Marcel Rohner

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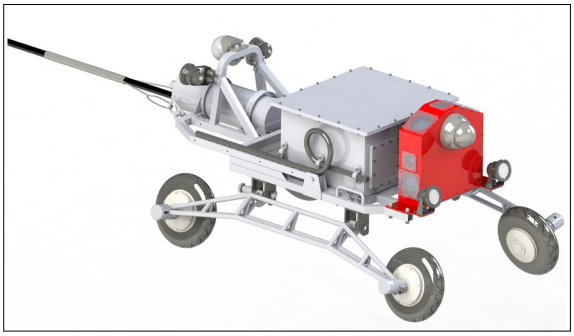
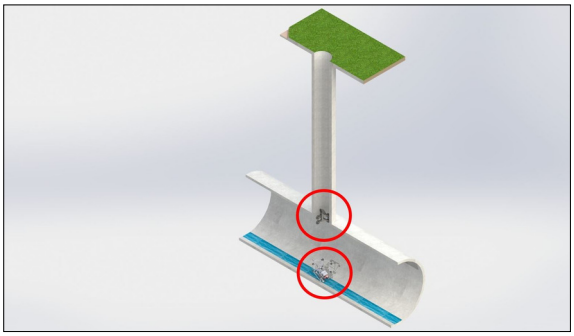
Subject Area	Automation & Robotics
Project Partner	Nanyang Technological University, Singapore

Deployment Cage for Sewer Inspection Robot

Removing the Need for Human Intervention



Sewer Inspection Robot [Robotic Research Center, NTU]



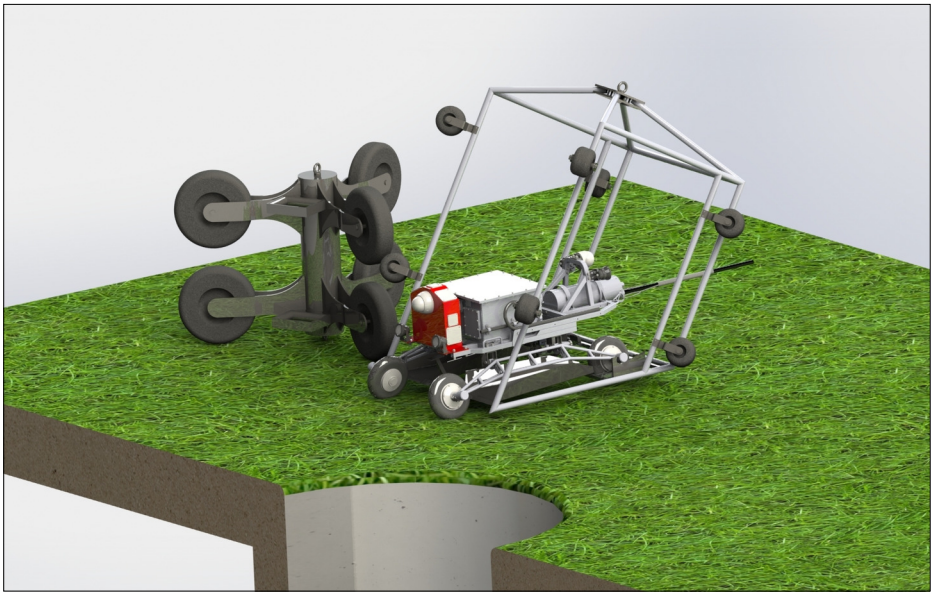
Deployment of Upper and Lower Cage in Deep Tunnel Sewerage System

Introduction: In order to meet Singapore's long-term needs for drinking water by treating used water, deep tunnel sewer systems were built, which have to be regularly inspected for structural damage. Nanyang Technological University Singapore developed an inspection robot for this purpose. A deployment cage is being developed to transport the robot into tunnels of 50 metres in depth.

Objective: This bachelor thesis aims to evaluate the existing concept for the cage, identify weaknesses and develop a new and optimized system as a virtual model with an animation.

The project follows a clear procedure according to "clarify, concept, design and elaborate". After the exact clarification of the system and its environment, the developed model was evaluated. The evaluation showed deficiencies resulting in the elaboration of a new functional concept in the CAD program, with a structural analysis at the critical point. The animation explains the functionality of the components and the process flow.

Result: There was a risk that the upper part of the existing cage could free-fall 50 metres causing not only personal injury but also material damage. The newly developed model allows manual handling due to the 70% reduction in weight, secures the robot during travel using its own gravity and makes use of existing robot functions. The functions that previously performed with nine motors are now fulfilled without actuators. This reduces complexity and thus cost. The resistance to external influences is increased and the immediate construction of a prototype is made possible. The final evaluation shows that the new concept meets all relevant requirements.



Upper (left) and Lower (right) Deployment Cage