

Rover

VILNIUS UNIVERSITY, FACULTY OF MATHEMATICS AND
INFORMATICS, INFORMATION TECHNOLOGIES STUDY
PROGRAMME

Done by:

Gabrielius Drungilas

Aistė Grigalūnaitė

Nedas Janušauskas

Adomas Jonavičius

Supervisor: Linas Bukauskas

Outline

- Project vision.
- Functional requirements.
- Non-functional requirements.
- Change of plans.
- Accomplishments.
- Current status.
- Mapping system.
- Problems.
- Future goals.

Project vision

- An autonomous robot companion, with the ability to detect and avoid objects, execute given tasks and alert the user.

Functional requirements

- Obstacle avoidance.
- Object detection.
- Depth extraction using stereo computer vision.
- Autonomous decision making.
- Room layout mapping.
- Sound signals.

Non-functional requirements

- The robot will operate until turned off manually or there are no unaccomplished tasks.
- The robot will get tasks from the user with a remote controller.
- The robot will be able to add tasks to the queue.

Change of plans

- We decided to use a remote controller instead of a card reader.

Accomplishments

- 3D printed the body parts and assembled the robot.
- Soldered the required electronic components.
- Successfully tested depth extraction using two cameras.
- Made a version of a robot that drives around the room and avoids collisions.

Current Status

- 440 hours spent on the project.
- Working on:
 - room mapping system.
 - stereo computer vision.

Mapping system

- Dynamically allocated.
- Made out of tiles which contain information like:
 - x, y coordinates.
 - is_known, is_obstacle, is_visited boolean values.
- Tiles are stored in a dictionary (which is in Map class) that stores key:value pairs.
- Map class contains methods that allows us to manipulate the map.

Mapping system

S - starting position.

X – current position.

0 – clear.

. – visited.

? - unknown.

- obstacle.

```
#####  
#000000000000#  
?0.....0#  
?0.....X..0#  
?0.....0#  
?0...0000000#  
00...0#####  
00...00  
00...00  
00...00  
0.S.00  
000000
```

Figure 1: Map visualisation from a terminal.

Problems

Problem:

- Uneven camera angles from identical USB cameras.

Solution:

- 3D printed adjustable camera mounts.

Future Goals

- Create a mapping system.
- Model and 3D print adjustable camera mounts.
- Work on computer vision.

THANK YOU FOR YOUR ATTENTION

QUESTIONS?