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Mobile Robots for Hospital Logistics

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Hospitals are complex and dynamic organisms that are vital to the well-being of societies. Providing good quality healthcare is the ultimate goal of a hospital, and it is what most of us are only concerned with. A hospital, on the other hand, has to orchestrate a great deal of supplementary services to maintain the quality of healthcare provided.

Logistics is the most resource demanding service in a hospital. The scale of the transportation tasks is huge and the material flow in a hospital is comparable to that of a factory. We believe that these transportation tasks, to a great extent, can be and will be automated using mobile robots. This talk consequently addresses the key technical issues of implementing service robots in hospitals.

In simple terms, a robotic system for automating hospital logistics has to be reliable, adaptable and scalable. Robots have to be semi-autonomous, and should reliably navigate in large and dynamic environments in the hospital. The complexity of the problem has to be manageable, and the solutions have to be flexible, so that the system can be applicable in real world settings.

This talk summarizes the efforts to address these issues. Upon the analysis of the transportation tasks and how they are currently handled in hospitals, a navigation system is envisaged. The concept of hybrid mapping is at the core of the solution, making it possible to efficiently represent the environment. Topological nodes greatly improve planning capabilities, and create a redundant layer for localization. The system features automatic annotation, which significantly reduces manual work and offer many advantages beyond robotics.

A case study on logistics solutions is finally presented. A robotic solution is tested in a hospital to handle the transportation of blood samples between the clinic and the lab. Without any environmental modification; it is shown that lab turnover time can be reduced from hours to minutes; by simply replacing the human porter with a mobile robot.