Position estimation by succesive distance measurements to known beacons.

Goal: to estimate the time-variant position $P_t(x, y, z)$ of a moving object by using individual distance measurements to stationary beacons $B_1 - B_n$.

Method: Start with initial position estimate $P_0 = (0, 0, 0)$ and initial velocity vector $V_0 = (0, 0, 0)$ at $t = 0$. Whenever a distance measurement d_i to a known beacon B_i at (x_i, y_i, z_i) is received at $t = t + dt$, a new position and velocity estimate is calculated as follows:

1. The estimated position P_e at $t = t + dt$ is equal to $P_t + V_t * dt$.

2. Since the actual distance d_i to beacon position B_i is known, we can correct the estimate by moving it along the line from the estimated position to the beacon position until the distance is met:

   $$P_e = P_e + (P_e - B_i) * (d_i / d(P_e, B_i) - 1)$$

3. The velocity vector is also adjusted:

   $$V_e = (P_e - P_t) / dt$$

4. The new estimates replace the current values:

   $$P_t = P_e$$
   $$V_t = V_e$$

5. Wait for the next distance measurement and go back to step 1.