

Visualizing Sensors Data

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Shared Link with the teacher: <https://drive.matlab.com/sharing/d7b554c7-ab4c-48e1-85a1-85981395d743>

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Load data

```
clear
close all
load("Sensors_Data.mat");

Tf = 60.08;
Ts = 0.02;
W = 0.52;
Gear_ratio = 100;
r = 0.1;

R_inc = right_angular_speed(:, 2) / Gear_ratio * r * Ts;
L_inc = left_angular_speed(:, 2) / Gear_ratio * r * Ts;
t = (0:Ts:Tf-Ts)';
```

Odometry

```
delta_d = (R_inc+L_inc)/2;
delta_t = (R_inc-L_inc)/W;
```

Pose integration

```
Initial_pose=transl(0,0,0)
```

```
Initial_pose = 4x4
    1    0    0    0
    0    1    0    0
    0    0    1    0
    0    0    0    1
```

```
Initial_position=transl(Initial_pose)
```

```
Initial_position = 3x1
    0
    0
    0
```

```
Initial_orientation=0
```

```
Initial_orientation = 0
```

```
x(1)=Initial_position(1)
```

```
x = 0
```

```
y(1)=Initial_position(2)
```

```
y = 0
```

```
o(1)=Initial_orientation
```

```
o = 0
```

```
for i=1:(length(t)-1)
    x(i+1)= x(i)+delta_d(i)*cos(o(i));
    y(i+1)= y(i)+delta_d(i)*sin(o(i));
    o(i+1)=o(i)+delta_t(i);
end
```

Mapping

```
count = 1;
m = size(polar_laser_data);
for i=1:m(1)
    for j=1:(m(2)-1)
        if polar_laser_data(i, j)/1000 > 0
            alpha = (j-1) * 0.3515 * pi/180;
            if alpha <= 240/2
                alpha = o(20*i) + alpha - 122*pi/180;
            else
                alpha = o(20*i) - alpha - 122*pi/180;
            end
            x2(count) = x(20*i) + polar_laser_data(i, j)/1000 * cos(alpha);
            y2(count) = y(20*i) + polar_laser_data(i, j)/1000 * sin(alpha);
            count = count + 1;
        end
    end
end

figure
scatter(x2, y2, 0.5, '.', 'red')
```

