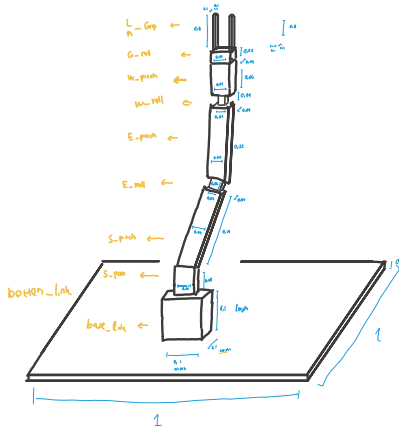
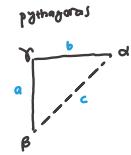
Arm bot


L_Grip
G_rot
W_pitch
W_roll
E_pitch
E_rot
S_pitch
S_rot
bottom_link
base_link
1
1

Robot Motion 3 DOF

IMU Sensor → x, y, z } translate

⇒



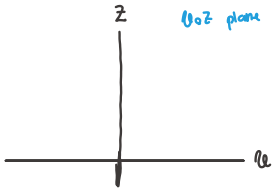
concept △ → α + β + γ = π rad = 180°

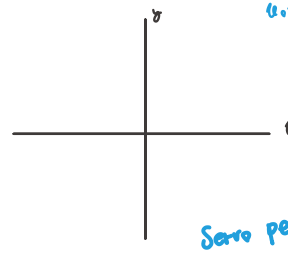
$\cos\gamma = \frac{a^2+b^2-c^2}{2ab}$

$\cos\beta = \frac{a^2+c^2-b^2}{2ac}$

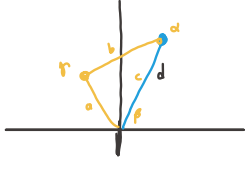
$\cos\alpha = \frac{c^2+b^2-a^2}{2bc}$

IMU Sensor → x, y, z





imu gerak, baca data x,y,z
↳ berupa titik
x y z
jarak pusat ke titik

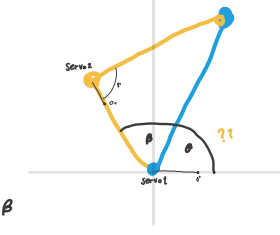


pass robot
d = c

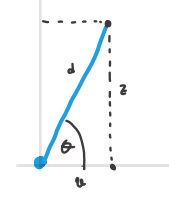
diperoleh
a
b
c = d

servo1 = θ + β
servo2 = γ

Servo perspective



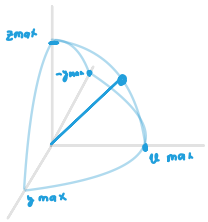
How to get θ



$\theta = \tan^{-1}\left(\frac{z}{x}\right)$

mat cardinal calculation

Constrain



→ ball equation

$$(x-a)^2 + (y-b)^2 + (z-c)^2 = r^2$$

r is constrained

a,b c is center

final equation

$$x^2 + y^2 + z^2 = r^2 \rightarrow r = a + b$$

first link, second link

Servo 1 motion

$$servo1\_angle = \theta + \beta$$

Hasil IMU x, y, z

$$\theta = \tan^{-1}\left(\frac{z}{x}\right)$$

$$\beta = \cos^{-1}\left(\frac{a^2+c^2-b^2}{2ac}\right)$$

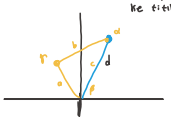
$$c = \sqrt{x^2+z^2}$$

imu gerak, baca data x,y,z

↳ berapa titik

x, y, z

jarak pusat ke titik



@ pasti robot

d=c

Servo 2 motion

$$servo2\_angle = \gamma$$

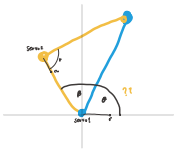
$$\gamma = \cos^{-1}\left(\frac{a^2+b^2-c^2}{2ab}\right)$$

diperoleh

a

b

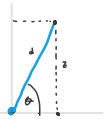
c = d



servo1 : θ + β

servo2 : γ

How to get θ



$$\theta = \tan^{-1}\left(\frac{z}{x}\right)$$

Servo 3 motion

$$servo3\_angle = \delta \quad \text{if}$$

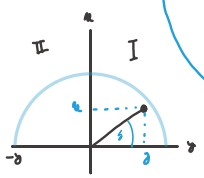
quadrant I

$$\delta = \tan^{-1}\left(\frac{a}{b}\right)$$

quadrant II $(90° < \delta < 180°)$

$$\delta = \pi + \tan^{-1}\left(\frac{a}{b}\right)$$

$$servo3\_angle = \delta$$

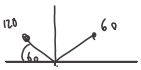


quadrant I

$$\delta = \tan^{-1}\left(\frac{b}{a}\right)$$

quadrant II $(90° < \delta < 180°)$

$$\delta = \pi + \tan^{-1}\left(\frac{a}{b}\right)$$



Test case