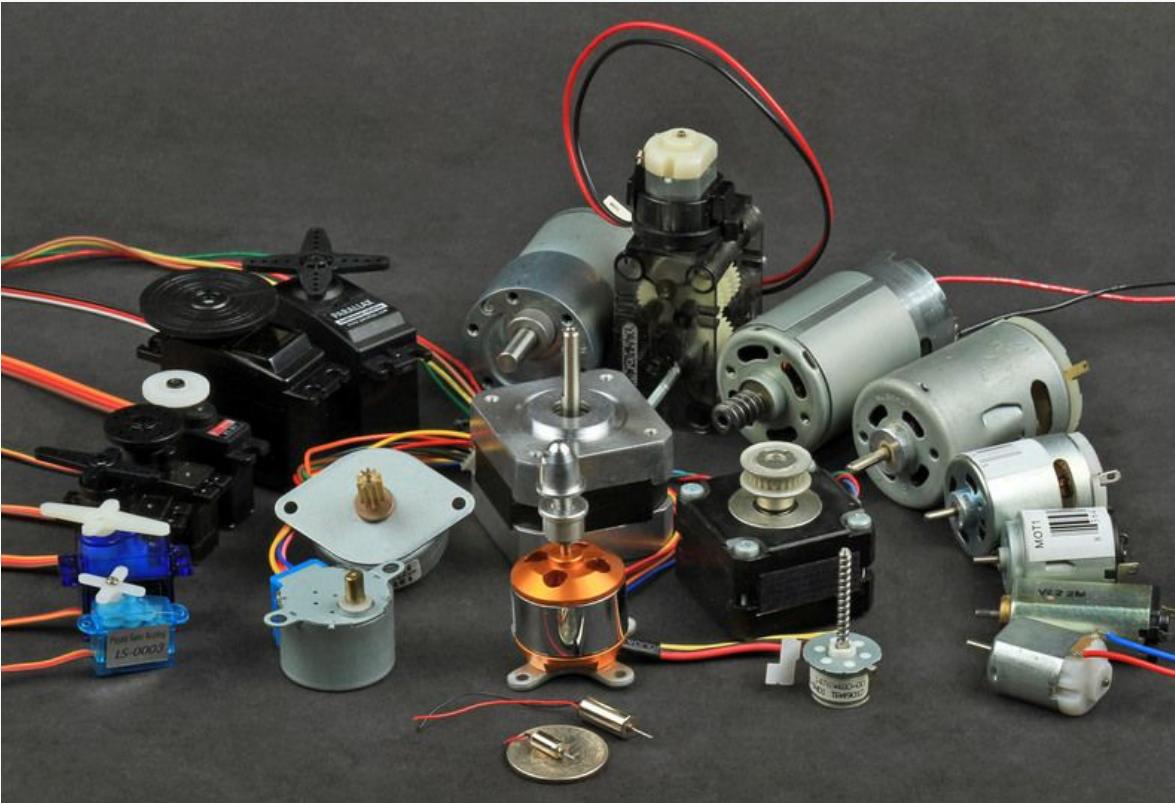
Jetson Nano

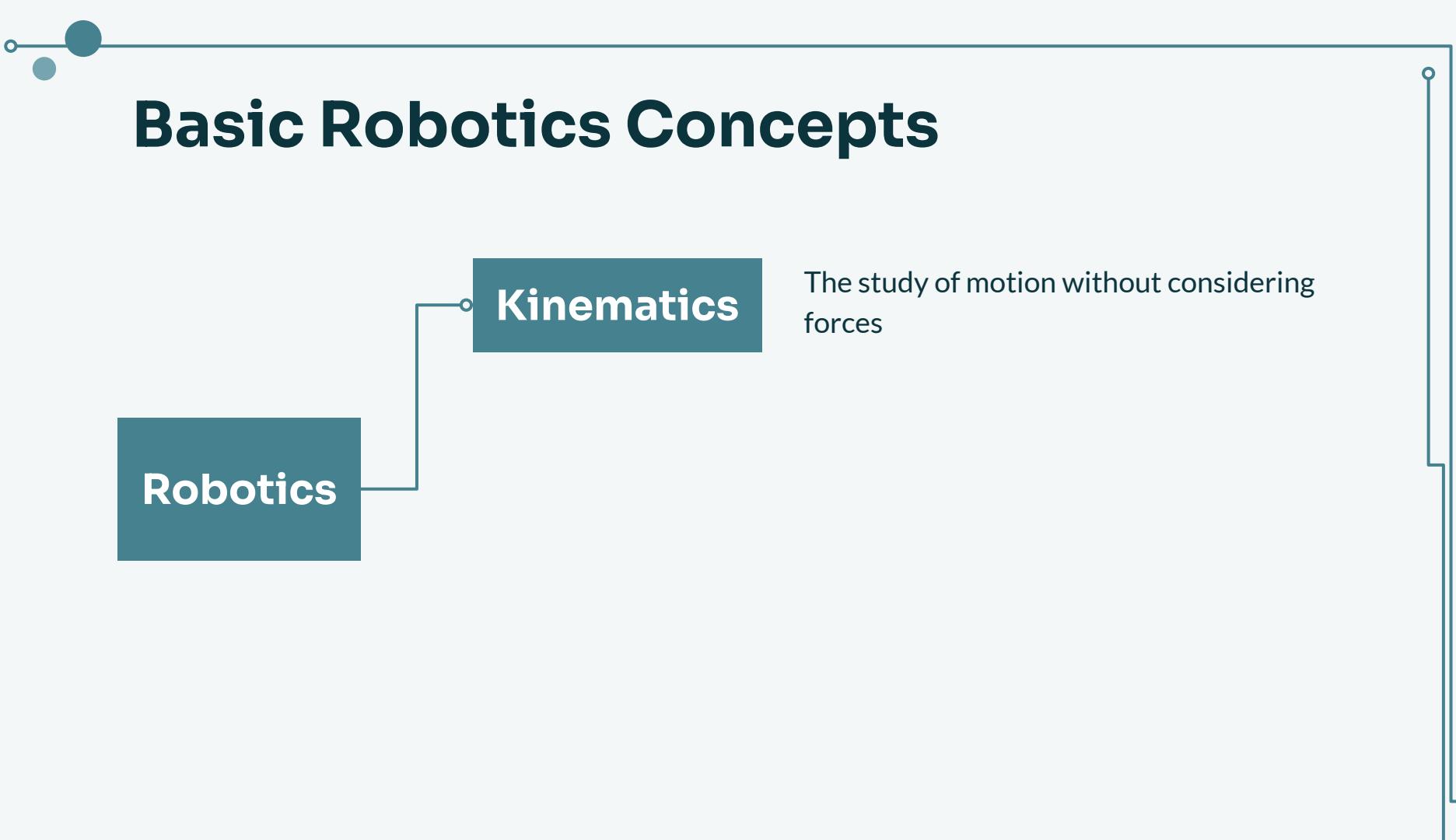
# Actuator - performs an action



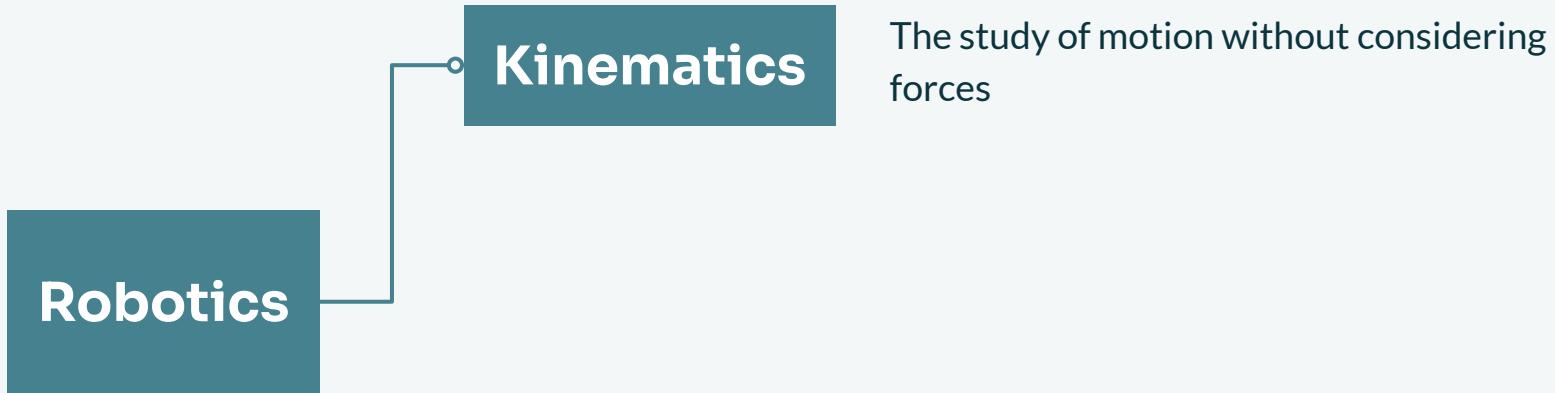
Converts Electrical signal into physical gesture like heat, sound, motion, electricity etc.

# Actuator - performs an action

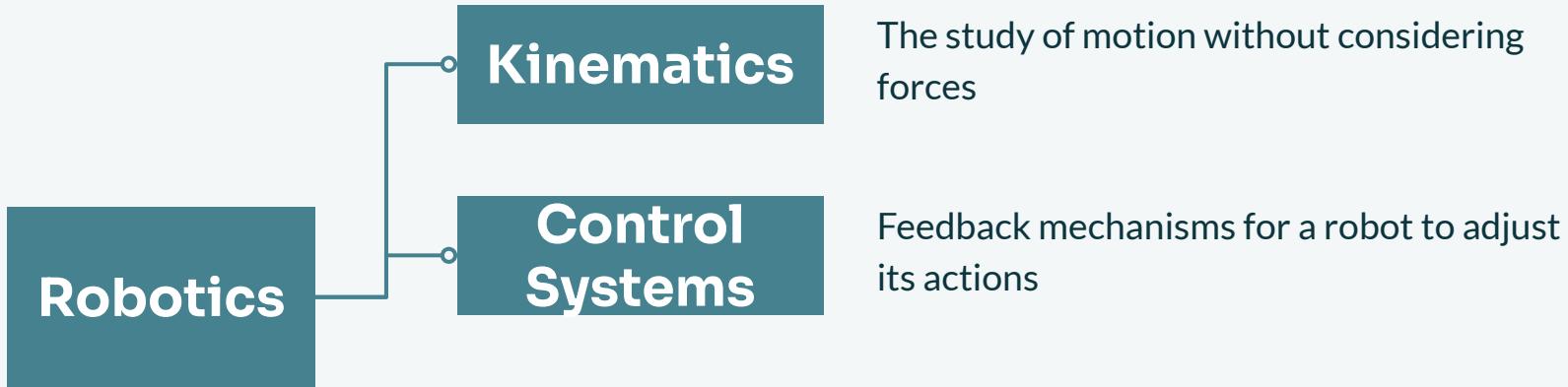




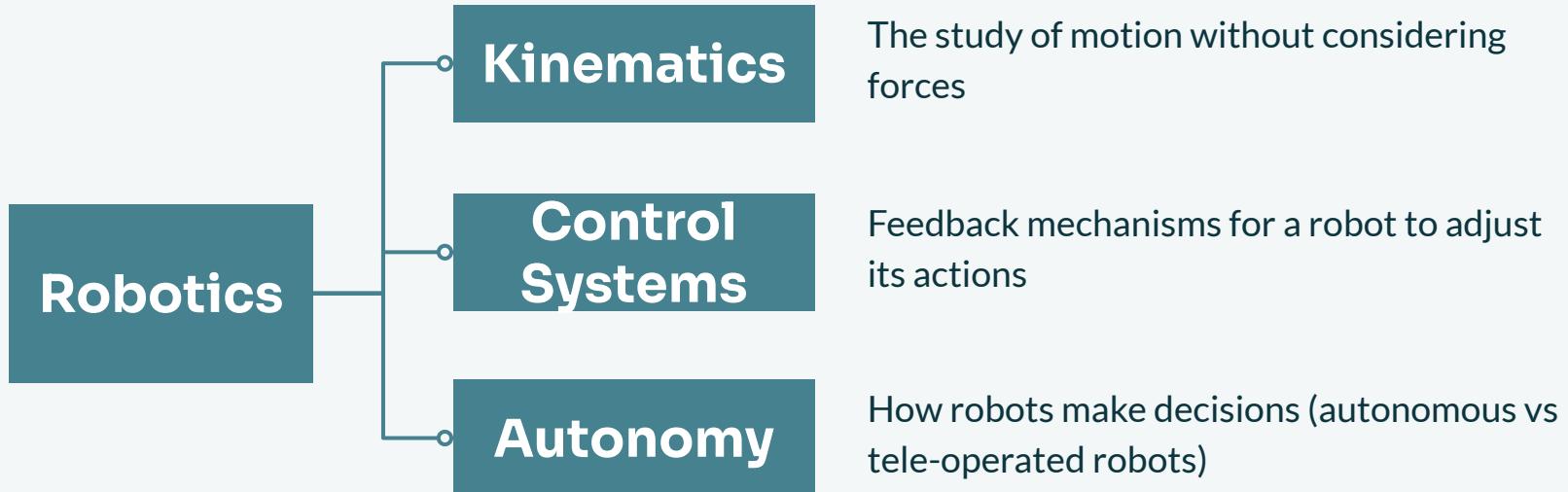
# Basic Robotics Concepts



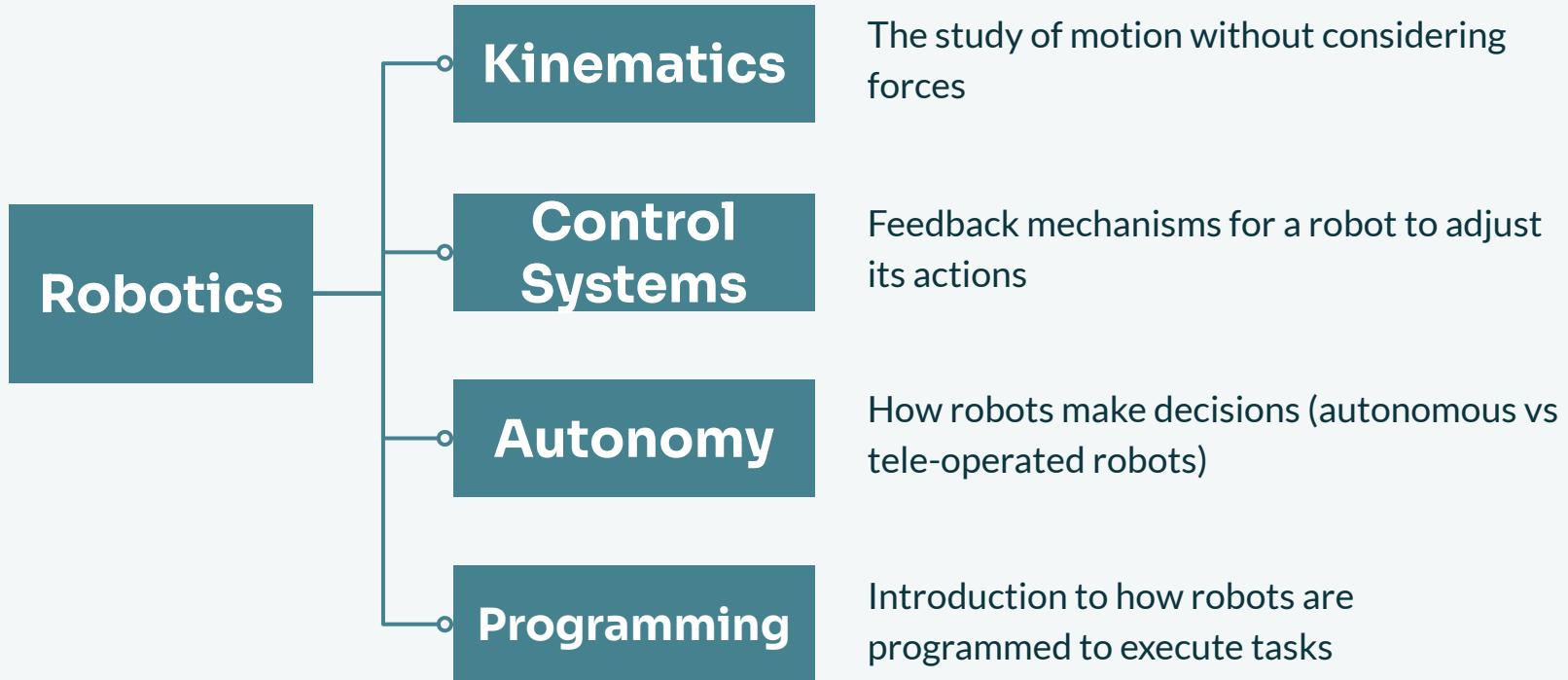
# Basic Robotics Concepts



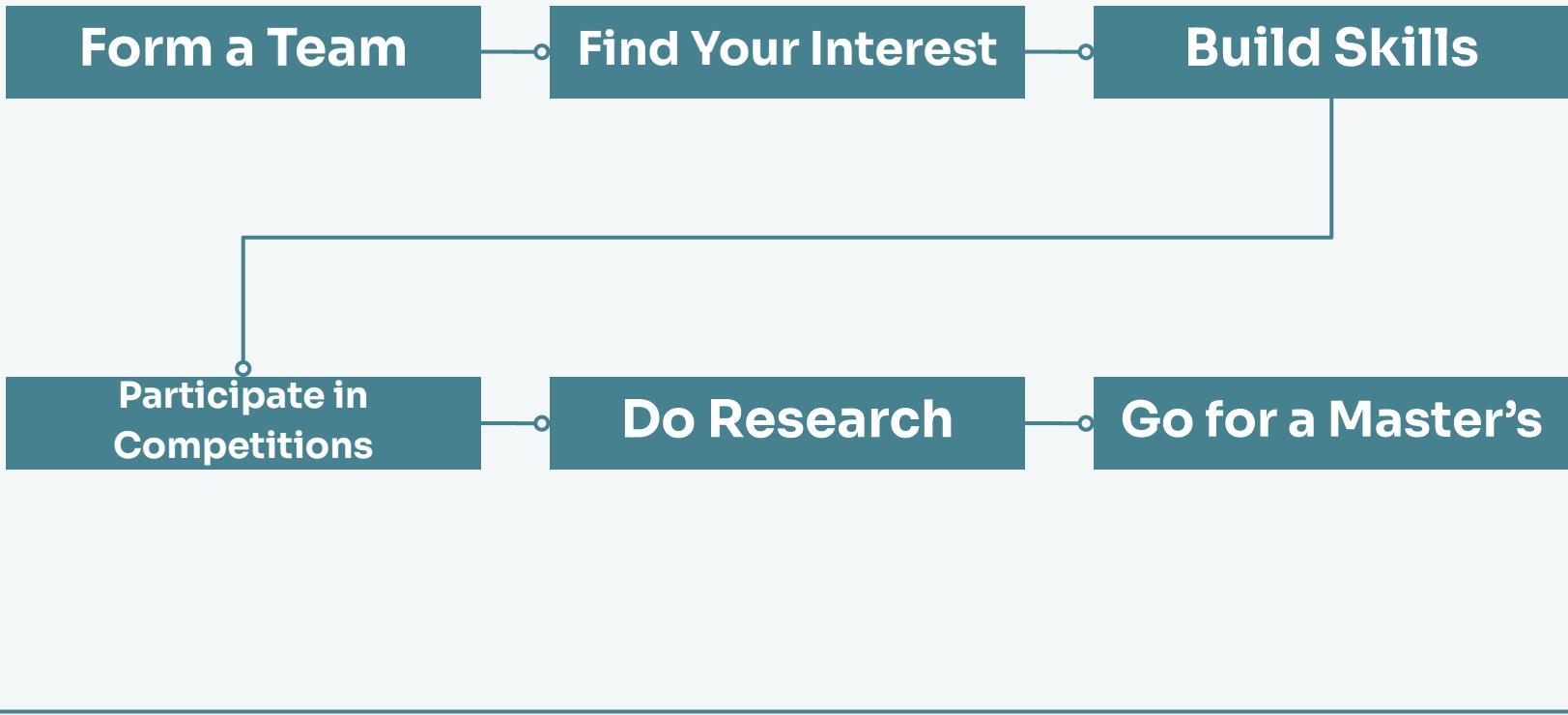
# Basic Robotics Concepts



# Basic Robotics Concepts



# Guideline



# Key to Success

- Find Your Mentor who can guide you
- Maintain an avg CGPA and Upgrade your Skills
- Create a skill sheet and set your monthly goal
- Find job requirements
- Keep your university work history
- Work on a good Thesis topic
- Create a CV
- Invest on YOU



# QnA



# Class Task

- List down 10 sensors and their use cases using internet

# Home Task

- Find 1 Industrial Robot from Internet and List Down their Sensor, processor, and Actuator