1. Types of Robots:
    a. Manipulator: These are fixed at one location, and only the arm will reach its workspace. It is an electronically controlled mechanism consisting of multiple segments that perform tasks by interacting with its environment.
    https://www.youtube.com/watch?v=X_fSlOewcrI&ab_channel=LucaMosetti
    https://www.youtube.com/watch?v=re3oCC14rzE
    b. Mobile Robots: It is an automatic machine that is capable of locomotion. Mobile robotics is usually considered to be a subfield of robotics.
    https://www.youtube.com/watch?v=BiemOdLYf48
    https://www.youtube.com/watch?v=Zb5PPMNKR1Y
    https://www.youtube.com/watch?v=-sqRPO71Mfo
    c. Areal Robots: Aerial robots, also known as unmanned aerial vehicles (UAVs) or drones, fly through air, land, as home robots, or unmanned ground vehicles (UGVs), that navigate on dry land or within houses.
    https://www.youtube.com/watch?v=gPNRZi0EPQw
    https://www.youtube.com/watch?v=J3gmzn0bSa4

    d. Underwater Robots: It is a robot that travels underwater without requiring input from an operator.
    https://www.youtube.com/watch?v=4WOOwesIkss
    https://www.youtube.com/watch?v=bbMNJXYFwPc
    e. Soft Robots: A subfield of robotics concerns the design, control, and fabrication of robots composed of materials instead of rigid links. In contrast to rigid-bodied robots built from metals, ceramics, and rigid plastics, the compliance of soft robots can improve their safety when working in close contact with humans.
    https://www.youtube.com/watch?v=A7AFsk40NGE
    https://www.youtube.com/watch?v=iwQRYzLZvGE
    https://www.youtube.com/watch?v=ifLvpxMuos8
    f. Microrobots: It is the field of miniature robotics, particularly mobile robots with characteristic dimensions less than 1 mm. The term can also be used for robots capable of handling micrometer-size components.
    https://www.youtube.com/watch?v=N7lXymxsdhw
    https://www.youtube.com/watch?v=FLFse2RcuRU
2. Motors
    There are AC induction motors in the AC synchronous motors, the DC brushless motors, stepper motors, and servos which are still basic brush DC motors but with some extra components, and by that, we consider a different types of motors. First, we divide these motors into two main types. AC motors and DC motors. For the alternating current motors, we had synchronous and asynchronous motors, mainly induction motors. Basically, the main difference between this one synchronous motor is a machine whose rotor speed and the state's magnetic field speed are equal; this is not for asynchronous AC motors. For direct current motors, we have two main types. We have the brush DC motors and brushless DC motors. For the brushless category, we have yet another sub-category because we could have the standard stepper motor, which is also brushless, so we will look at the brush DC motors, AC induction motors, AC synchronous motors, brushless DC motors, stepper motors, and servos.

3. $R_0^1 = \begin{matrix} i_1 \cdot i_0 & j_1 \cdot i_0 & k_1 \cdot i_0 \\ i_1 \cdot j_0 & j_1 \cdot j_0 & k_1 \cdot j_0 \\ i_1 \cdot k_0 & j_1 \cdot k_0 & k_1 \cdot k_0 \end{matrix}$

If we take rotation about the z-axis about Θ, then

$$R_{z,\theta} = \begin{bmatrix} \cos\theta & -\sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

The dot product of the first and second columns gives $-\cos\theta \sin\theta + \sin\theta \cos\theta = 0$
The dot product of the third and second columns gives 0.
The dot product of the third and first columns gives 0.
So we can say that columns are orthogonal to each other.

4. $R_0^1 = \begin{matrix} i_1 \cdot i_0 & j_1 \cdot i_0 & k_1 \cdot i_0 \\ i_1 \cdot j_0 & j_1 \cdot j_0 & k_1 \cdot j_0 \\ i_1 \cdot k_0 & j_1 \cdot k_0 & k_1 \cdot k_0 \end{matrix}$

If we take rotation about the z-axis about Θ, then

$$R_{z,\theta} = \begin{bmatrix} \cos\theta & -\sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\det(R_{z,\theta}) = 1((\cos\theta)^2 + (\sin\theta)^2) = 1$$

Reference: Wikipedia, YouTube, and internet.

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