

January 2007

## Novel Parallel SCARA System

Information Summary

*For review for potential licensing*

### Summary

Applications:	Manufacturing
Validation:	Prototype
Inventors:	Dr. Jorge Angeles and Dr. Alexei Morozov, McGill University
Needs/Opportunity:	High-performance robotic applications
Deal Terms	US patent issued, Pending patents in other countries for Exclusive/Non-exclusive license.
Ideal receptor	Electronic assembly, packaging, pharmaceutical-sample manipulation
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### Technology Description



- Novel Parallel SCARA System (PSS) which:
  - is capable of the motions produced by Selective-Compliance Assembly Robot Arms (SCARA): three translations and one rotation about a vertical axis;
  - offers high structural stiffness and low inertia of its moving parts, as required for higher operational speeds;
  - differs from traditional SCARA systems in that its four motors are fixed to a common base either at the floor or at the ceiling, so that higher velocities and accelerations can be achieved;
  - has all four independent motions produced by identical motors, while motion is transmitted from the motors to the end-effector by two legs.
- These innovations result in an advanced SCARA system capable of higher productivity than existing systems.



## Benefits

- **Lower weight, higher load-carrying capacity** - All four motors are placed on the base, a common feature of parallel robots, but the motion is transmitted to the end-effector by only two legs, the layout being fully symmetrical in that all motors share equally the load.
- **Simple control and a more reliable operation** – With a simple architecture and a simple kinematics, the likelihood of self-collisions, common in parallel robots, is reduced. In addition, identical motors performing identical tasks means ease of maintenance and control.
- **Functional flexibility** - A simple kinematics means that various arrays are possible, depending on the type of application intended, while keeping the essential features of the device.

## Market Potential

- The PSS can be used in a number of applications: assembly of printed-circuit boards; manipulation of moderately heavy equipment; and any task where currently SCARA systems are used. The market segments for the PSS are: manipulation; machine tools; automated assembly; micro-assembly.
- Use of the PSS as a four-axis machine tool for milling, cutting, drilling and deburring of sheet and cast metal parts is also possible.

## Principal Investigator

**Jorge Angeles** - *James McGill Professor of Mechanical Engineering, Holder of the NSERC Design Engineering Chair*  
Professor Angeles and his team have designed, manufactured and installed numerous research robots.