TU Berlin Robotics

Lab Assignment #4

Gruppe: 1_Mon_G

Student Name	B1	C1	C2	C3	C4	C5
Bryan Oppong-Boateng	X	X	X	X	X	X
Gökay Sengün	X	X	X	X	X	X
Jarne Jüchser	X	X	X	X	X	X
Caspar Siemssen	X	X	X	X	X	X

A Bayes

A.1

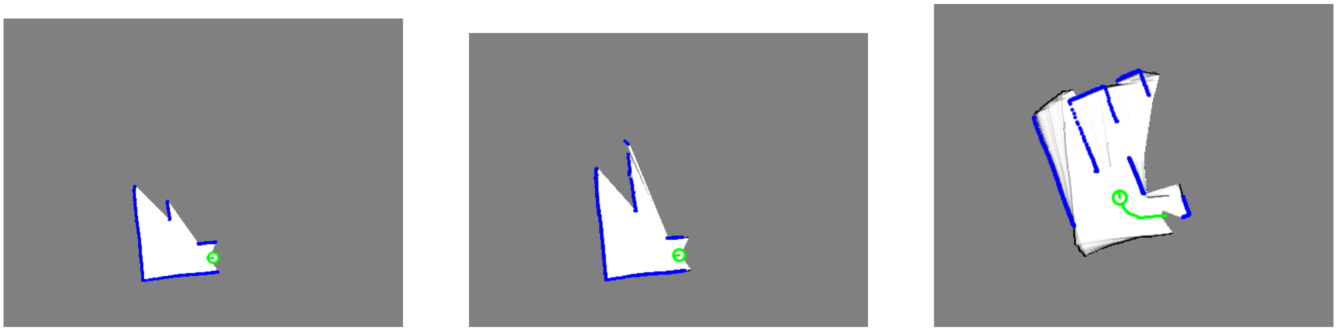
$$P(open \mid z = 42) = \frac{P(z = 42 \mid open)P(open)}{P(z = 42)}$$

$$\begin{aligned} P(z = 42) &= P(z = 42 \mid open)P(open) + P(z = 42 | \neg open)P(\neg open) \\ &= \frac{2}{3} \cdot \frac{3}{5} + \frac{1}{3} \cdot \frac{2}{5} \\ &= \frac{8}{15} \end{aligned}$$

$$\begin{aligned} P(open \mid z = 42) &= \frac{\frac{2}{3} \cdot \frac{3}{5}}{\frac{8}{15}} \\ &= \frac{3}{4} \end{aligned}$$

B Mapping with Raw Odometry

B.2



(a) $t = 2\,\mathrm{s}$ (b) $t = 8\,\mathrm{s}$ (c) $t = 20\,\mathrm{s}$

Figure 1: Mapping

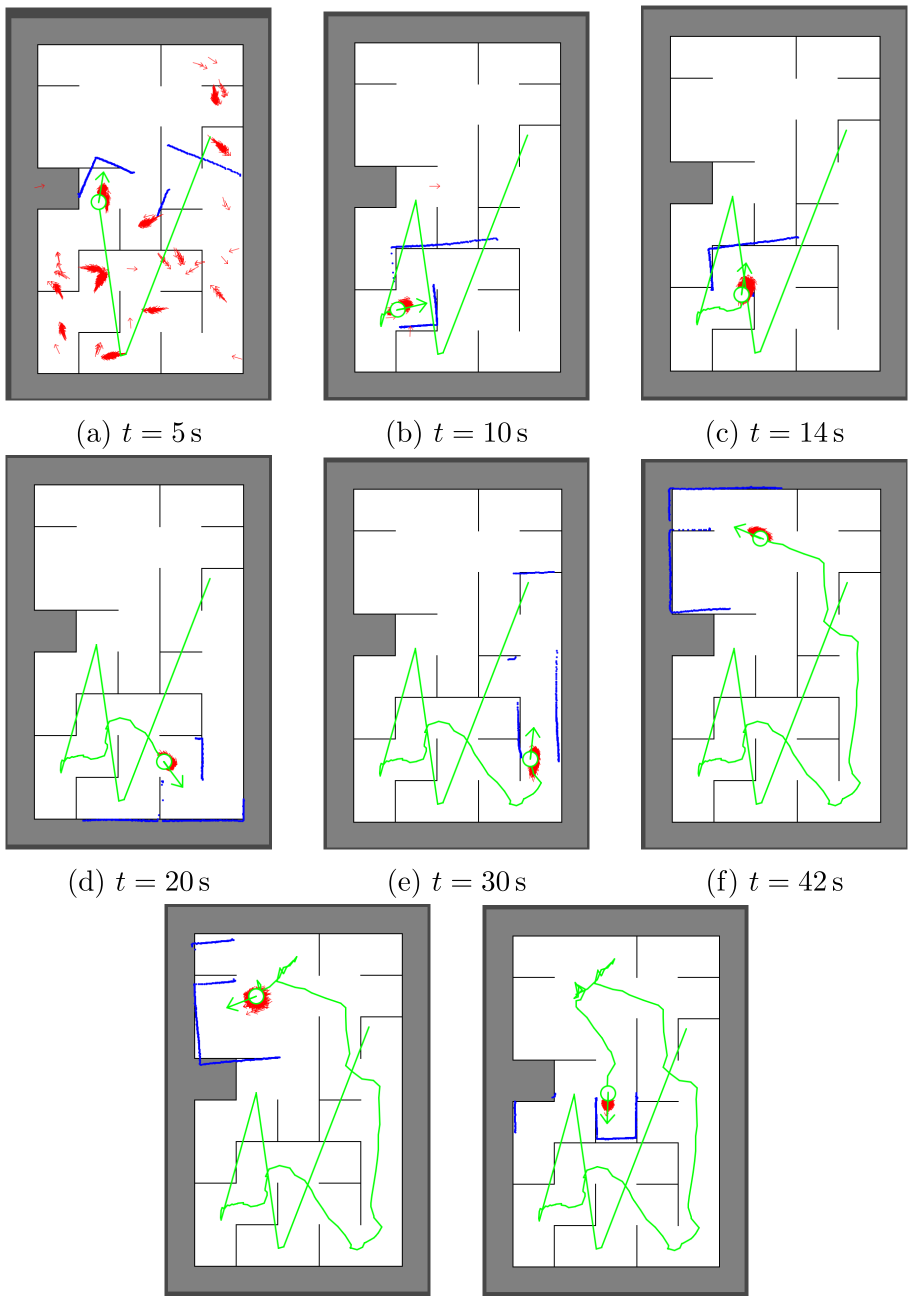
B.3

The localization uses the current roboter pose in the map. Errors in the roboter pose are directly reflected in the map because the obstacles are drawn relative to the roboter pose. Therefore, it is important to have an accurate roboter pose which is not easy as there might be different error sources like slippage or inaccuracies in the robots movement. To improve this, one should do simultanious localization and mapping to increase the accuracy of the robot pose.

C Monte Carlo Localization: Particle Filter

C.6

(a)



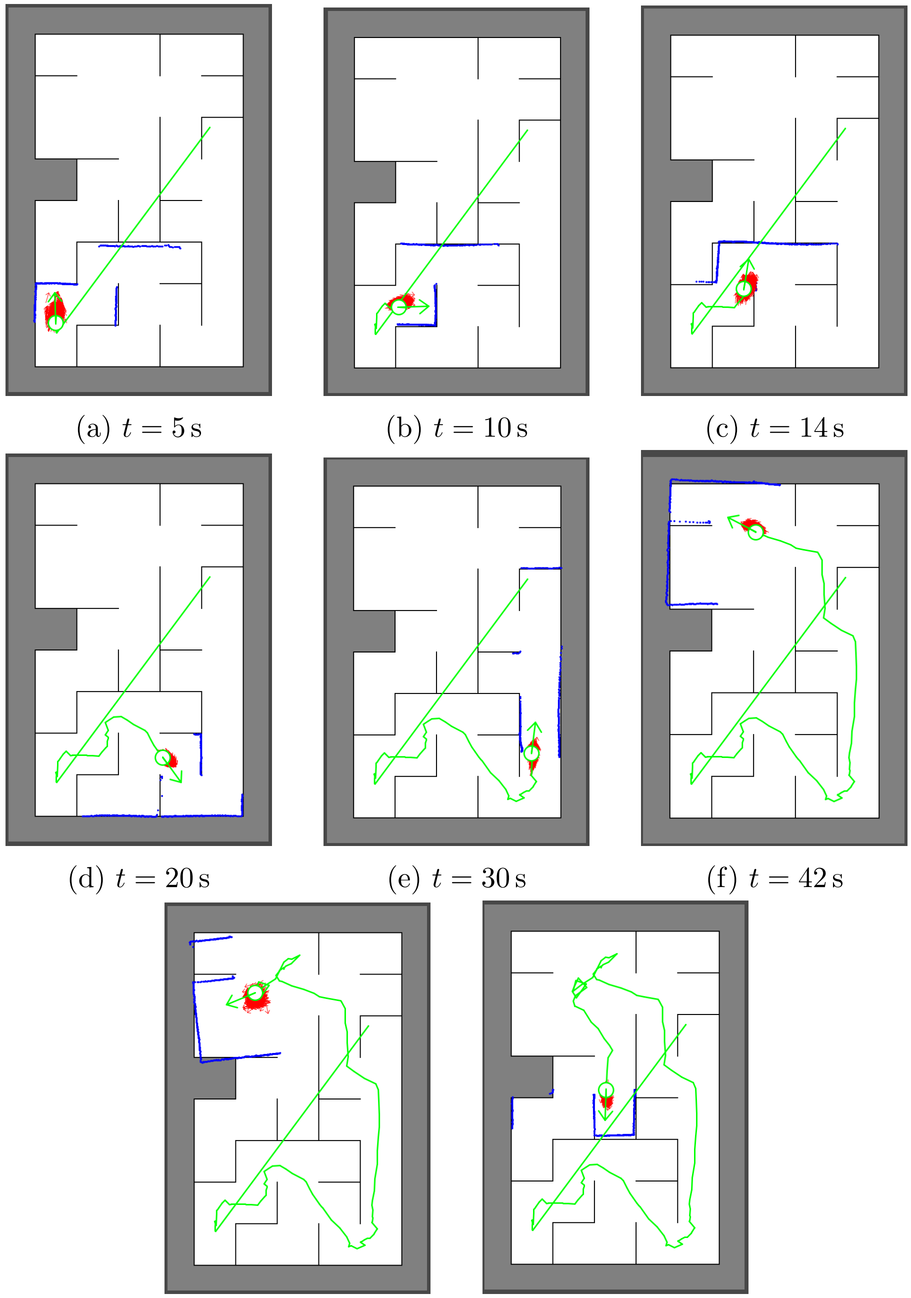
(a) $t = 5\,\mathrm{s}$ (b) $t = 10\,\mathrm{s}$ (c) $t = 14\,\mathrm{s}$

(d) $t = 20\,\mathrm{s}$ (e) $t = 30\,\mathrm{s}$ (f) $t = 42\,\mathrm{s}$

(g) $t = 60\,\mathrm{s}$ (h) $t = 75\,\mathrm{s}$

Figure 2: Localization with uniform distribution

(b)



(a) $t = 5\,\mathrm{s}$ (b) $t = 10\,\mathrm{s}$ (c) $t = 14\,\mathrm{s}$

(d) $t = 20\,\mathrm{s}$ (e) $t = 30\,\mathrm{s}$ (f) $t = 42\,\mathrm{s}$

(g) $t = 60\,\mathrm{s}$ (h) $t = 75\,\mathrm{s}$

Figure 3: Localization with gaussian distribution