

PACKAGE ID - 000811SGIIP00 PROMPT

KWIC TITLE - A Collision-Free Motion Planner for Robot
Manipulator

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LIMITATION CODE -COPY **AUDIENCE CODE** - LIM

COMPLETION DATE - 09/01/1991 **PUBLICATION DATE** - 09/01/1991

DESCRIPTION - The PROMPT code computes a collision-free motion to move a robotic manipulator from one configuration to another. Given the geometric descriptions of the manipulator links and obstacles in the surrounding environment, the PROMPT code finds a collision-free path if it exists, which is outputted in the form of a sequence of joint angles.

PACKAGE CONTENTS - Media Directory; Software Abstract; Media Includes Source Code, User Guide, Executable Module, Object Module, Sample Problem Input;

SOURCE CODE INCLUDED? - Yes

MEDIA QUANTITY - 1 3.5 Diskette

METHOD OF SOLUTION - Motion planning is done by first confining the set of possible solutions through a series of task restrictions, and then searching for a solution under this assumption. Task restrictions include space coarsening (grouping points into cells), joint separation (dichotomizing joints into primary and secondary joints corresponding to large and small-scale movements), and maximal monotonicity (enforcing a total of at most 3 monotone joint movements).

COMPUTER - SILICON GRAPHIC

OPERATING SYSTEMS - IRIX 4.0.5E, which is the SGI Unix is used

PROGRAMMING LANGUAGES - C

SOFTWARE LIMITATIONS - The robot manipulators need to be serially linked and should have at most 6 joints. This limit can be increased by changing the value of MAX DOF. The number of discretized point for each joint should be less than 256. The shapes of the obstacles and the robot links should be polyhedral. Curved objects must be approximated with polyhedrals.

SOURCE CODE AVAILABLE (Y/N) - Y

UNIQUE FEATURES - Traditional motion planners either take hours of computation time, or fail to find a solution even if one exists.

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UNIQUE FEATURES - (CONT) The PROMPT code can find a solution for typical industrial robots with 6 joints in a predictable and feasible amount of time, which is about a few minutes.

OTHER PROG/OPER SYS INFO - The PROMPT code consists of *.c and *.h files. The documentation files have the suffix .doc. The PROMPT code uses the forms library to display the search process and the collision-free motion found. The forms library is a graphics SGI workstations, freely available on the internet. Version 1.0 is used with the PROMPT code; newer versions may be available on the internet.

HARDWARE REQS - The PROMPT code is about 3000 lines of C code without graphics, 4000 lines of C code with graphics, and the executable is 237 KB. A unix workstation with 100 MB of disk space and 8 MB of RAM should be sufficient.

TIME REQUIREMENTS - The PROMPT running time is a function of the number of degrees of freedom and the number of obstacles. For a typical 6-degrees-of-freedom robot with 10 obstacles, PROMPT takes on the order of 5 to 10 minutes of both wall clock and computer time.

REFERENCES - Informal documentation.

ABSTRACT STATUS - Submitted 4/12/95. Released AS-IS 7/5/95.

SUBJECT CLASS CODE - T

KEYWORDS -
COMPUTER PROGRAM DOCUMENTATION
P CODES
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ROBOTS
MANIPULATORS

EDB SUBJECT CATEGORIES -
990200 420200

SPONSOR - DOE/DP

PACKAGE TYPE - AS - IS