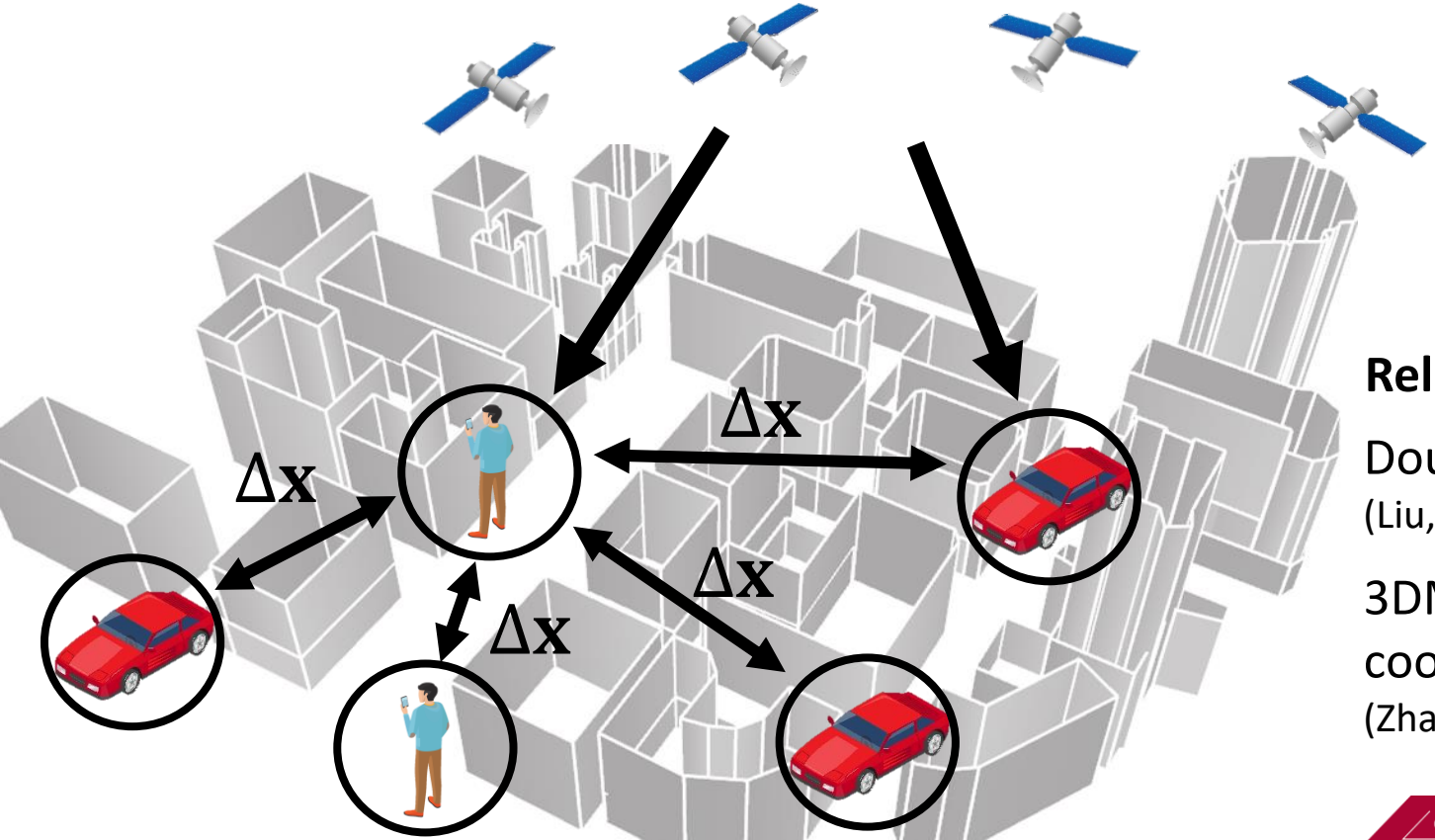
GNSS-Based Cooperative Positioning



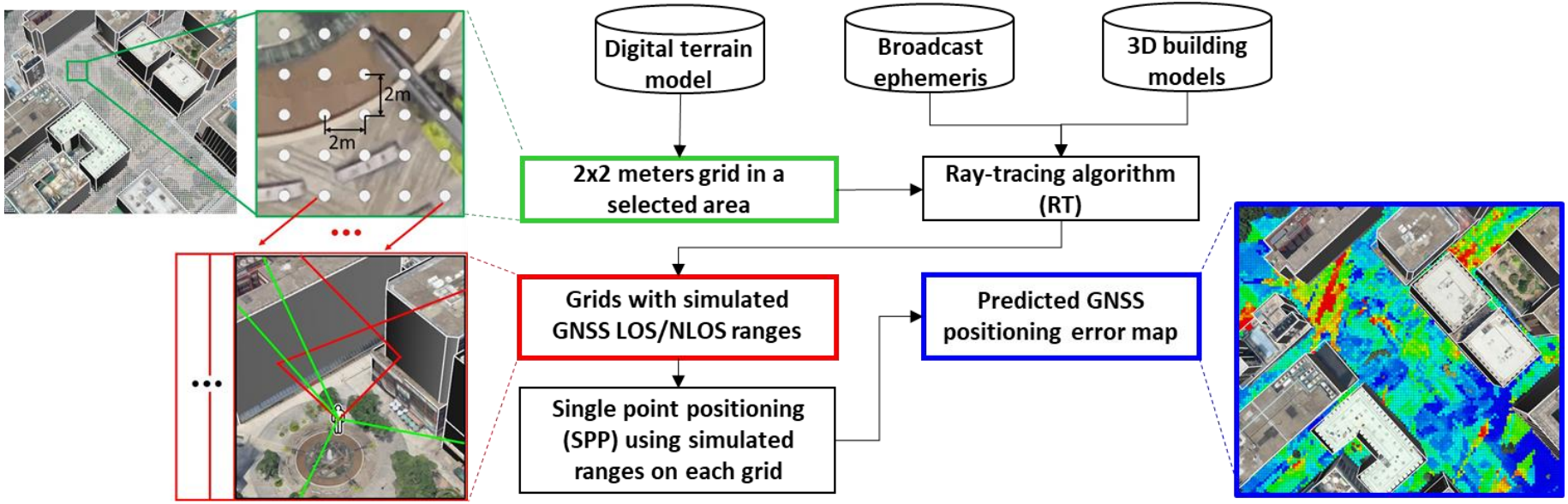
Relative position:

Double difference (DD)
(Liu, Lim et al. 2014)

3DMA GNSS cooperative positioning
(Zhang, Wen et al. 2018)

3DMA GNSS Cooperative Positioning (ION GNSS+ 2018)

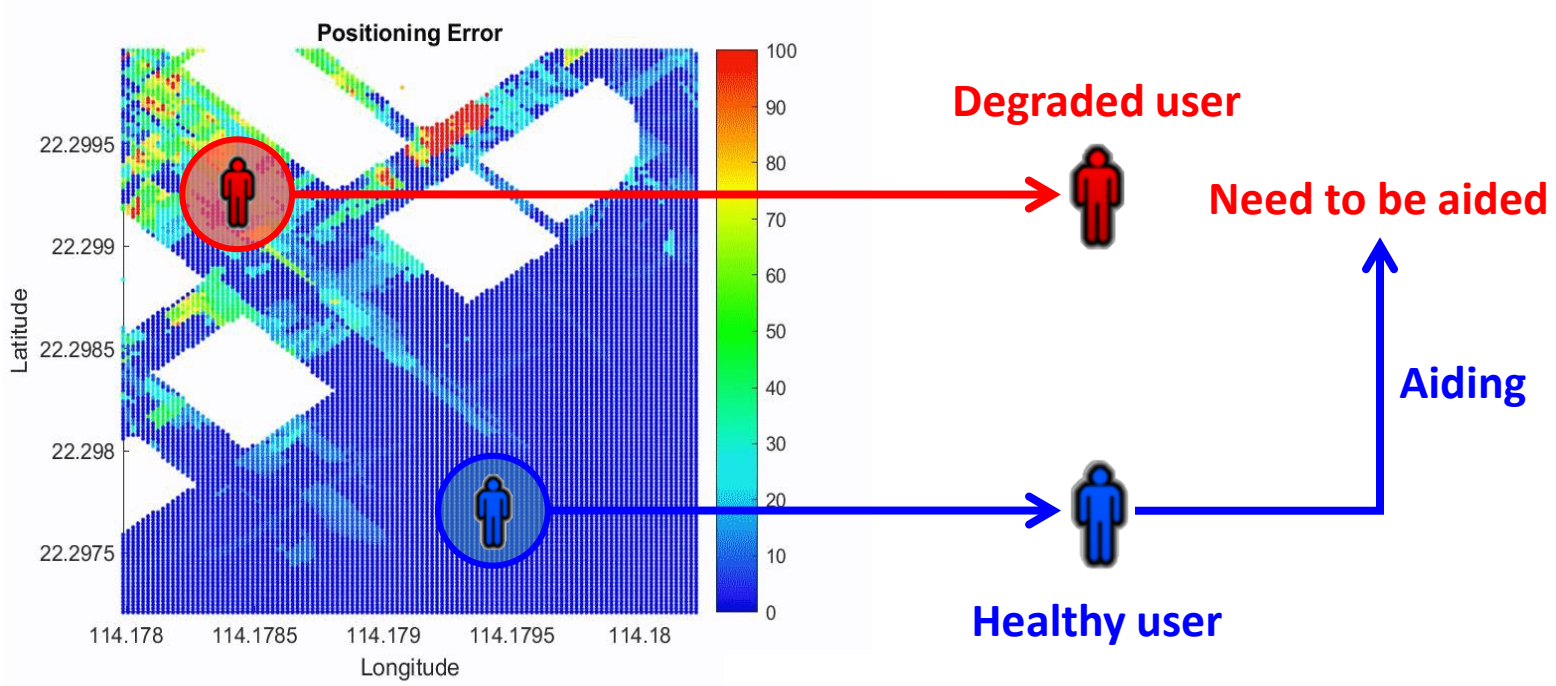
User status evaluation (healthy/NLOS degraded)



Zhang G., Wen W., Hsu, L.T.* (2019) Rectification of GNSS based Collaborative Positioning using 3D Building Models in Urban Areas, GPS Solutions 23(3):83

3DMA GNSS Cooperative Positioning (ION GNSS+ 2018)

User status evaluation (healthy/degraded) for NLOS-mitigation



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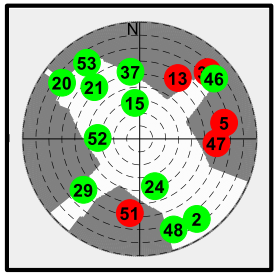
3DMA GNSS Cooperative Positioning (ION GNSS+ 2018)

NLOS mitigation by integrating **shadow matching** & **double difference**



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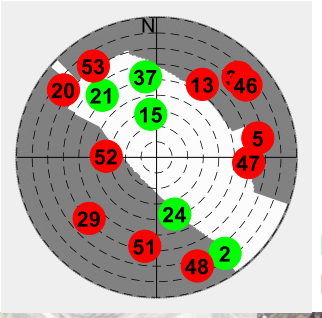
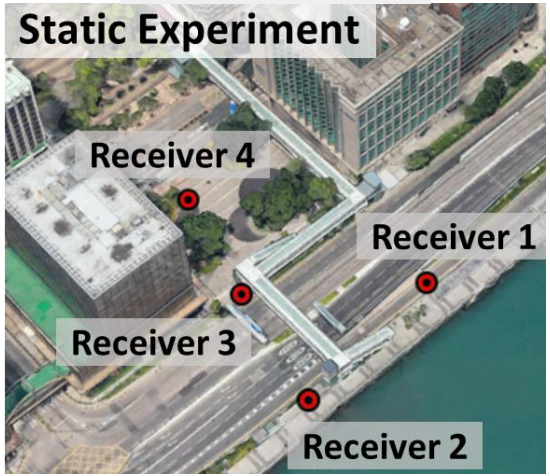
3DMA GNSS Cooperative Positioning Performance

Relative positioning error between Receiver 1 and Receiver 4

Method	LS	DD	SDM-DD
RMSE (m)	33.3	84.6	20.3
Availability	100%	100%	**70%**

LS: Least square positioning
DD: Double difference positioning
SDM-DD: Shadow matching
NLOS-excluded DD





3DMA GNSS NLOS-excluded cooperative positioning RMSE (m)

Receiver	1	2	3	4
LS	3.7	5.0	14.7	30.9
SDM-CP	4.2	4.7	**14.2**	**16.2**

Limited measurements after NLOS exclusion!

LS: Least square positioning
SDM-CP: Shadow matching NLOS-excluded cooperative positioning

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