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**Algorithm 1** Particle filter update

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1: procedure PARTICLE_FILTER( $\mathcal{X}_{t-1}, z_t^x, z_t^y, f_t^x, f_t^y$ )
2:    $q_x^2 = 15, q_y^2 = 15, r_x^2 = 100, r_y^2 = 100$ 
3:    $\triangleright$  Particle update
4:   for  $m = 1$  to  $M$  do
5:     sample  $x_t^{[m]} \sim \mathcal{N}(x_{t-1}^{[m]} + f_t^x, q_x^2)$ 
6:     sample  $y_t^{[m]} \sim \mathcal{N}(y_{t-1}^{[m]} + f_t^y, q_y^2)$ 
7:      $w_t^{[m]} \leftarrow p(z_t^x \mid x_t^{[m]})p(z_t^y \mid y_t^{[m]})$ 
8:    $\triangleright$  Importance resampling
9:    $\mathcal{X}_t \leftarrow \text{RESAMPLING\_WHEEL}(\mathcal{X}_{temp}, w_t)$ 
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