

# T&Tnet: Navigation for elderly people

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**Abstract.** Disorientation is one of the main consequences of dementia, making independence more difficult for elderly people outdoor. Traditional navigation systems use directional information based on distances and maps, what is known as ‘allocentric navigation’. However, these systems miss different navigation strategies, i.e., landmarks and Points of Interest (PoI) information-based that are included in T&Tnet system.

**Keywords.** Landmark, navigation, turn-by-turn navigation, dementia, PoI, ontology.

## Introduction

The traditional navigation systems are designed assuming that the user has no problems to follow directional instructions by a map. Unfortunately this is not the case when it comes to people with mild cognitive impairment, for example elderly. Special care to this issue has to be taken when developing applications for these users.

The T&Tnet project adds value to traditional systems of navigation by adapting technology to the needs of elderly and, especially, of people with symptoms of dementia. This added value is offered by the possibility to change the navigation mode to “egocentric navigation” making use of landmarks and clear instructions (by means of turn-by-turn navigation, amongst other instruments).

## 1. Navigation for elder people

The turn-by-turn navigation is based on giving the user indications on which direction they need to take on each intersection, i.e. the user would be given instructions such as “turn right “(when user is at the intersection)

In the landmark navigation, the information is given as directional instructions. IN the T&Tnet case we include information related to easily recognizable objects, as monuments, businesses, etc. just the way directions are given by people on the street.

The solution purposed for the T&Tnet application is a combination of both solutions. The user would be guided through directional instruction, augmented by landmark references. The system will use instructions like “go to the petrol station” and “when you are near to the petrol station, turn left”. This method has outlined some advantages, as shown in [1].

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### 1.1. Land mark navigation in T&Tnet

T&Tnet uses openStreetMap to calculate routes. In this software, geographical data is represented as nodes which are points in space referenced by latitude and longitude, and ways, with sequences of edges between adjacent nodes. These edges can be streets, but also they can be other real world elements as buildings or nodes and ways can be enriched by using tags associated with an ontology that improves the information by adding semantics. [2]

This information allows us to make traditional landmark navigation by once calculating the route get all nodes and ways related, get all remarkable landmarks associated and on each node of the route show to the user information about the route. This information is based on visual elements of the route, so the user can identify visual elements on his route taken as a reference. This is shown in Figure 1.

Dividing the route in sections allows us to get nodes of each section; streets can be formed by many sections, so we can give the users information for multiple landmarks even inside the same street so they go from their position to the next landmark, also adding the distance so that it could be helpful.

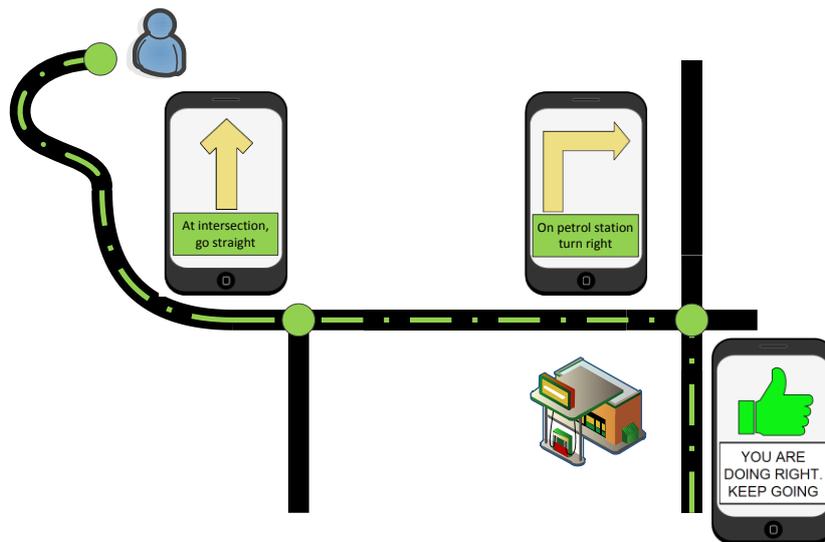


Figure 1. An example of how the T&Tnet application provides information to the user.[2]

Some facts to take into account when dealing with landmark navigation are the locations of the landmark. It has been outlined by Veldkamp *et al.* [1] that if the landmark itself is placed after the intersection where the turn has to be made, the probability of making a mistake is higher.

### References

- [1] D. Veldkamp, F. Hagethorn, B. Kröse, P. de Greef, The Use of Visual landmarks in a Wayfinding System for Elderly with Beginning Dementia, *Med-e-Tel 2008 proceedings* (2008), 161-165.
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