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foreword/PREface/acknowledgements

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Tampere X.X.20XX

Sakari Lampola

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# Introduction

Situation awareness means being aware and understanding the objects and events in the surrounding environment and being able to predict the near future. Computer vision algorithms can detect objects, caption images and answer visual questions. The next natural step is to develop methods which can perceive the elements in the environment within a volume of time and space, comprehend their meaning and project their status in the near future. This work will study what kind of methods can achieve this goal, using visual information based on images.

## Research questions

The five research questions the thesis addresses are:

1. By which methods an image-based perception of the environment can be produced, including object detection and localization in the field of view context?
2. By which methods a comprehension of the situation can be produced? This includes estimating object locations and their velocities in a 3d coordinate system, also for currently hidden objects.
3. By which methods a future projection of the situation can be created?
4. By which methods the comprehension and the future projection can be translated into human language?
5. How are uncertainty and reliability considered and represented?

## Prototype

This thesis also seeks to implement a reliable and fast system which can help a visually impaired person to understand her environment better by accurate and rich description. The system will be demonstrated on physical hardware by building a prototype.

The overall system structure for the prototype is displayed on Figure 1.

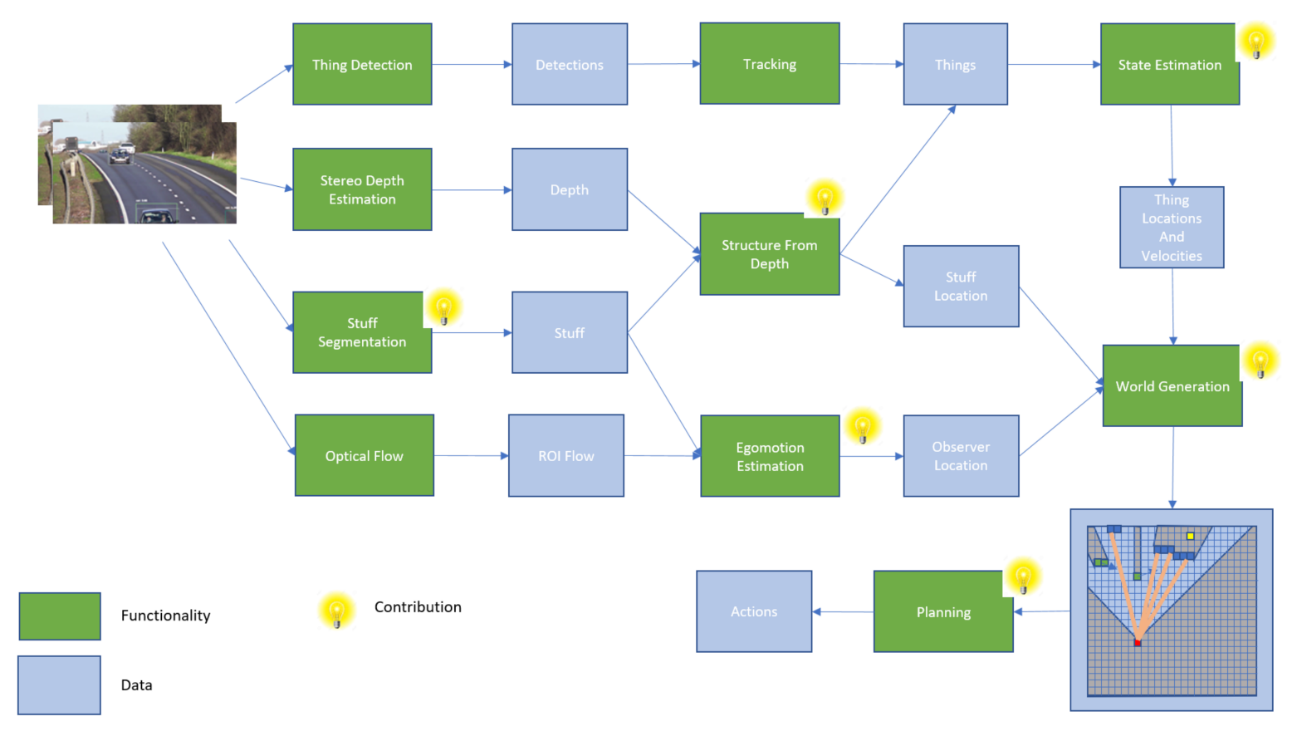


Figure 1. Prototype system structure

The structure of this thesis follows the structure of the system. Each green block represents a functionality which is described in a separate chapter. The integrated system tests together with conclusions are presented in the final chapters.

# CONTRIBUTIONs

This thesis makes following contributions:

* …

# thing detection

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## Terminology

## Datasets

## Algorithms

## Implementations

## Feasibility

## Input Data

## Output Data

# stereo depth estimation

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# stuff segmentation

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# optical flow

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# tracking

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# structure from depth

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# egomotion estimation

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# state estimation

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# world generation

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# planning

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# Prototype test results

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# conclusions

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# future work

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4. Lorem Ipsum, 2009 [↑](#footnote-ref-4)
5. Lorem Ipsum, 2009 [↑](#footnote-ref-5)
6. Lorem Ipsum, 2009 [↑](#footnote-ref-6)
7. Lorem Ipsum, 2009 [↑](#footnote-ref-7)
8. Lorem Ipsum, 2009 [↑](#footnote-ref-8)
9. Lorem Ipsum, 2009 [↑](#footnote-ref-9)
10. Lorem Ipsum, 2009 [↑](#footnote-ref-10)
11. Lorem Ipsum, 2009 [↑](#footnote-ref-11)
12. Lorem Ipsum, 2009 [↑](#footnote-ref-12)