Fuzzy Collision Avoidance for Industrial Robots

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In advanced robotics, there is still a strong need for a fast reactive collision avoidance computable in realtime in order to prevent the robot from hazardous situations during motion. Most of these situations occur due to unforeseen events (e.g. collision objects entering the workspace accidently) or incorrect remote operation (e.g. scenery misinterpretation during teleoperation).
Handling of collision conflicts implies a sensor-based collision prediction and a fast strategy to resolve the conflict. Advances solutions do not cause simple blockades to prevent damage, but recalculate actual paths on-line and at the same time intend to reach preplanned goal positions on deviation paths without any time-out.

In this research project, we have chosen a collision prediction based on 3D image processing and we have designed a fuzzy rulebase applicable to modern industrial robots for consequent collision avoidance.

Figure 1 shows our realtime image processing strategy, which we have proven to be applicable for solving dynamic collision conflicts in stationary robotics. In order to handle two input video streams (2×40 video frames per second), a drastical reduction of data is included into our strategy.

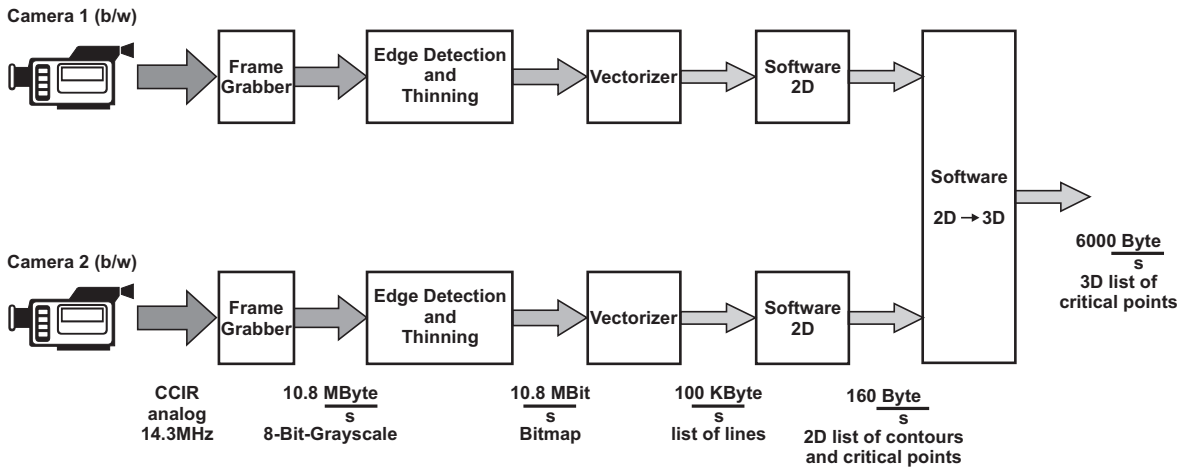

Figure 1: Realtime image processing strategy

[1] *M.Gerke:* Fuzzy Collision Avoidance for industrial robots (in German), 34th colloquium on control matters, Boppard, Germany, February 2000

[2] *A. Bischoff and M.Gerke:* Fuzzy Collision Avoidance Using Stereo-Vision 6th IFAC Symposium on Robot Control, SYROCO '00, Vienna, Austria, September 2000