

Mid

Niby Alsam
21101255

CSE461

(sec-09)

①

Answer to the Q.No -1

(a) According to the question we need the following
sensors,

- (i) To understand the voice command we need a voice recognition sensor.
- (ii) ~~we~~ To remind the ~~also~~ elders about their medicine we need a medication sensor.
- (iii) To ~~an~~ engage with ~~id~~ individual and to see them we have to use a camera and vision sensor.
- (iv) ~~To~~ To detect the sickness and alert we can use a motion sensor. ~~or~~

(2)

(b) For this case we can use some actuator like robotic arm and speaker.

(c) To use this ~~robotic~~ robot in this scenario, we need a microcontroller or a microprocessor that can process any data from the input. For this we can use RPi because it can process voice and image.

(d) For this case we can use hybrid paradigm. Because, in hybrid paradigm the robot will sense the ~~the~~ environment and ~~act~~ react real-time. But when it can sense a ~~uncertain~~ uncertainty in the environment, it ~~makes~~ ~~plan~~ plans and again acts in the environment. ~~and~~ Here the robot should act ~~realtime~~ as it ~~have~~ has to

communicate with the individual

(e) In robots

(e) In robotics, there are mainly three primitives and those are sense, plan and act. The robot should sense the environment using the sensors. Then it has to make a plan to do any ~~no~~ steps. Then according to the plan it will act to the ~~env~~ environment. These three primitives are mostly used in traditional robotic system.

Q4

Ans to que Q. → 3

(a) DH,

joint	α	a	d	θ
1				58.77°
2	25.41°			θ_2
3	70.5°			θ_3

Then

The homogeneous transformation matrix,

$$T_i = \begin{bmatrix} \cos \theta_i & -\sin \theta_i \cos \alpha_i & \sin \theta_i \sin \alpha_i & a_i \cos \alpha_i \\ \sin \theta_i & \cos \theta_i \cos \alpha_i & -\cos \theta_i \sin \alpha_i & a_i \sin \alpha_i \\ 0 & \sin \alpha_i & \cos \alpha_i & d_i \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$\therefore T = (T_1 \cdot T_2 \cdot T_3)$$

(5)

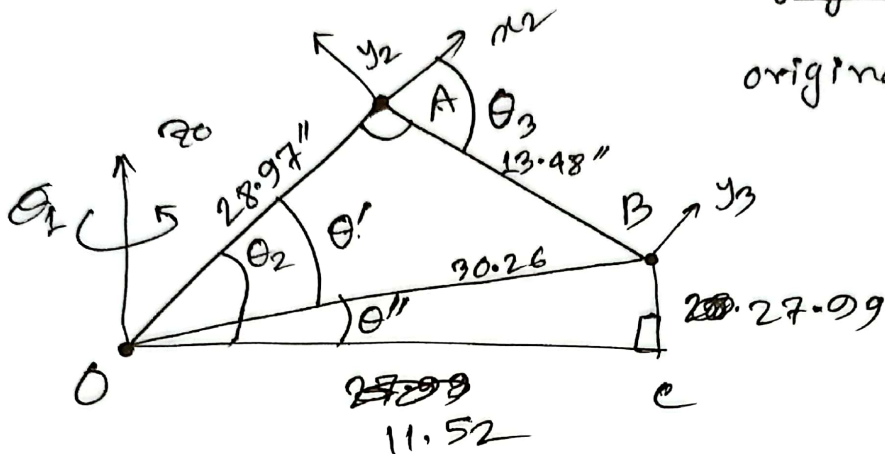
(b) Given,

$$(x, y, z) = (11.52, 27.99, 28.44)$$

$$\text{base, } d = 20.84''$$

~~original z = d = 28.~~

$$\text{original } z = (28.44 - d) = 7.6$$


~~ΔOAB~~ ΔOBC,

$$\vec{OB} = \vec{OC} + \vec{BC}$$

$$\Rightarrow OB = \sqrt{OC^2 + BC^2}$$

$$= \sqrt{(11.52)^2 + (27.99)^2}$$

$$= 30.26$$

ΔOAB,

$$\cos A = \frac{28.97^2 + 13.48^2 - (30.26)^2}{2 \times 28.97 \times 13.48}$$

~~$$\Rightarrow A = \cos^{-1}(\dots)$$~~

$$\Rightarrow A = \cos^{-1}(0.134)$$

$$\Rightarrow A = 82.25^\circ$$

$$\therefore \theta_3 = 180^\circ - A$$

$$= 97.74^\circ$$

(Ans.)

④ ⑥

Again,

$$\cos \theta' = \frac{28.97^2 + 30.26^2 - 13.48^2}{2 \times 28.97 \times 30.26}$$

$$\Rightarrow \theta' = \cos^{-1}(0.897)$$

$$\Rightarrow \theta' = 26.19^\circ$$

Again,

$$\tan \theta'' = \frac{y}{x}$$

$$\Rightarrow \theta'' = \tan^{-1}\left(\frac{27.99}{11.52}\right)$$

$$\Rightarrow \theta'' = 67.62^\circ$$

$$\therefore \theta_2 = (\theta' + \theta'') = 93.81^\circ \quad \text{(Ans.)}$$

$$\text{now, } \theta_1 = \tan^{-1}\left(\frac{7.6}{11.52}\right) = \tan^{-1}\left(\frac{7.6}{11.52}\right)$$

$$= 33.41^\circ \quad \text{(Ans.)}$$