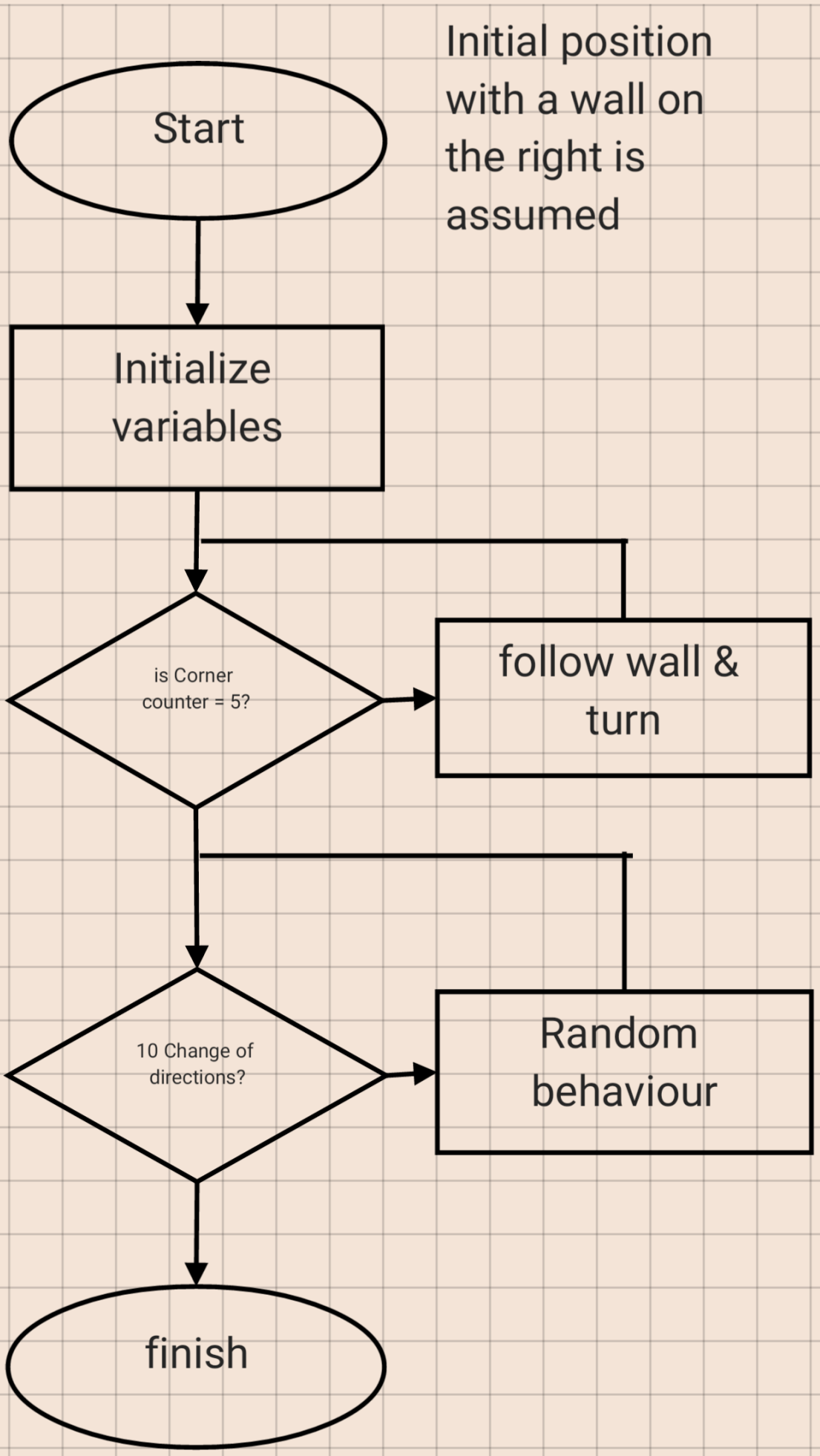
Initial position with a wall on the right is assumed
Start
Initialize variables
is Corner counter = 5?
follow wall & turn
10 Change of directions?
Random behaviour
finish

follow wall & turn

Check sensors distance

if Wall ahead
go back a little (Timer)
    set speed and control variables to Zero
    O linear velocity, positive angular velocity
    Inverse kinematics
    Timer Loop
        PID
    set speed and control variables to Zero

if no side wall detected
go Straight a little (Timer)
turn 90 degrees clockwise
    set speed and control variables to Zero
    O linear velocity, Negative angular velocity
    Inverse kinematics
    Timer Loop
        PID
    set speed and control variables to Zero

if Stairs detected
turn 90 degrees anticlockwise
    set speed and control variables to Zero
    O linear velocity, positive angular velocity
    Inverse kinematics
    Timer Loop
        PID
    set speed and control variables to Zero

if only wall detected
follow wall
    Calculate angular Speed from wall distance
    Set constant linear and angular Speed
    Inverse kinematics
    PID
    Set Wheel speed

Random behaviour

if any of the object Sensors is lower than 10 Cm

Random Value of time between a certain range.

set speed and control values to zero.

set 0 linear speed and angular Speed a constant value

Inverse kinematics

loop timer random time

PID

if no object detected

first time?

set linear Speed Constant and angular speed 0

Inverse kinematics

PID

Inverse kinematics

$$\dot{\varphi} = \begin{vmatrix} \dot{\varphi}_1 \\ \dot{\varphi}_2 \end{vmatrix} = \begin{vmatrix} -\frac{1}{r} & -\frac{L}{r} \\ \frac{1}{r} & -\frac{L}{r} \end{vmatrix} \cdot \begin{vmatrix} v \\ \omega \end{vmatrix}$$

, $\dot{\varphi}$ Motors Speed

$\dot{\eta}$ Wheels Speed

Encoder Lecture

$$0.025\,\dot{\varphi} = \dot{\eta}$$

P: Encoder pulse Rising edge
n: number of pulses

$$P = 18^\circ = 18^\circ \frac{\pi}{180^\circ} = 0.1\,\pi$$

$$\dot{\varphi} = \frac{n\,P}{\Delta t} \rightarrow \dot{\omega} = 0.025 \frac{n\,P}{\Delta t}$$

Mechatronics

Notion Link: https://constantinscholz.notion.site/Lab-Knowledge-base-MECHX-and-Design-Methodology-4d1ad2194e75443ea52b0f2ff1b86c32?pvs=4

use 4 wire temperature resistor sensor for an accurate

$\omega_e \approx N_p \cdot \frac{\Delta q}{T_s}$ velocity: fixed time method (pulse counting method)

$\omega_e = \frac{1}{N_c} \cdot \frac{\Delta q}{T_c}$ velocity: fixed position method (pulse timing or "T" method)

Melexis Belgian Company