Memo

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Subject: Graduation Assignment 3D Object Localization for Vision Controlled Robots
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Context

Prodrive-technologies is a developer and manufacturer of world-class electronics. It comprises over 750 employees and is one of the fastest growing companies in Europe.

Our organization is based on two groups: Development and Operations. The Development department is oriented at developing first-rate electronic, mechanic and software solutions. The operations department is responsible for production, assembly, testing and life-cycle-management of electronic products and systems in the range of 1 to 100.000 pieces per year.

The Development department also develops machinery and tools for the automation of production steps in the Operations department. In that context, several robot solutions are currently being developed (e.g. see figure 2). For the sake of the flexibility of the robot solutions it is advantageous to automatically locate objects in the real world using visual sensors. Currently this is done using 2D cameras but the need arises to localize objects using 3D.

The 3D localization will be piloted in an application where stacks of delivered component reels (see figure 2) on a conveyor belt are automatically destacked and booked into the warehouse by a robot with 3D vision. 3D algorithms vision must produce the location and thickness of the topmost reel. The tape reels can have various forms and colours and have a diameter of either 7” or 13”.

Assignment

The student will investigate the literature on 3D object-detection and -localization algorithms and evaluate their advantages and disadvantages. The training method and data (e.g. CAD, depth map, point cloud) used for localization is still open and part of the investigation. With the acquired knowledge, a suitable algorithm is designed and implemented given the constraints of the pilot application. The implemented algorithm is evaluated for performance using images of the reels captured with a 3D camera.

Deliverables

- Specification of localization algorithm requirements
- Exploration and selection of localization algorithms
- Design and implementation of selected algorithm with c# interface
- Evaluation of algorithm performance

Figure 1: Production robots

Figure 2: component reel