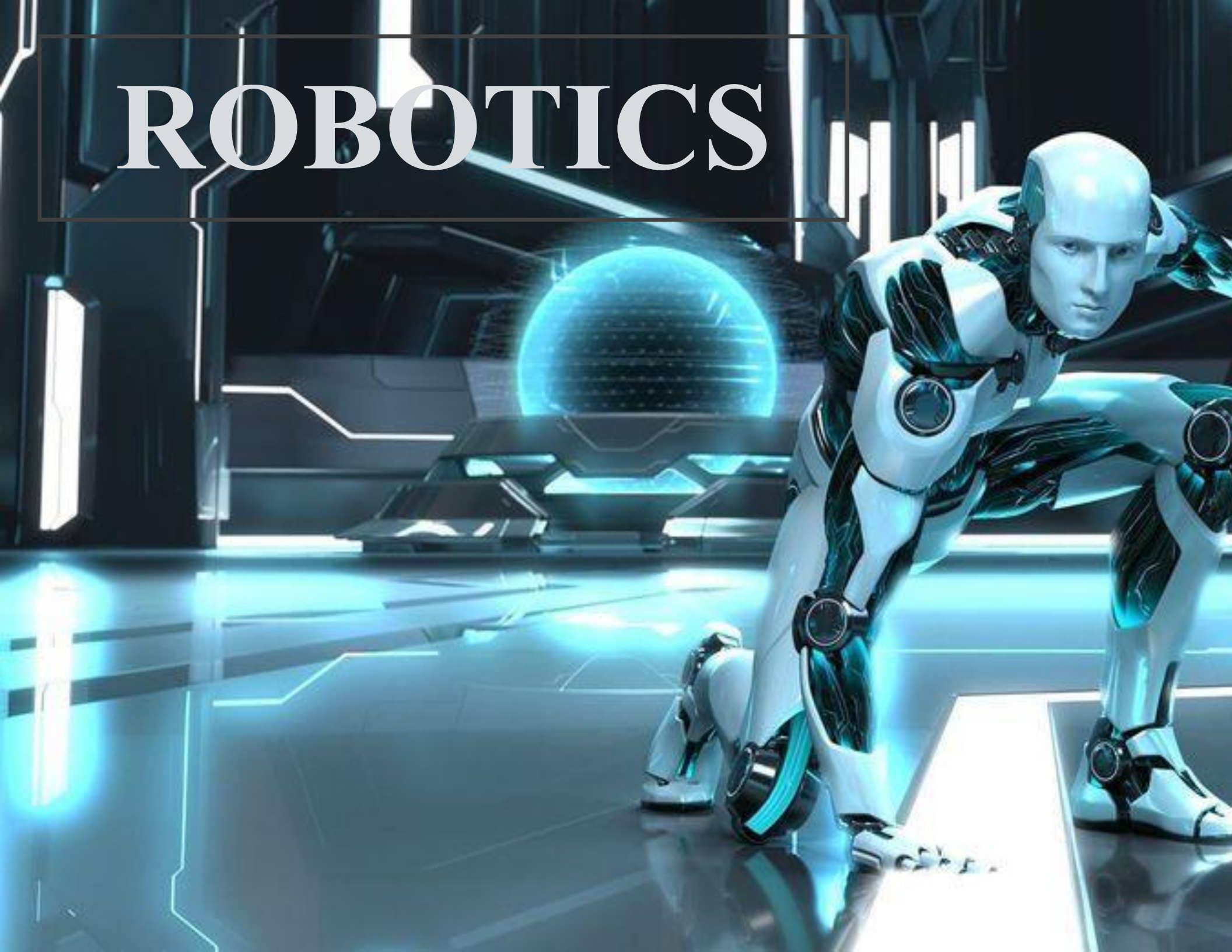


ROBOTICS



OUTLINE

- Definition
- Types
- Working principle
- Key components
- Applications
- Future



ROBOT DEFINED

- Word robot was coined by Karel Capek in a 1920.



Karel Capek

- Definition of robot:

–A robot is a reprogrammable, multifunctional manipulator designed to move material, parts, tools or specialized devices through variable programmed motions for the performance of a variety of tasks.

Types of robots



Robots used in welding



ROBOTS IN INDUSTRIES

ROBOTS IN MICRO SURGERY



ROBOTS IN ARMY



ROBOTS IN SPACE



MEDICAL ROBOTS



Robotic assistant for
micro surgery



ROBOTS IN HAZARDOUS ENVIRONMENTS



TROV in Antarctica
operating under water



HAZBOT operating in
atmospheres containing
combustible gases

INDUSTRIAL APPLICATIONS OF ROBOTS

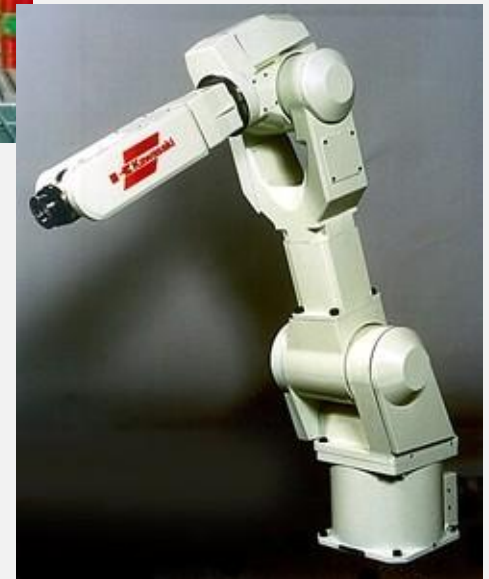
- Material handling
- Material transfer
- Machine loading and/or unloading
- Spot welding
- Continuous arc welding
- Spray coating
- Assembly
- Inspection



Material Handling Manipulator



Spot Welding Manipulator



Assembly Manipulator

PICK AND PLACE ROBOTIC ARM

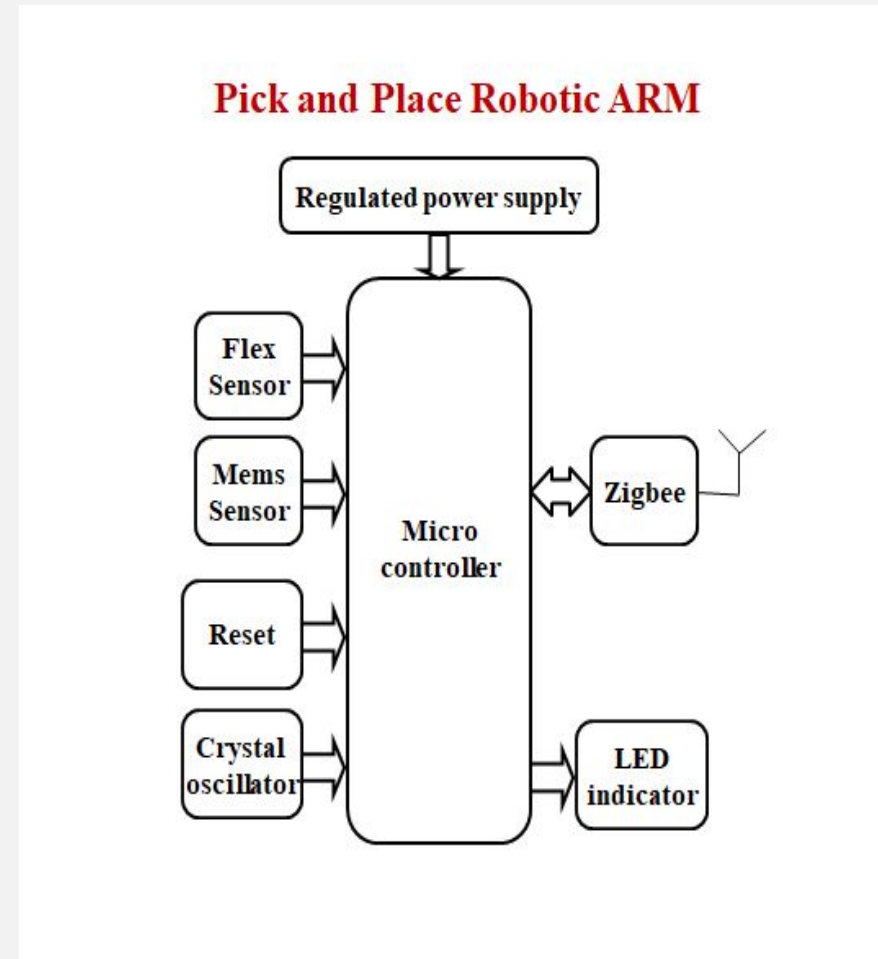


PRINCIPLES OF WORKING

The work is designed to develop a pick and place robotic arm with a soft catching gripper that is designed to avoid extra pressure on the suspected object (Like Bombs) for safety reasons. At the transmitting end using Flex sensor and Mems sensor, commands are sent to the motors to control the movement of the ARM either to move up, down, open, close, left and right using zigbee. At the receiving end five motors are interfaced to the switches where two of them are used for arm and gripper movement of the ARM. The main advantage of this robot is its soft catching arm that is designed to avoid extra pressure on the suspected object for safety reasons.

MAIN BLOCKS

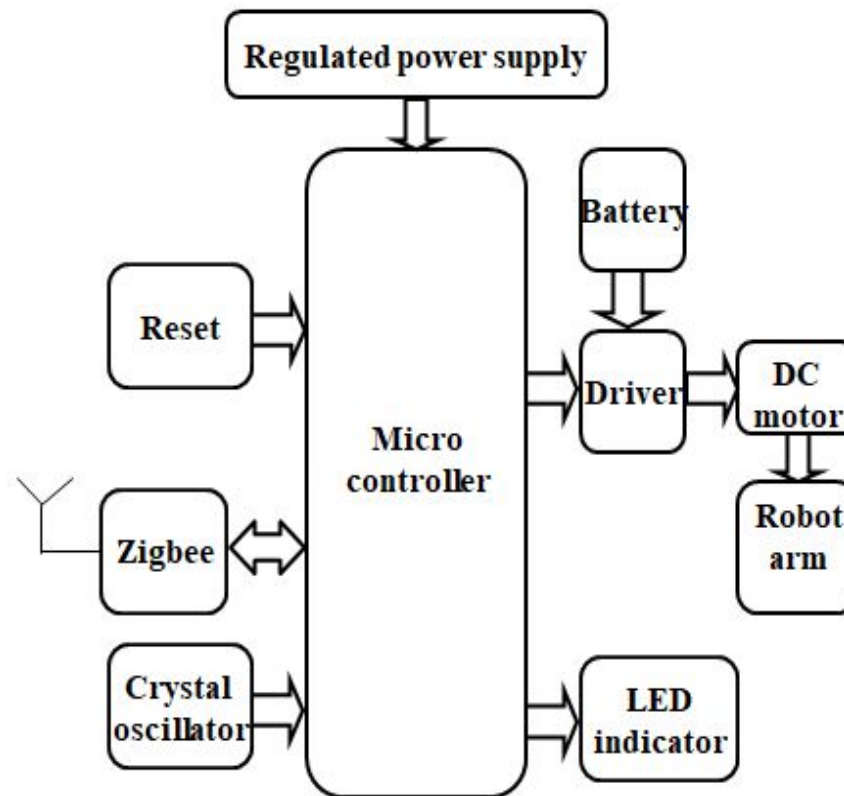
- Regulated Power supply
- Battery
- Flex sensor
- Mems
- DC Motors
- 4 bar link mechanism
- Microcontroller
- Zigbee



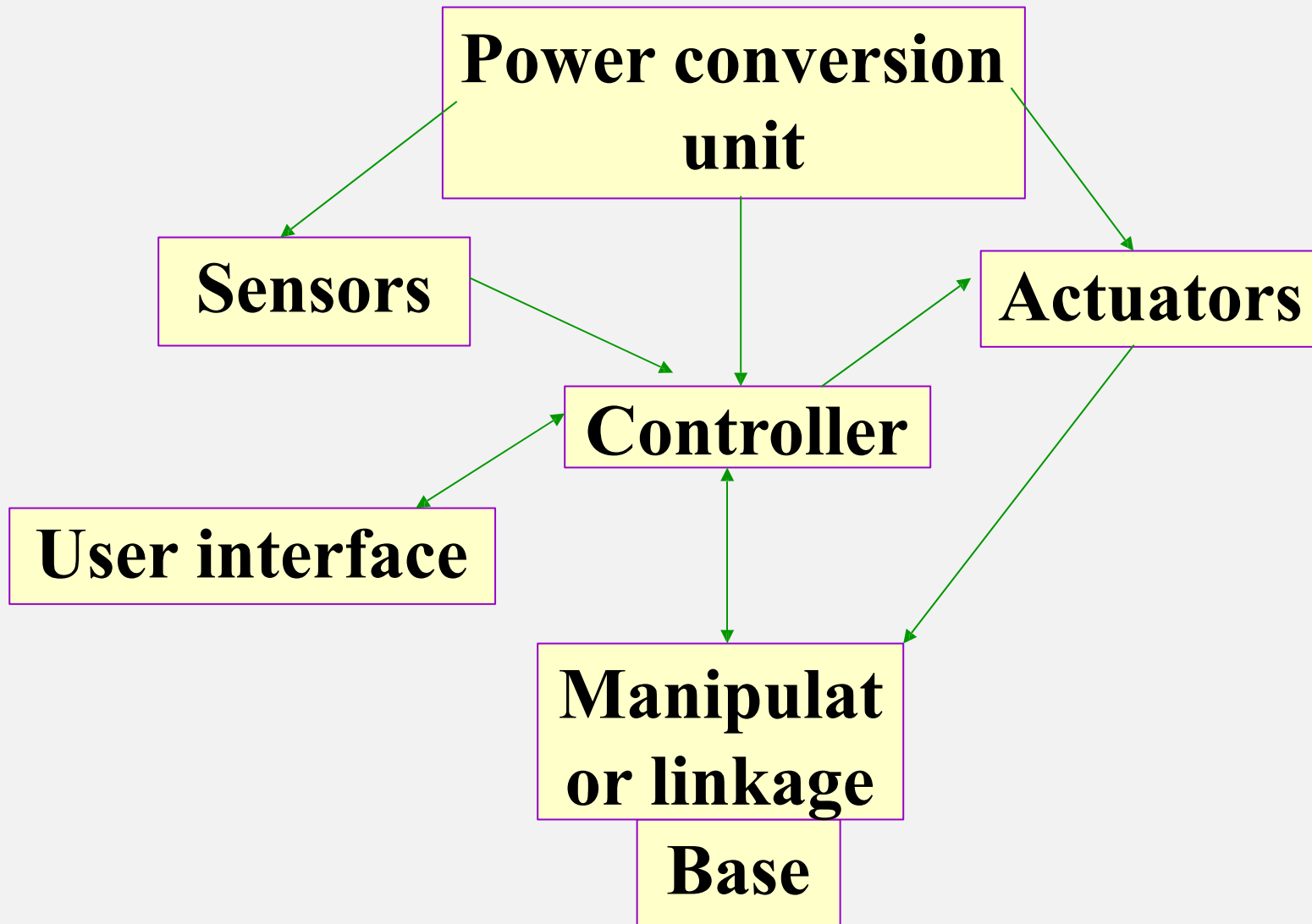
**BLOCK DIAGRAM OF
TRANSMITTING SECTION**

BLOCK DIAGRAM OF RECEIVING SECTION

Pick and Place Robotic ARM



KEY COMPONENTS



Robot Mechanism

Mechanical Elements



SENSORS

- Robots often need information that is beyond 5 human senses (e.g., ability to: see in the dark, detect tiny amounts of invisible radiation, measure movement that is too small or fast for the human eye to see)



Accelerometer
Using Piezoelectric Effect



Flexiforce Sensor

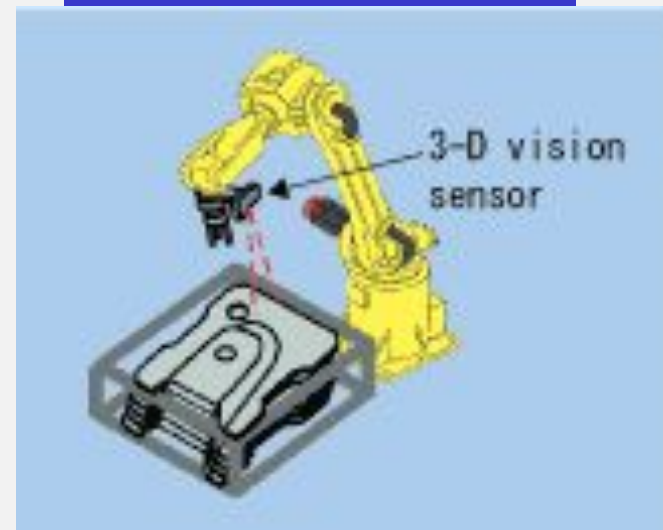
VISION SENSORS

Vision Sensor: e.g., to pick bins, perform inspection, etc.

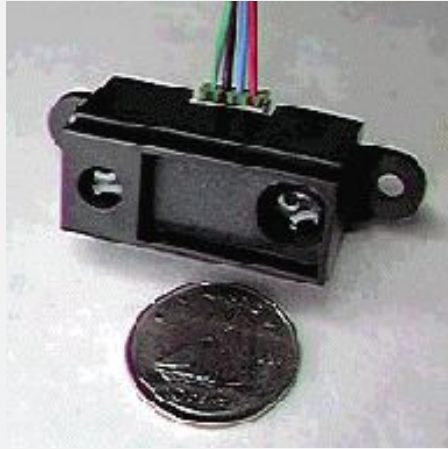
Part-Picking: Robot can handle work pieces that are randomly piled by using 3-D vision sensor. Since alignment operation, a special parts feeder, and an alignment pallette are not required, an automatic system can be constructed at low cost.



In-Sight Vision Sensors



PROXIMITY SENSORS



Infrared Ranging Sensor

Devantech SRF04



UltraSonic Ranger

Example



KOALA ROBOT

- 6 ultrasonic sonar transducers to explore wide, open areas
- Obstacle detection over a wide range from 15cm to 3m
- 16 built-in infrared proximity sensors (range 5-20cm)
- Infrared sensors act as a “virtual bumper” and allow for negotiating tight spaces

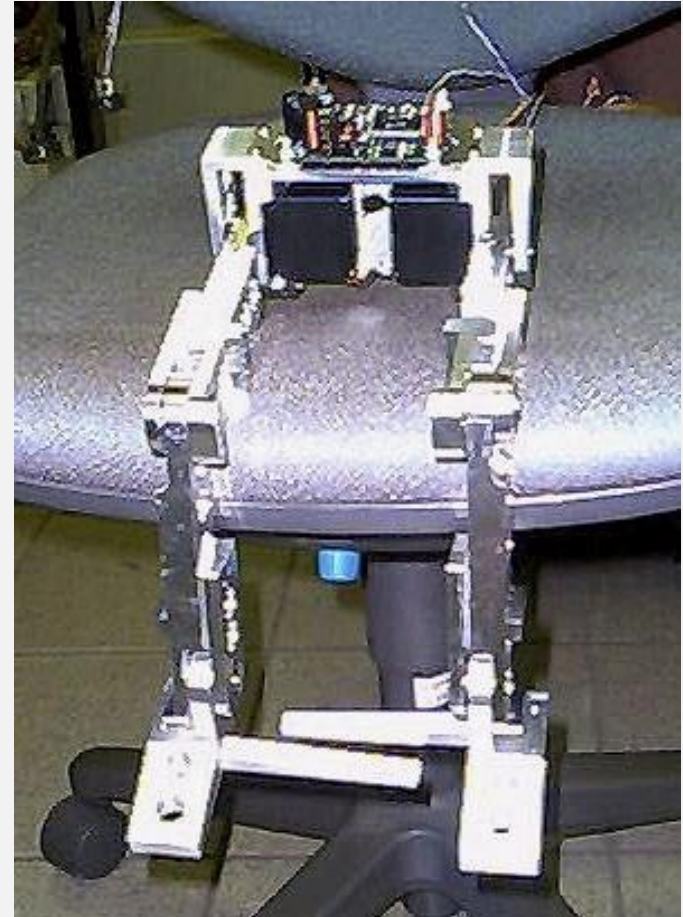
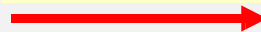
TILT SENSORS

Tilt sensors: e.g., to balance a robot



Tilt Sensor

Example



Planar Bipedal Robot

ACTUATORS:

- Common robotic actuators utilize combinations of different electro-mechanical devices
 - Synchronous motor
 - Stepper motor
 - AC servo motor
 - Brushless DC servo motor
 - Brushed DC servo motor



ACTUATORS



Hydraulic Motor



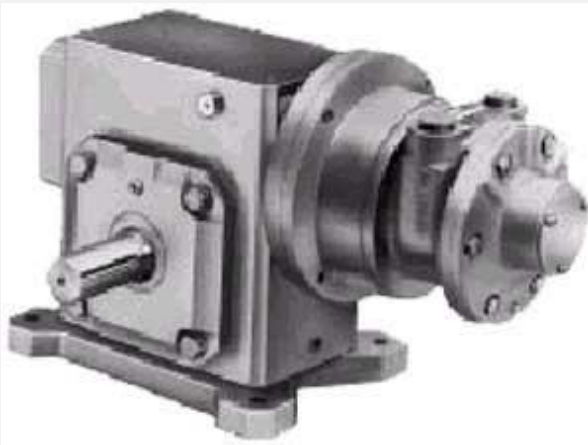
Pneumatic Cylinder



DC Motor



Stepper Motor



Pneumatic Motor



Muscle Wire



Servo Motor

ROBOTS IN INDUSTRY

- Agriculture
- Automobile
- Construction
- Entertainment
- Health care: hospitals, patient-care, surgery , research, etc.
- Laboratories: science, engineering , etc.
- Law enforcement: surveillance, patrol, etc.
- Manufacturing
- Military: demining, surveillance, attack, etc.
- Mining, excavation, and exploration
- Transportation: air, ground, rail, space, etc.
- Utilities: gas, water, and electric
- Warehouses

- **ADVANTAGES AND DISADVANTAGES**

- **Advantages:**

this robot can handle dangerous chemicals in chemical lab or in nuclear reactor labs which are hazardous to human body.

- Having a android control facility this robot can perform many tasks that human cannot or dangerous for human to handle.
- With some modifications this robot can be used for helping the physically challenged people. Stable performance and long life
- Simple drive circuit
- Low power consumption.
- This system helps in accidents.
- Efficient and low cost design.

- **Disadvantages:**

- Manual attention is required
- Movement is limited to one direction at one time
- Up to 8-10 meters the zigbee. Can transfers the data
- Robots can't take self decisions with out programming.

CONCLUSION:

- **Future Scope:** There are many unsolved problems and fundamental challenges for robotics. At a very high level. Manipulation and physical interaction with the real world: We need concerted modeling and control efforts together with the development of good hardware to make arms and hands that can perform anything but the simplest of pick-and-place operations that are prevalent in industry. The pick and place robot is having the very vast area of applications.

Artificial Intelligence



Cog



Kismet

THANK YOU

<https://youtu.be/9PtD5R2o9NE>