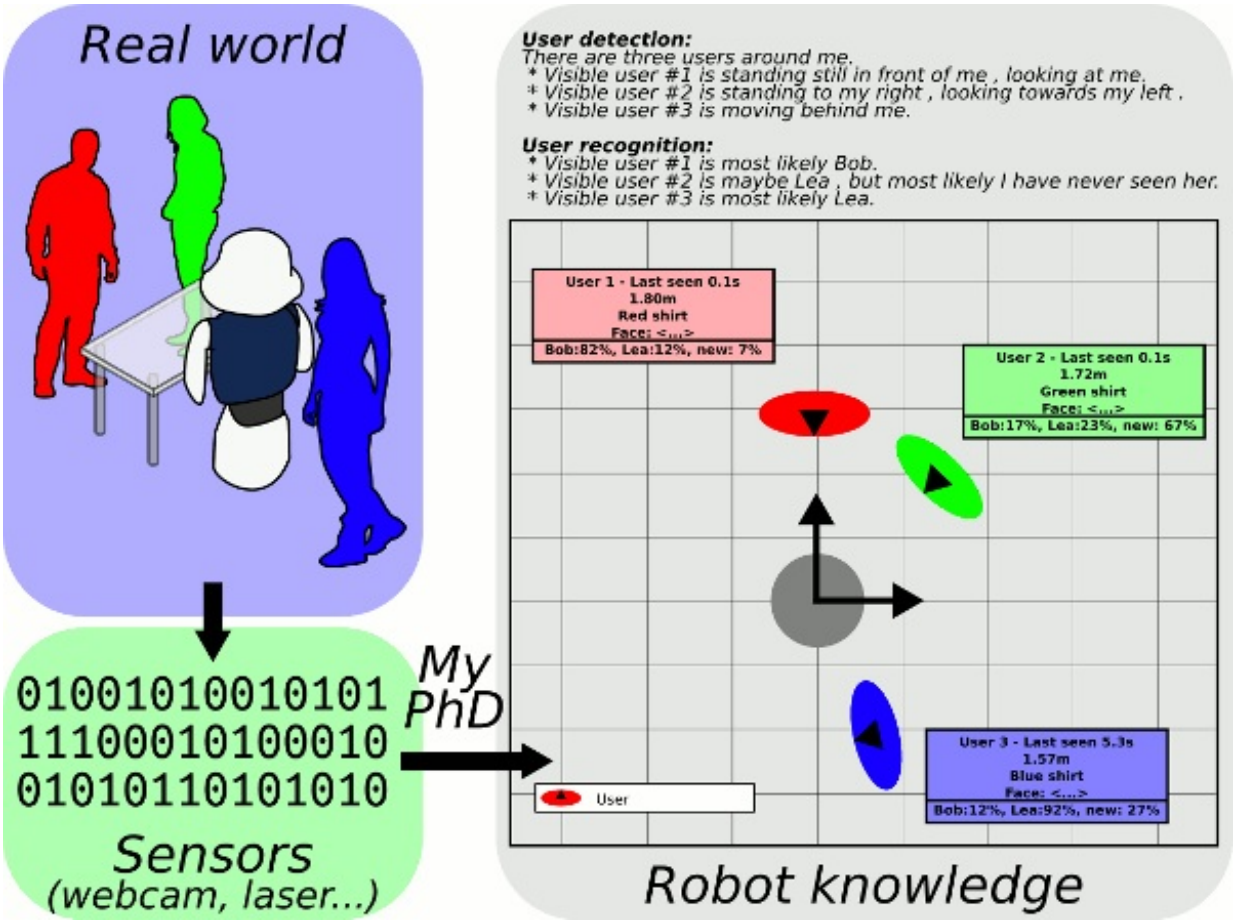
people_recognition_vision



User detection, recognition and tracking is at the heart of Human Robot Interaction, and yet, to date, no universal robust method exists for being aware of the people in a robot surroundings. The presented work aims at importing into existing social robotics platforms different techniques, some of them classical, and other novel, for detecting, recognizing and tracking human users. These algorithms are based on a variety of sensors, mainly cameras and depth imaging devices, but also lasers and microphones. The results of these parallel algorithms are then merged so as to obtain a modular, expandable and fast architecture. This results in a local user mapping thanks to multi-modal fusion.

In this package, we integrate the different user recognition algorithms:

- **Euclidean distance PPLM**: the simplest method to estimate the likeliness of a track against a detected PP is to compare their 3D position.
- **Face recognition-based PPLM**: the visual appearance of the face is key information that the humans use extensively to discriminate between people. For this reason, a face recognition algorithm was integrated. The algorithm used is ”Fisherfaces” [Belhumeur, 1997]
- **Height-based PPLM**: We used a novel method for estimating the height of the user [Ramey, 2015], based on the depth map and the user mask.
- **NiTE multi-map-based PPLM** The raw output of the NiTE algorithm is shaped as a user multimap. The cost of matching a given detected PP with the set of tracks is defined as follows: this cost is equal to zero if two NiTE user identifiers are equal, and equal to one otherwise.
- **PersonHistogramSets**: We developed a novel method for user recognition based on color histograms [Ramey, 2015], by generating a set of Hue histograms structured so as to represented a natural segmentation of the human body. We call this set of Hue histograms a PersonHistogramSet (PHS).

For more information, check out Arnaud Ramey's PhD.

How to install

1. Dependencies from sources

Dependencies handling is based on the wstool tool. Run the following instructions:

```
$ sudo apt-get install python-wstool
$ roscd ; cd src
$ wstool init
$ wstool merge `rospack find people_recognition_vision`/dependencies.rosinstall
$ wstool update
```

2. Dependencies included in the Ubuntu packages

Please run the rosdep utility:

```
$ sudo apt-get install python-rosdep
$ sudo rosdep init
$ rosdep install people_recognition_vision --ignore-src
```

3. Compile

Use catkin_make:

```
$ roscd
$ catkin_make
```

How to cite this work

Use the following BiB entry

```
@phdthesis{
 title = {Local user mapping via multi-modal fusion for social robots},
 type = {phdthesis},
 year = {2015},
 pages = {274},
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eness},
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 bibtype = {phdthesis},
 author = {Ramey, Arnaud}
}
```

References

- [Belhumeur, 1997] Belhumeur, P. (1997). Eigenfaces vs. fisherfaces: Recognition using class specific linear projection. Pattern Analysis and Machine Intelligence, IEEE Transactions on.
- [Ramey, 2015] Cf above "How to cite this work"

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