Context information : location

lo calization

Range Based → Propagation delay ultrasonic
(ranging) Received Strength (range)
Temperature affects →
propagation speed

range-free : See propagation area ultrasonic
Recv. strength

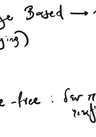
ToA: Time of arrival



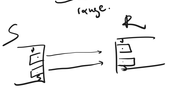

$d_{SR} = (t_2 - t_1) \cdot v$

speed of sound : 1000/300ms ~ 343 m/s

radio signal : 300 km/s

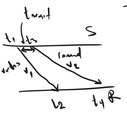



$d_{SR} = \frac{(t_4 - t_1) - (t_3 - t_2)}{2} \cdot v$




$d_{SR} = (v_1 - v_2) \cdot (t_1 - t_2 - t_w) + t$

→ $v_1$: ultrasound speed
→ $v_2$: expressing measurement in seconds
→ $t_1$: process delays
$t_2$: process delays
$t_w$: processing delays




twait: choosing process in network and dynamic low frequency time

micaz → tinyOS , network, sound emitter/receiver

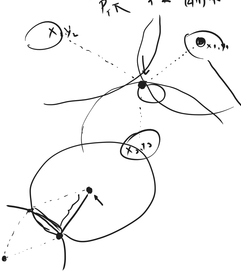
TDoA

AoA

RSS : Received Signal Strength.

RSSI : RSS indication

$$\frac{P_2}{P_1} = G_1 G_2 \cdot \frac{\lambda^2}{(4\pi)^2 \cdot R^2}$$

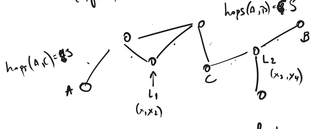



Triangulation
↓
Trilateration
{ anchor nodes
landmarks

Not the positioning System. (APS)

* topology fixation (+ hops geographic kriging)
* kaption coupled/decoupled

Hardware/software optimizations localization ye
configuring has overhead/ressources for fixation




hop(L1,L2) = 3

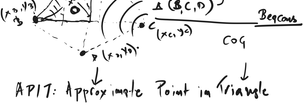
$C$ : Correction factor

$$C = \frac{d(L_1, L_2)}{hop(L_1, L_2)} = \frac{x}{3}$$

hop(A,B) = 5 dist(A,B) = 5 · C

$$C = \frac{2\sqrt{(x_i - x_j)^2 + (y_i - y_j)^2}}{\sum h_i}$$

$\sum h_i$ → sum of hop counts




d(A1,A2) = 50m d(A2,A3) = 80m d(A1,A3) = 110

$$C = \frac{50 + 80 + 110}{2 + 5 + 6} = \frac{240\,m}{13\ hops} = 18.5\ m/hop$$

hop(S,A1) = 3 hop(S,A2) = 2 hop(S,A3) = 3

dist(S,A1) = 3 hops · 18.5 m/hop

dist(S,A2) = 2 · 18.5
dist(S,A3) = 3 · 18.5




APIT: Approximate Point in Triangle