

*B. CHU. Modeling of a mobile manipulator for redundancy resolution. Gerontechnology 2012;11(2):367; doi:10.4017/gt.2012.11.02.547.00* **Purpose** Recently, various applications of robotic systems to construction sites have been tried<sup>1</sup>. In this research, a mobile platform-based serial manipulator, the so called 'mobile manipulator', is employed for construction tasks such as material handling, beam assembly, welding, and so on<sup>2</sup>. Generally, a serial manipulator has 6 DOF (degrees of freedom). The mobile manipulator suggested in this paper adds 2 or 3 DOF, so that there are a total of 8 or 9 DOF. In 3-dimensional space, the minimum DOF for manipulation is 6. A manipulator that has more DOF than 6 is called a manipulator with 'redundancy'. While a manipulator with redundancy like the proposed mobile manipulator has several advantages such as large flexibility, singularity avoidance, easy obstacle avoidance, and so on, the redundancy resolution for optimal manipulation is not easy. In this research, modeling of the mobile manipulator for redundancy resolution is studied. **Method** Since the suggested mobile manipulator is a MIMO(multi-input multi-output) robot system with 8 or 9 links, a state-space model is derived for redundancy resolution. Analysis of kinematics and dynamics for a serial manipulator and a mobile platform is performed. An integration of the serial manipulator and the mobile platform is used. **Results & Discussion** In this research, a state-space model for the proposed mobile manipulator is derived. This model enables redundancy resolution for optimal solution of 8 or 9 DOF-robot system. In order to solve the redundancy resolution problem, a linear quadratic method, which is one of the conventional optimal control methods, or a reinforcement learning method can be used.

#### References

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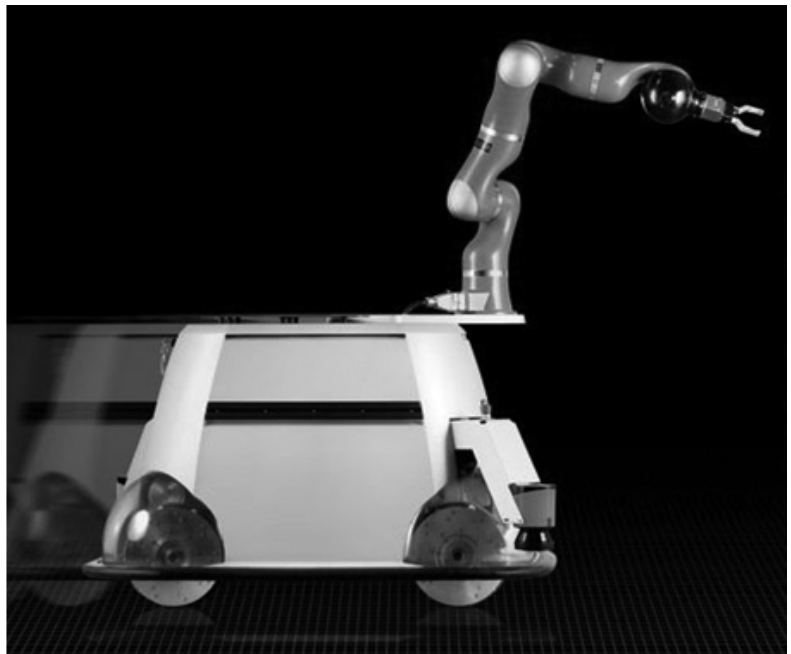


Figure 1. Mobile manipulator with 8 or 9 DOF (KUKA)