ENSIAS NeuroDynamics Club

INTRODUCTION TO ROBOTICS

Let's learn how to build a robot together!

NEURODYNAMICS

ROBOTICS TRAINING

TRAINING SUMMARY

1. WHAT IS A ROBOT ?
2. APPLICATIONS OF DIFFERENT DISCIPLINES IN ROBOTICS.
3. PIPELINE TO BUILD A ROBOT.
4. SIMPLE EXAMPLE OF DATA ACQUISITION

WHAT
IS A
ROBOT
?

WHAT IS A ROBOT

A ROBOT IS A PROGRAMMABLE MECHANICAL SYSTEM CAPABLE OF CARRYING OUT COMPLEX ACTIONS AUTOMATICALLY.

Speed

Precision

IF THE COMPUTER REPRESENTS HUMANITY'S ATTEMPT TO SIMULATE THE BRAIN, A ROBOT EMBODIES OUR ENDEAVOR TO RECREATE THE ENTIRE HUMAN EXPERIENCE.

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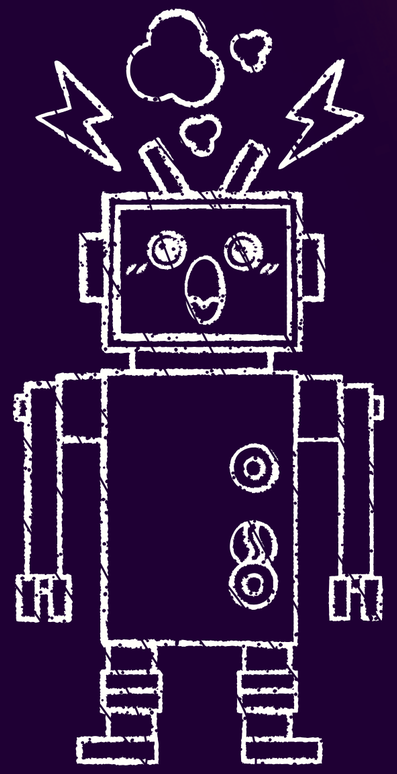


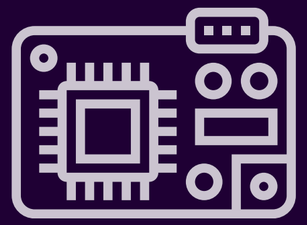
NEURODYNAMICS

ROBOTICS TRAINING

THE ANATOMY OF ROBOTS

BRAIN

MICROCONTROLLER /COMPUTER

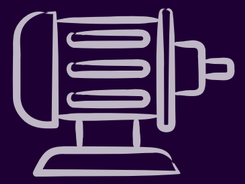


NERVOUS SYSTEM

SENSORS AND WIRING

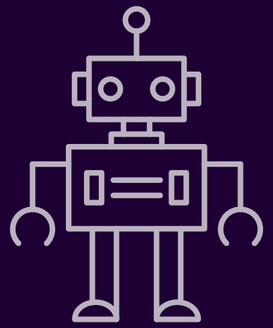
MUSCLES

MOTORS AND ACTUATORS



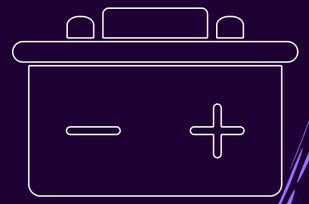
SKELETON

FRAME AND STRUCTURE



NUTRITIONS

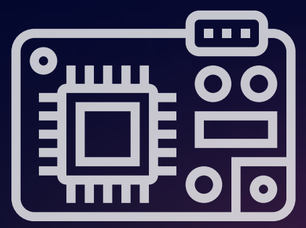
BATTERIES/POWER SUPPLY



ESSENTIAL CHARACTERISTICS

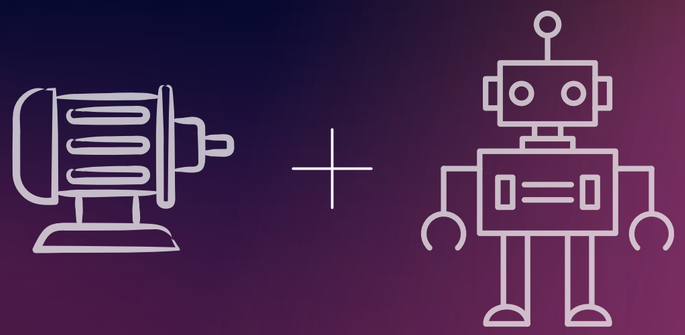
SENSORS AND WIRING

- Environmental perception
- Internal state monitoring
- Data collection and processing



MICROCONTROLLER /COMPUTER

- Decision making
- Data analysis
- Control algorithms
- Task planning



MOTORS AND ACTUATORS

FRAME AND STRUCTURE

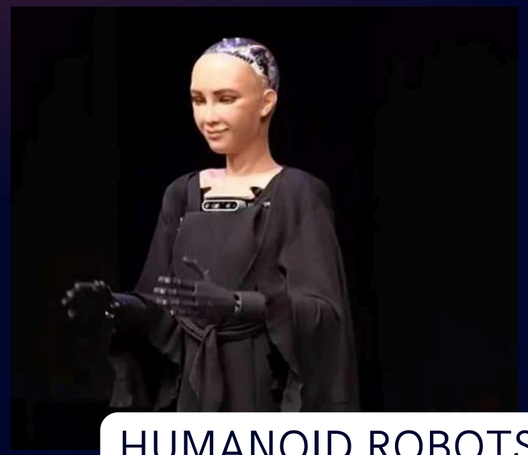
- Physical movement
- Environmental manipulation
- Task execution
- Feedback response

TYPES OF ROBOTS

INDUSTRIAL ROBOTS

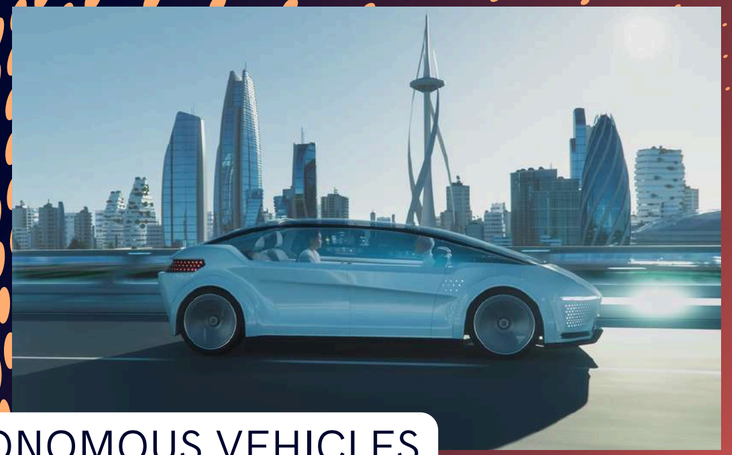
EXPLORATION ROBOTS

SERVICE ROBOTS



HUMANOID ROBOTS

MEDICAL ROBOTS



AUTONOMOUS VEHICLES

TYPES OF ROBOTS

AGRICULTURAL ROBOTS

MODULAR ROBOTS

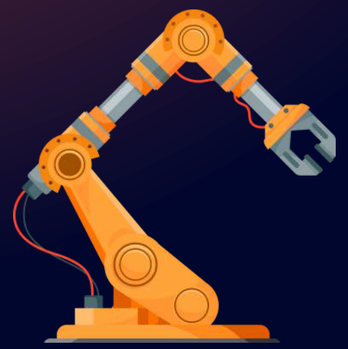
SWARM ROBOTS

MILITARY AND DEFENSE ROBOTS

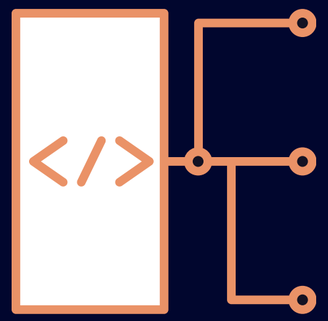
APPLICATIONS OF DIFFERENT DISCIPLINES IN ROBOTICS

CORE COMPONENTS OF ROBOTS

Physical Layer



Control Layer



Intelligence Layer

Network Layer

MAIN COMPUTER SCIENCE APPLICATIONS IN ROBOTICS

ARTIFICIAL INTELLIGENCE

- AUTONOMY
- VISION AND PERCEPTION
- INTERACT WITH HUMANS

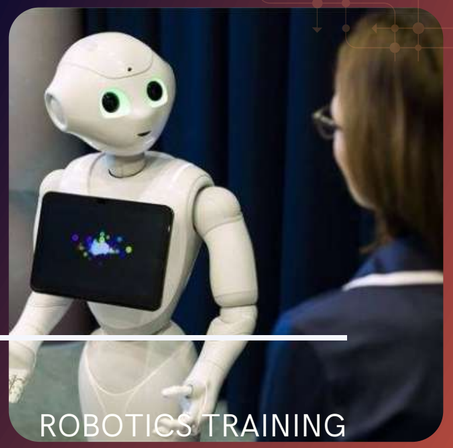
01 Autonomous Decision-Making

02 Sensor Fusion

03 Computer vision

04 Natural language processing (NLP)

05 Reinforcement Learning



NETWORK

COLLABORATIVE ROBOTS (COBOT)

IOT INTEGRATION

Communication protocols

Cloud connectivity

IoT integration

Mesh Networks

Low Latency Networks

Security systems

Edge Computing

REMOTE CONTROL AND MONITORING

SOFTWARE

ROBOT OPERATING SYSTEMS

DEVELOPMENT TOOLS AND ENVIRONMENTS

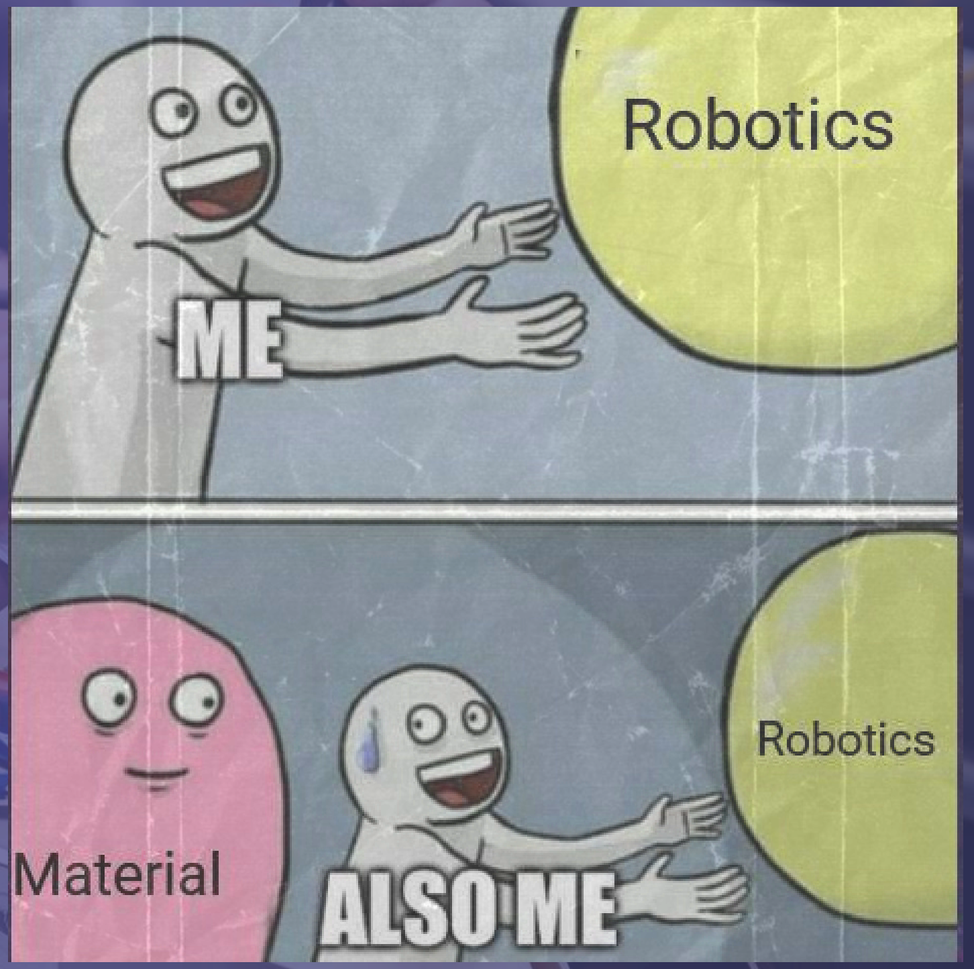
USER INTERFACE (UI) SOFTWARE

CONTROL SOFTWARE

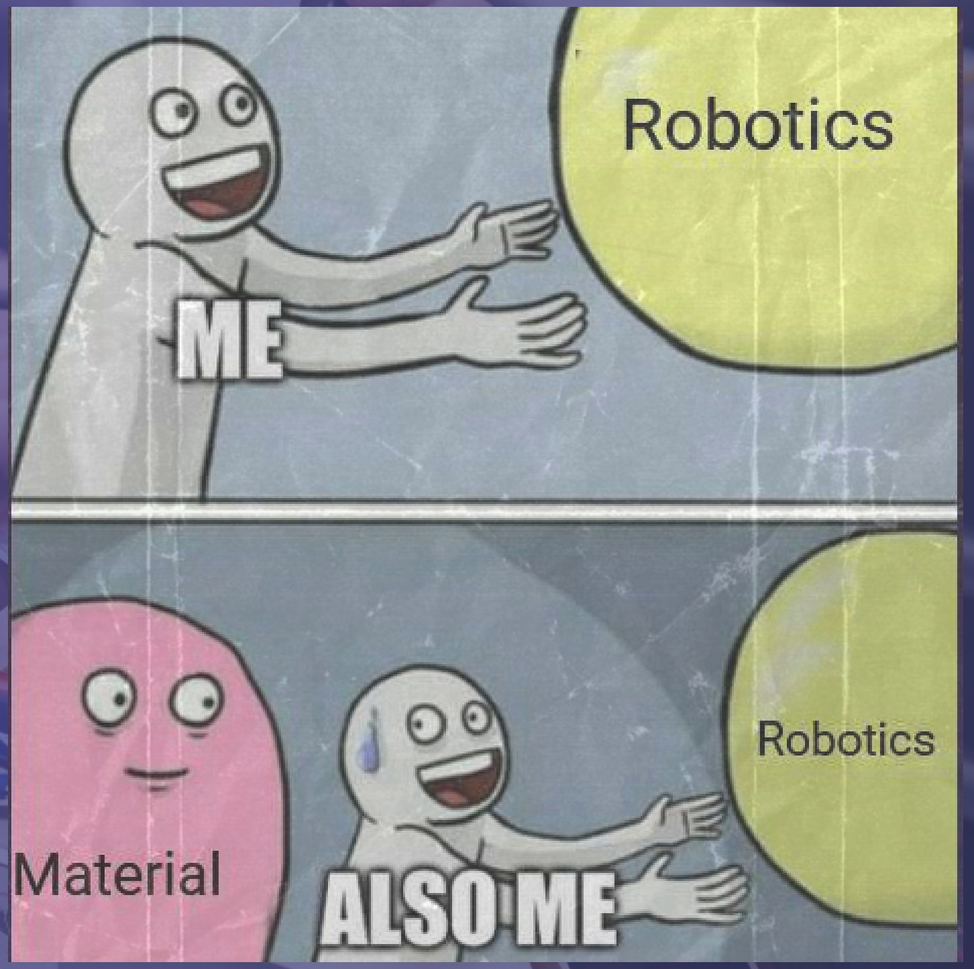
SIMULATION AND TESTING

WHAT IF WE WANT TO BUILD OUR OWN ROBOT

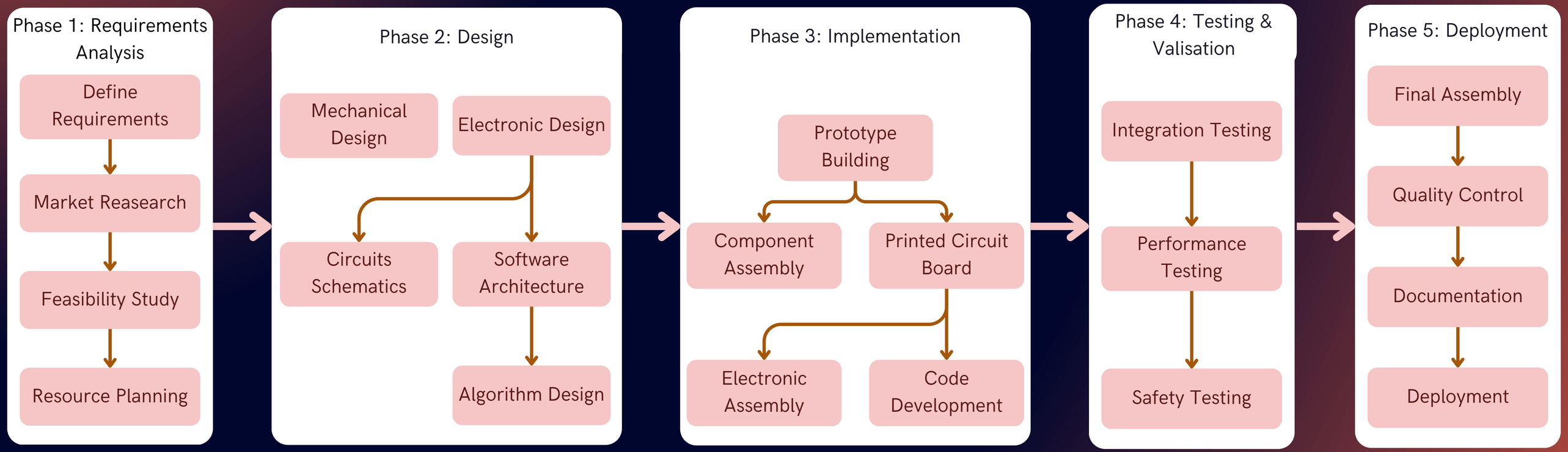
Well, you can't



just kidding



PIPELINE TO BUILD A ROBOT



A SIMPLE APPLICATION TO START

ENSIAS NeuroDynamics Club

THANK YOU FOR BEING HERE

NEURODYNAMICS

ROBOTICS TRAINING