**RADOE-Robot Application Development and Operating Environment**

*Principal Investigator:* Professor Chen I-Ming  
*Email:* MICHEN@ntu.edu.sg  
*Office:* N3.2-02-23  
*Tel:* (65) 6790 5941 (Office)

**PROJECT DESCRIPTION:**

**Motivation & Objectives**

This project aims to develop a Robot Application Development and Operating Environment (RADOE). RADOE is developed based on ROS and it is an incorporation of high-level robotic software that has been developed in the A*STAR industrial robotics program for diversified robotics application development. RADOE is typically meant for industrial robots used in manufacturing sector but can be used for other robotic applications. It has a user-extensible software library and APIs (Application Programming Interfaces) for users to use to build applications.

**Methodology**

Currently, development of robot software is lagged behind hardware. Due to the complexity of handling robots, potential users would rather do things the usual way rather than learning a new robot programming language. RADOE is a software for developing robotic applications and operating robotic systems. It allows easy, convenient and interactive access to controlling robots. It has a graphical user interface for task definition, robot setup, configuration and registration (including calibration), robot programming, supervisory monitoring and control user actions, including corrective actions and error recovery. The user interface allows access to software libraries for rapid robot application development with appropriate APIs. RADOE will also include device drivers for communication and control of different robots, peripherals (such as conveyors, mobile bases, etc), actuators and sensors. It is capable of communicating with different industrial robots for accomplishing prescribed tasks.

**Advantages of RADOE**

- A friendly user interface with easy graphic programming capability.
- Ability to easily learn, develop a robot program and operate the robotics system.
- Ability to communicate with most of industrial robots (ABB, KUKA, DENSO, Fanuc etc) due to intermediate language
- Users will have the option of developing the program using a graphical programming environment and developing the software using high level programming languages (C++, Python) through the RADOE APIs in the portable controller.
- It has open source ROS to allow rapid and flexible architecture of API for further development of value-added robotic modules and customized applications.
- Due to its simple interface, RADOE is suitable for rank and file workers such welding operators or technical staff doing manufacturing operations.
Results / Progress

- A graphic user interface has been built using Qt-creator. It consists of project initialization, tasks definition, motion planning, simulation and execution sub-panels.
- A simulation environment has been built for automated robot taping, useful for taping motion trajectories generation and verification purposes in Rviz environment.
- A demo of robot bin-picking system (picking up warehouse items) has been built. The software of RADOE integrates research works of other A*STAR industrial robots namely task planning, object recognition and pose registration, real-time motion planning of manipulator and grasping planning of the robot gripper.
- By far, 3 conference papers have been presented in International Robotics Conference (IFToMM World Congress 2015, Meder2015 and ISRM2015)

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PERSONNEL:

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<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>E-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prof Chen I-Ming</td>
<td>Professor, School of Mechanical &amp; Aerospace Engineering, NTU</td>
<td><a href="mailto:MICHEN@ntu.edu.sg">MICHEN@ntu.edu.sg</a></td>
</tr>
<tr>
<td>Dr Conghui LIANG</td>
<td>Research Fellow</td>
<td><a href="mailto:chliang@ntu.edu.sg">chliang@ntu.edu.sg</a></td>
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PUBLICATIONS:

Figure 1: Automated bin-picking robot system
Refereed Journal (Published/In Press): Nil

Refereed Conference (Published/In Press):

