

Environmental Design for Palletizing Tasks with 6DOF Manipulator (Dr. R. Chiba, Prof. J. Ota and Prof. T. Arai)

Palletizing tasks (Fig.1) play important roles in manufacturing systems. It is necessary for the manufacturing to design the effective systems, because the tasks should be essential in several processes. In this research, a method of environment design is proposed to reduce cycle time in the palletizing tasks.

The cycle time can be reduced with an effective design of the working environment such as 1) placement of manipulator and 2) shape and position of pallet. The effective these environment parameters can be designed with nearest neighbor search. In this method, the parameters should be evaluated the summation of takt-time of all products to be placed. Moreover, the dimension of the search space is very high, because the number of the parameters is very large. Therefore, it will take long time to design the proper environment.

In this research, the problem is solved with 1) motion planning with passing point (Fig.2), 2) reduction of the dimension with proper parameters and 3) evaluations with some represented place points in place of all products

Though simulation experiment (Fig 3), the effective environment can be obtained (Fig.4) and the result shows the effectiveness with the proposed method increase by no more than 59 % compared with an empirical method. The design time is within 8 minutes in this experiment.

Keywords: Palletizing Task, Environment Design, Manipulator Placement

References

- 1) Takehisa Fujita, Ryosuke Chiba, Jun Ota, Tamio Arai and Tsuyoshi Ueyama, “Optimal Working Environment Design for Palletizing with 6 DOF Manipulator” Proc. of the 23th annual conference of the Robotics Society of Japan, 1D16, 1/4, 2005. (in Japanese)

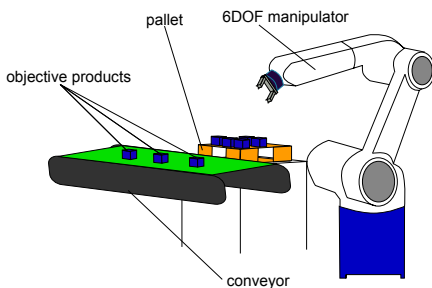


Fig. 1 Palletizing Task

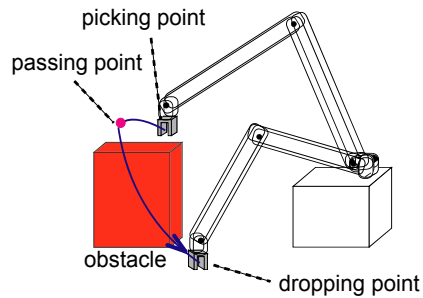


Fig. 2 Motion Planning with Passing Point

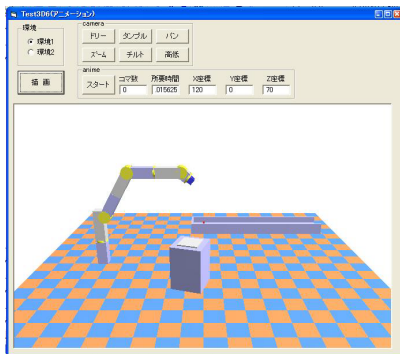


Fig. 3 Simulator for Palletizing

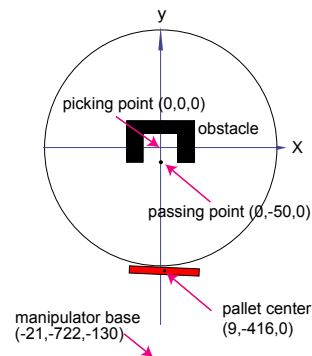


Fig. 4 Result of Environment Disgn