WalkBot: A Portable System to Scan Sidewalks

Miguel Costa[1], Paulo Cambra[2], Filipe Moura[2], Manuel Marques[1]
[1]ISR LISBOA - LARSyS / [2]CERIS - IST

What is WalkBot?

- Innovative and low cost platform to scan the sidewalks walking conditions;
- Aim to provide critical accessibility features;
- Today's methods consist of manual and visual audits (costly in time and manpower);
- Capture Depth and GPS data to evaluate pedestrian network more efficiently.

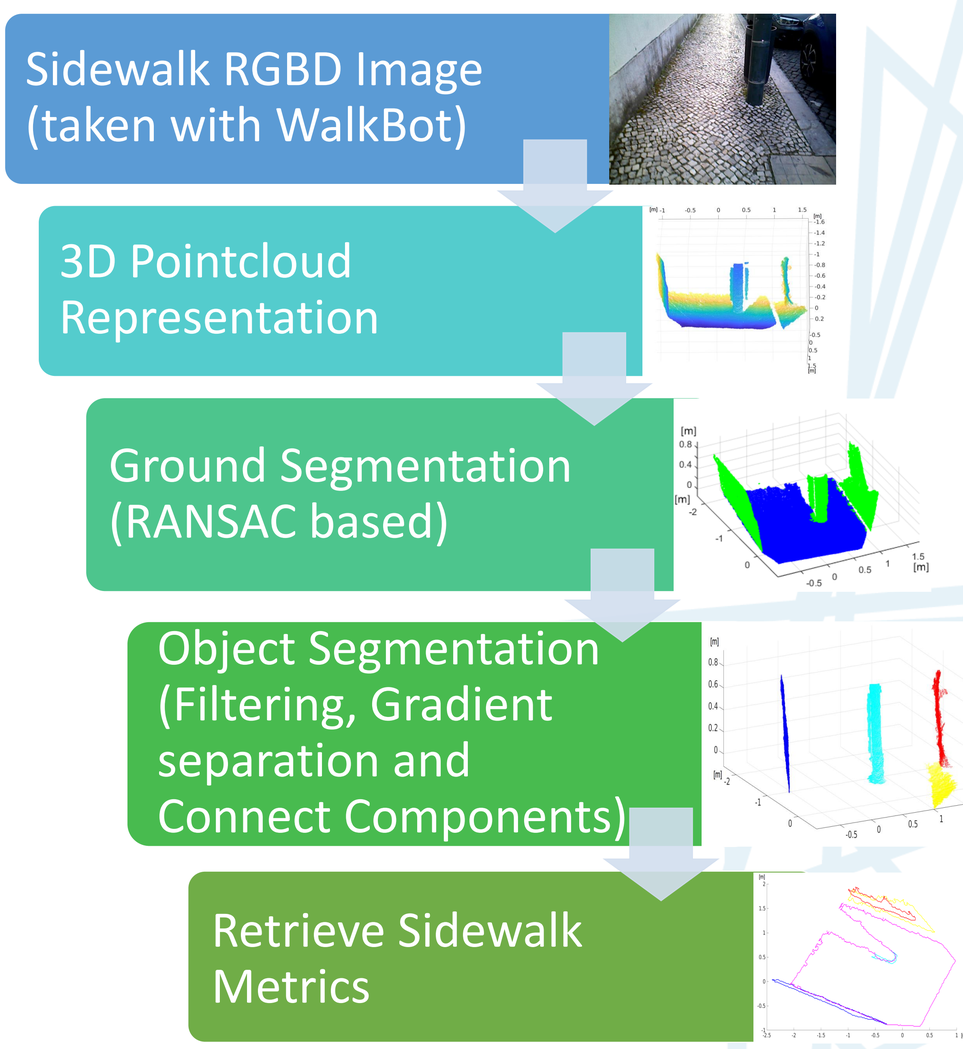
Fig. 1 – WalkBot.

Data Processing

Taking the sampled data with WalkBot we perform data analysis to extract the key features from the sidewalk, such as:

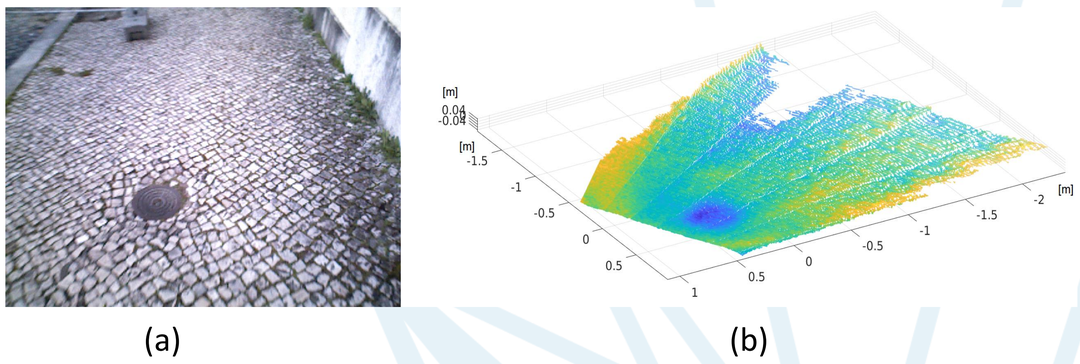
- Sidewalk's Width
- Sidewalk's Height
- Sidewalk's Passing Distance
- Presence of Ground Irregularities

To do this we perform the following method:



Results

- 700m of scanned sidewalk;
- Tested feature extraction and comparison to ground truth measurements;



(a) (b)

Fig. 1 – Ground Depression: The depression due the existence of a sewage cap in (a) is clear on the depth pointcloud in (b) - blue circle.

Fig. 2 – Passing Distance: The passing distance along a section of sidewalk. A blue point appears in location A due to the existence of a lamp post in the middle of the sidewalk, decreasing the total passing distance to about half of the sidewalk's width.

Table I: Measurement errors between our processing extracted features and the ground truth.

Distance	Number of measurements	Mean Absolute Error [m]	Mean Relative Error [%]
Sidewalk Width	12	0.060	4.18
Sidewalk Height	7	0.020	19.05
Passing Distance	25	0.095	10.40

Conclusions and Future Work

- We perform sidewalk analysis, providing key accessibility measures;
- We tested WalkBot on real sidewalk data;
- We hope to motivate further research on pedestrian confort and safety.

Acknowledgments: We also would like to acknowledge support from the TecInnov 1st Edition Thales 2017 and FCT with ref. UID/EEA/50009/2013.