

## 3D Plane Detection in Stereo Sequences observed by a Mobile Robot

### Thesis outline

At the UGV Centre, we have developed a methodology for automatic detection of 3D planes in stereo images. As input to this algorithm, a pair of stereo images is given and the output is a simplified 3D view of the structure of the scene. See for an example the right image below: green areas indicate vertical planes (walls), red planes indicate horizontal planes (ceiling, table, floor) and blue areas indicate intermediately inclined planes.



The algorithm is not perfect yet, but shows very promising results, as the results of this algorithm provide very useful information for understanding the environment (e.g. we can easily deduce the room dimensions from this data) and also for robot navigation. The problem with the algorithm though, is that for now it is off-line: it uses previously recorded stereo video sequences and is written in Matlab as speed of execution was not an issue at the time of development. With this project, we want to make an on-line 3D plane detector, using the input from our BumbleBee stereo vision system and porting the code to C++ for implementation on a real robot.

### Student Tasks

The student will receive the following:

- An off-line 3D plane detection algorithm
- A BumbleBee Stereo vision system + SDK + documentation + example programs



With this information, the student is required to output the following:

- A 3D plane detection module, using the Bumblebee stereo data as input and processing this as fast as possible

### Student Profile

- Knowledge of programming C++
- Sound interest in computer vision