

### ★ Potential Field :

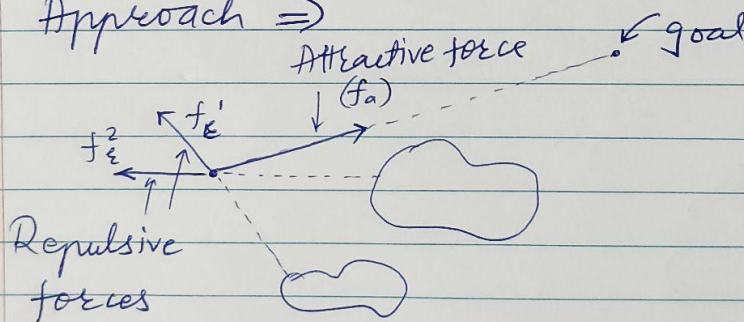
$$U_{att}(q) = \begin{cases} 0.4 d(q, goal)^2, & d(q, goal) \leq 2 \\ 1.6 d(q, goal) - 1.6, & \text{else} \end{cases}$$

$$U_{rep}(q) = \begin{cases} 0.4 \left( \frac{1}{d(q, goal)} - \frac{1}{2} \right)^2, & d \leq 2 \\ 0, & \text{else} \end{cases}$$

$$F_{att}(q) = \begin{cases} -0.8 d(q, goal), & d(q, goal) \leq 2 \\ -1.6, & \text{else} \end{cases}$$

$$F_{rep}(q) = \begin{cases} \frac{1.2}{d^3} - \frac{0.4}{d^2}, & d \leq 2 \\ 0, & \text{else} \end{cases}$$

### ★ Approach $\Rightarrow$



$$\vec{f} = \vec{f}_a + \sum_{i=1}^n \vec{f}_e^i$$

$\vec{f}$  is then normalized to a magnitude of 0.1 (step-size) and the components of  $\vec{f}$  become the increment that are to be added to the current location.

The robot was found to be stuck in local minima, as can be seen in the below figures.

```
ashay@ashay: ~/catkin_ws
/home/ashay/catkin_... x ashay@ashay: ~/catki... x ashay@ashay: ~/catki... x
0 0 0
0.03754533694001335 0.062232433837347965 1.0255541560765666
0.040337497517624714 0.06719914043585569 1.0920135499571642
0.040486039521591285 0.06748522734537685 1.0870070553278532
0.04065216566785426 0.06780112476000402 1.0815967750993218
0.0408204331323957 0.0681169533367157 1.0762932440567932
0.04100438719917541 0.06845770827902116 1.0706770552450742
0.04120210013945608 0.06881895173459154 1.0648171417389147
0.04140145640834663 0.06917819877371723 1.0590676528102816
0.0416205461371837 0.06956749224534842 1.052912809017536
0.04185867831891298 0.06998438436848134 1.0463964406984336
0.04211594897224186 0.07042783140289548 1.0395366438444988
0.04236551375876959 0.07085142480386702 1.0330405252190287
0.04263478854001335 0.07130154708066552 1.0261805498560217
0.04292033649040022 0.07177132071009565 1.0190624354091413
0.043212699365857046 0.07224417841354178 1.011940425096341
0.04350906294090539 0.07271554717492422 1.0048651933098707
0.043804438862998334 0.07317783034762564 0.9979355143549291
0.04411355018482408 0.07365401228455623 0.9908028598457835
0.044376023823920224 0.07405195664960453 0.9864514768314352
0.04441237451713378 0.07409722455983818 0.9879219309034584
0.044592696665194755 0.07436569551296539 0.9882494125570469
0.04479361579790579 0.07466504577821438 0.988617863028757
```