

SLAM

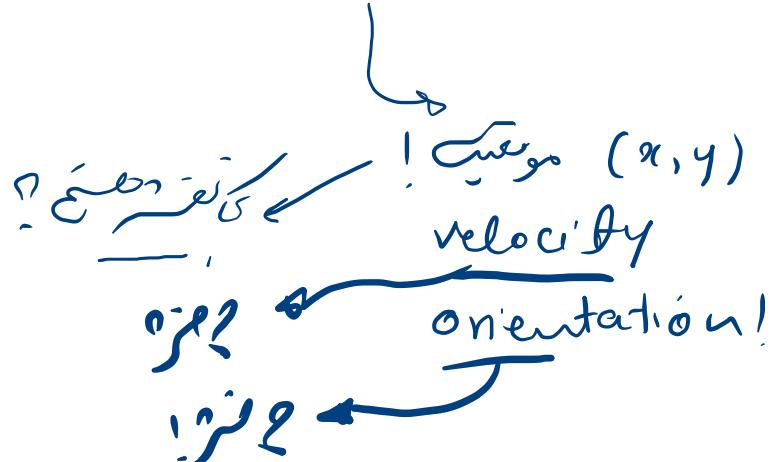
simultaneous  
localization  
& mapping!

Si

trade off       $\xrightarrow{\text{err} \rightarrow \text{localizat}}$   
 $\xleftarrow{\text{err} \rightarrow \text{mapp -}}$

Localization :

where am I ?



mapping :

what's around me ?

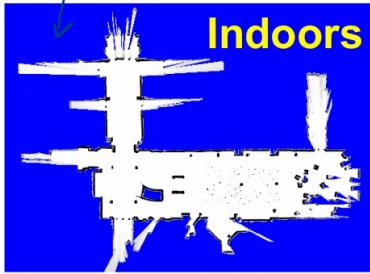


کوئی اس فن میں کوئی دل کوڑا

میں نہیں کر دیں میرے کوئی سرپریز نہیں کر دیں

بیٹھتے تھے اپنے طاری!

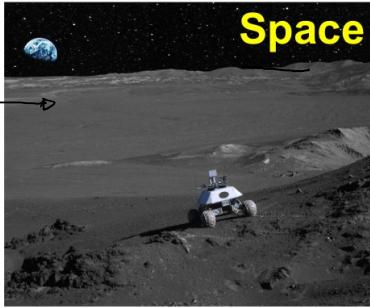
- Robotics
- Drones →
- driverless cars
- AR / VR



Indoors



Undersea



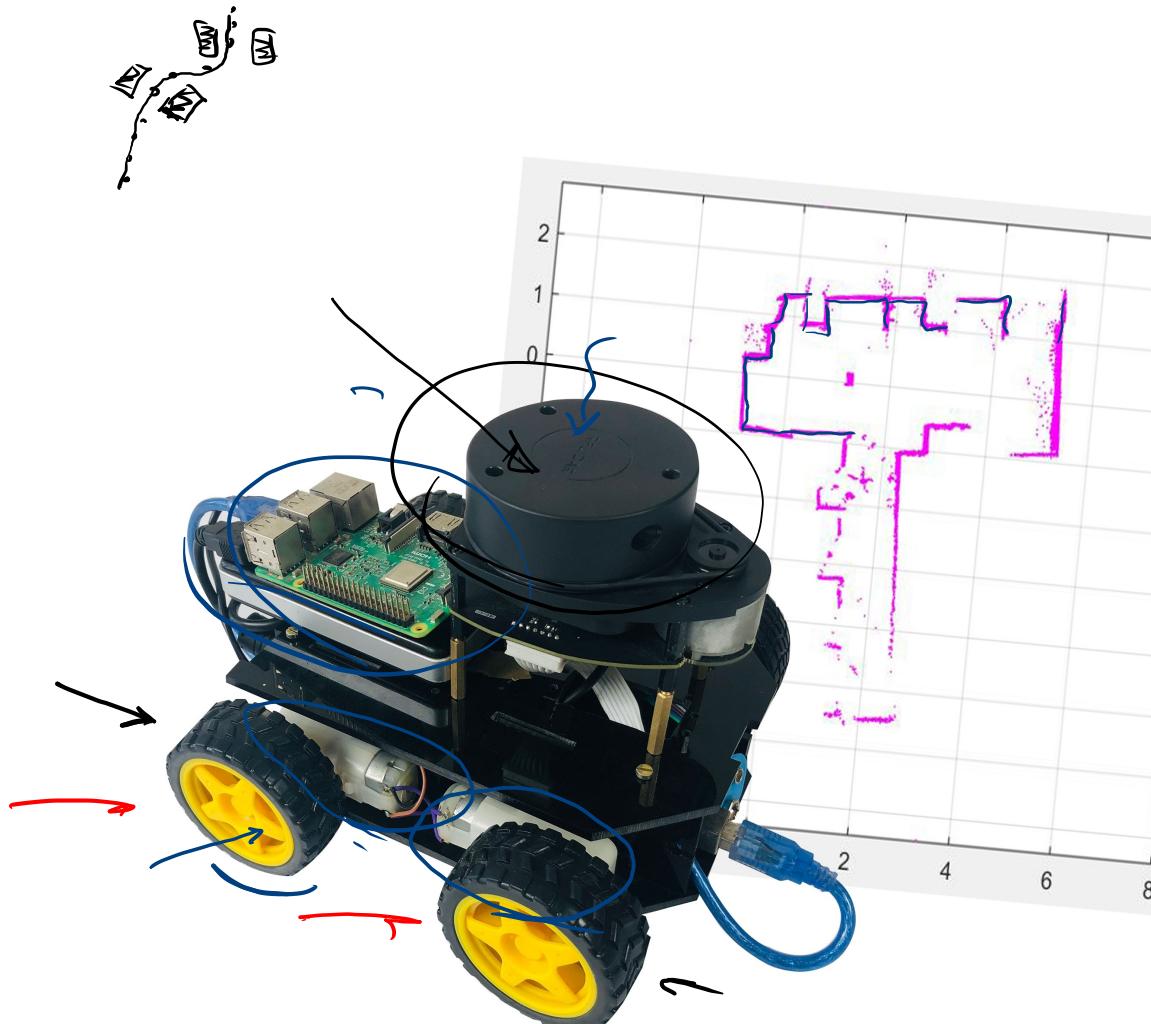
Space



Underground



6  
8  
! 1



SLAM      sensors

→ laser

LIDAR

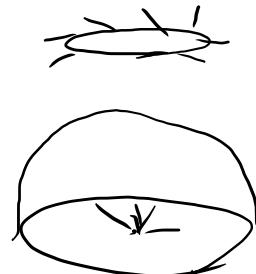
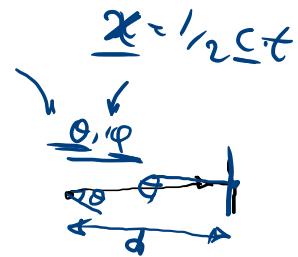


→ accurate ✓

→ expensive! ✗

curse!

Perception



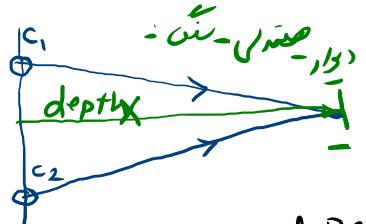
## 2 Camera

a. Monocular

!  $O_1(x)$  ←  $x$   $O_1(y)$   
!  $O_2(x)$  ←  $x$

" $(x, y)$ " → (depth)

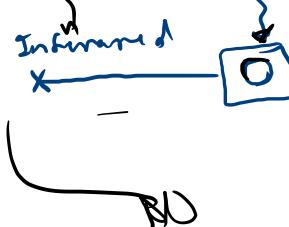
b. Stereo!



-  $d = \sqrt{(x - x_1)^2 + (y - y_1)^2}$

object

object detection — |



Inference

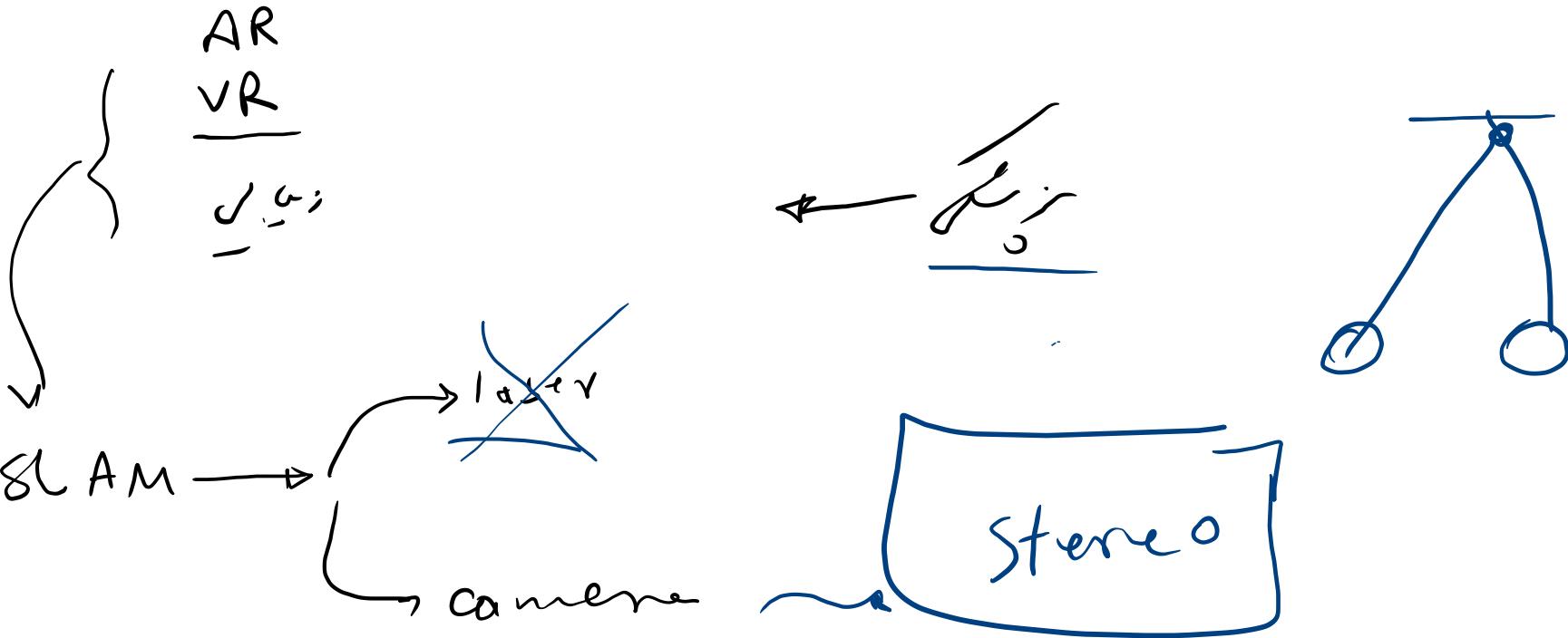
?  $C_{RGB} (D)$

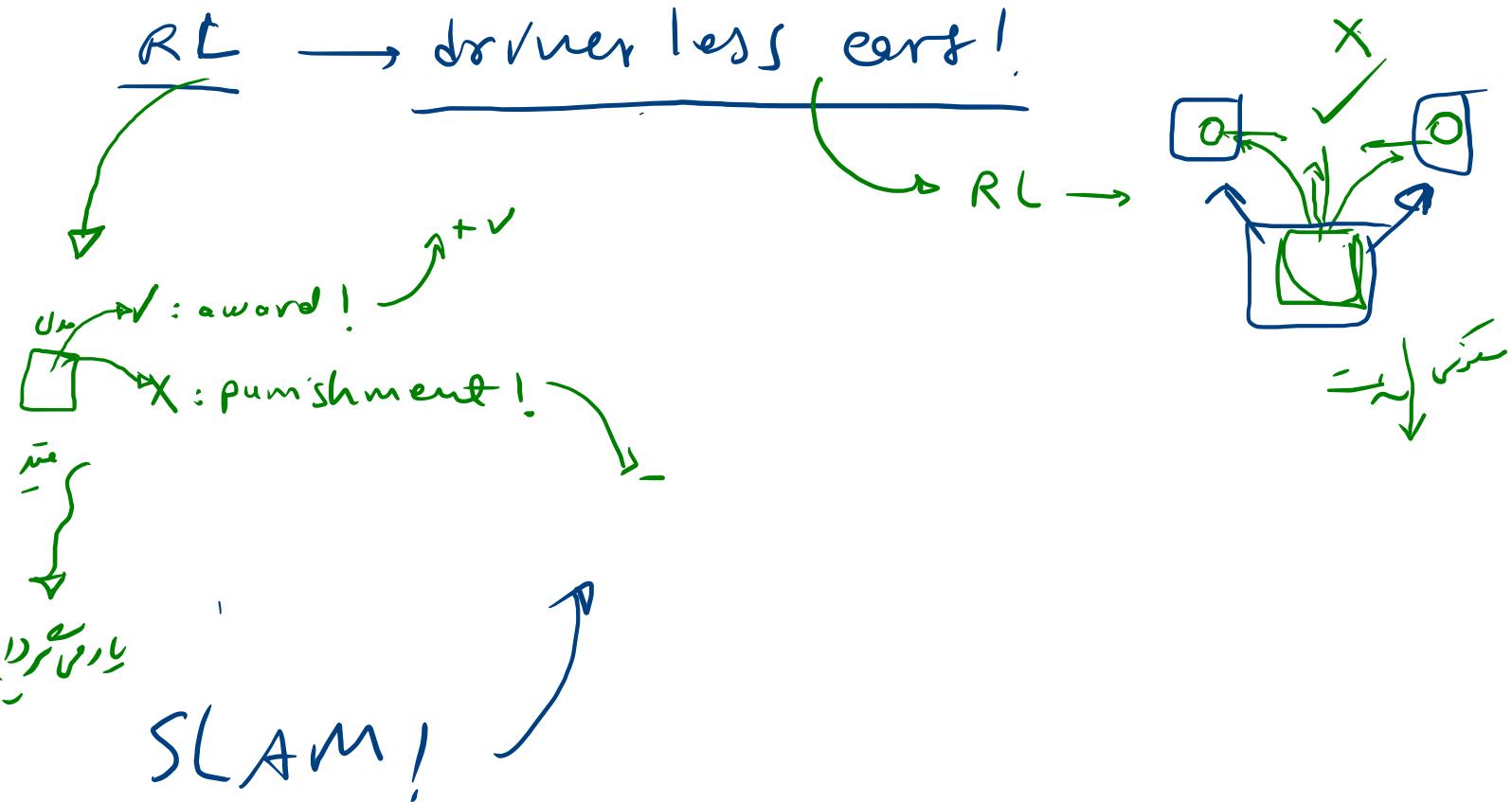
c. RGBD

RGB + D

Depth

VR  
AR



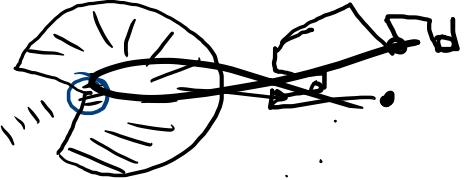
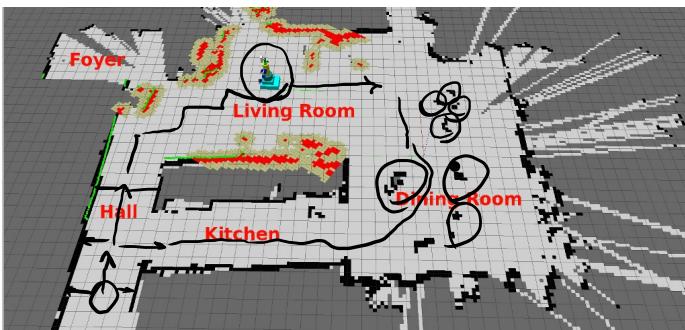
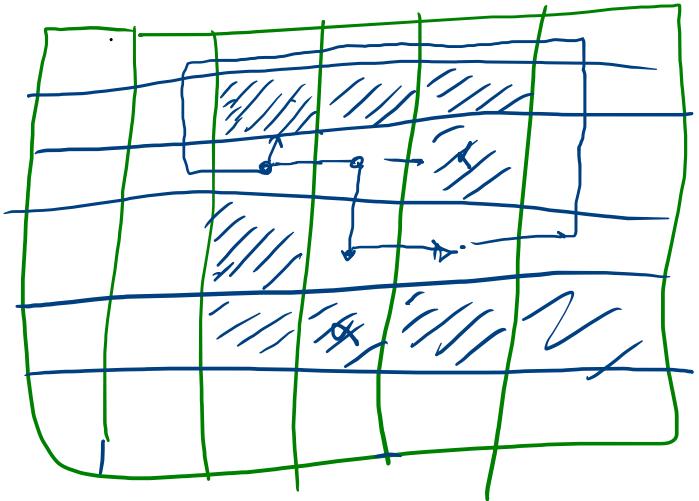


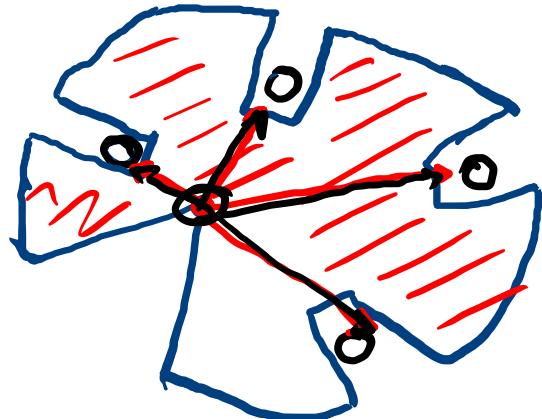
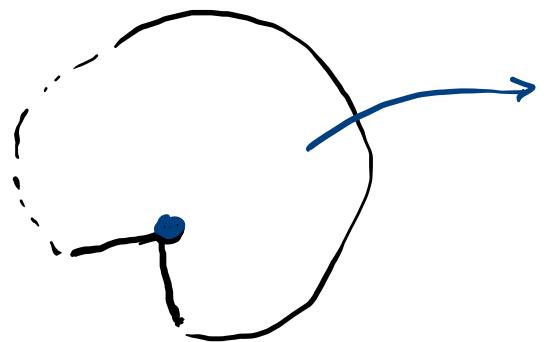
SLAM  
Outputs



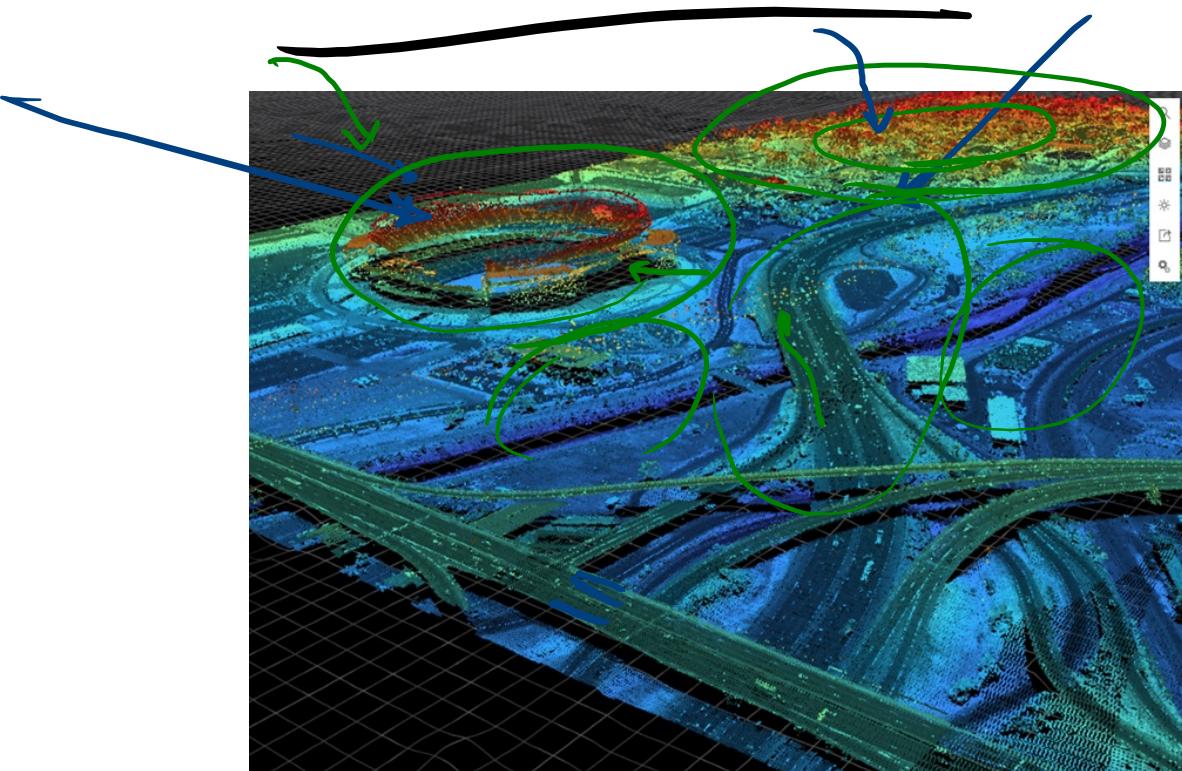
# 1. Grid map &

Binary + 2D

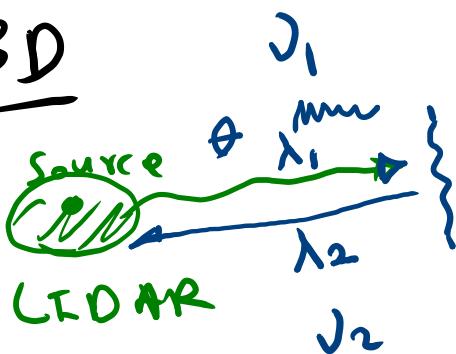




## 2. point cloud map 5



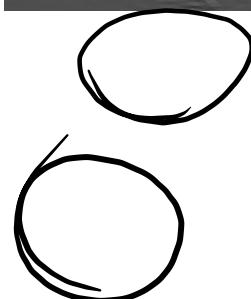
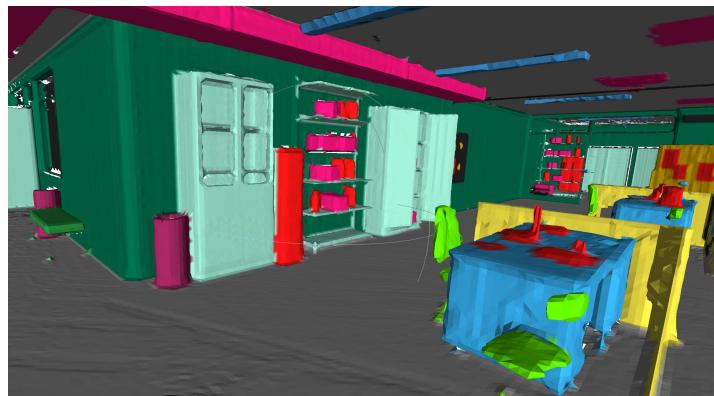
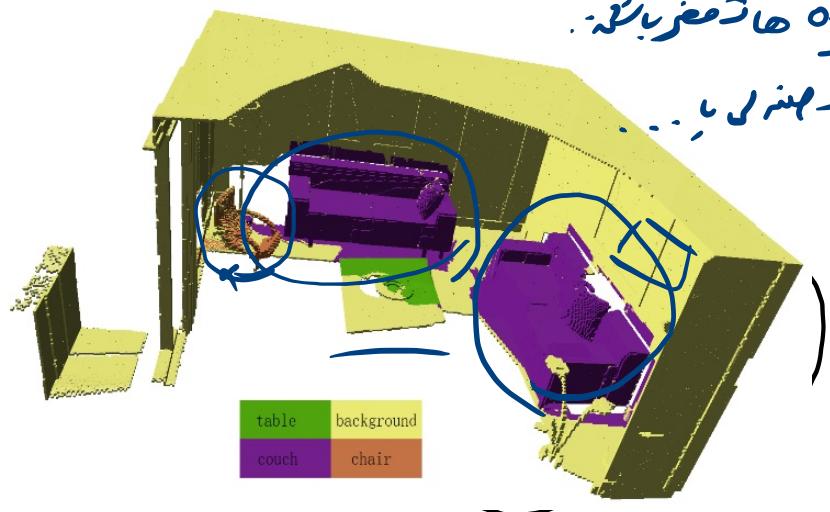
3D



### 3. semantic maps ← 3D

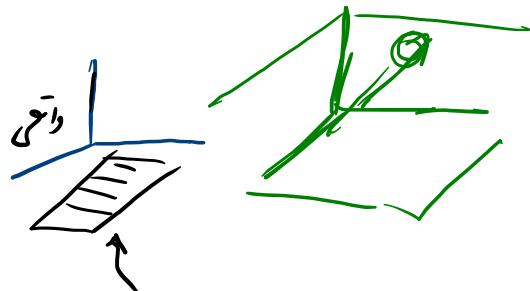
obj هاتھ مغرب کرنا۔

Digitized by srujanika@gmail.com



AR : Augmented Reality

اُخْرَاج اِلْعَزَفَةِ



VR : Virtual reality

اِنْتِرْاکْتِيُون

Chad