



HiT (Heemskerk Innovative Technology): Semi Autonomous Care Robot (SACRO)

By [Sandhya Sriram](#), biotechn.asia, 25 May 2016



This article is a feature on [HiT \(Heemskerk Innovative Technology\)](#), a startup based in Netherlands. Biotechn.Asia met with the founder, Dr.ir. C.J.M. (Cook) Heemskerk.

His new company HiT is a robotic company that is developing a one-of-a-kind care robot and also be involved in providing consultancy or developing a product.

HiT performs and supports innovative high-tech projects in the field of robotics and mechatronics. In addition, HIT is also actively involved in the research and development of high-tech projects in various markets. HIT specializes in Complex robotic systems and Remote Handling maintenance. Since 2014, HIT is developing a new generation of care robots. The latest generation of this care robot has started field testing in April 2016. The next generation will be around early 2017.

The technology and the startup

Heemskerk: "We started the development of the care robot 2 years ago, when I was looking for applications of the technology that we originally developed for remote Nuclear Fusion Maintenance in the ITER project. After a short cooldown period, a Nuclear Fusion reactor will produce much lower levels of radiation than a fission reactor, but still, around parts in the core of the reactor, it is not advisable or safe to handle parts by hand. In that environment, it takes only minutes to pick up a lethal dose!

So we use robots that are tele-operated; human intelligence is still required to control the robot motion. In traditional nuclear tele-operation, the 'slave' robot doing the work is inside a hot cell, while the 'master robot is only 3 meters away from the actual work. The tele-robot doing the work inside the hot cell is mechanically linked to the master robot outside. In the ITER project, the master and slave robots will be several hundreds of meters apart. The link in between is electrical.

In the nuclear world, it is mandatory to test critical maintenance operations on a one to one scale, typically using a hardware mock-up which is fully representative for the real thing. A full copy! But making a full copy of ITER would cost billions of Euros!

We solved that problem with virtual mock ups: We build an accurate simulation model of the work site and we test robot interaction with a master robot as if we are working on the real thing. The simulation model has to run contact dynamics in real time, because you want to feel the interaction. So if in the simulation the robot hits the table, you will feel it on the master side, that is a new key technology.

A small Dutch company working on care robots since 2012 was inspired by our new technology. A Professor from the University of Eindhoven involved in the company got in touch with us and we discussed the application of our nuclear tele-operation technology for assisted care for the elderly and aged. That was the start of our product development: [Semi Autonomous Care Robot \(SACRO\)](#), on which we have been working for the past 2 years. We are looking to advance the state of the care robot. Experiments are already being run with the robot in health care organizations, so the technology is sort of ready, but we are not there yet.

By exposing the care robots to real people (nurses, hospitals, doctors, elderly, patients) in a real environment, we get their feedback. Then we go back to the design, improve the robot, and work on an improved prototype.





The care robot: Robot Rose during a field test in 2014

The care robot is a mix between a butler and a nurse. The robot performs simple physical activities related to daily life, like setting the table, cleaning the table, putting the laundry in the laundromat, going to the door to see who is there, and if it is a friendly person, opening the door, unpacking the groceries from a bag, placing them in the cupboard, fetching a drink are some of the activities that we are hoping the robot could do eventually. Somebody confined to a wheelchair can have problems just fetching a drink, so then this robot would be the best option for them. The robot will also help to call emergency services, or fetch an Ipad or phone for the person to talk to a loved one etc.

The robot is operated by several computers inside. It has an arm that can stretch out and even reach out to items placed on higher shelves etc. Using a wireless connection via internet, it can be tele-operated from a remote cockpit. But to be economically viable, the robot should also have some basic autonomous skills.



Currently, the client interacts with a human operator in the remote cockpit. We are also working on social interaction; imagine that we can learn the robot to interact socially... Speech recognition is just starting to be useful, but what if we could add cooperative and social skills to the robot to make it sit next to an elderly lady, browse through a photo

album together and then make the robot say, "Well, is this your husband?" and maybe even mention that he was good-looking... What kind of intelligence would you need to add to a robot to make that jump in cognitive skills? New physical capabilities and social skills need to be developed and validated as useful. That will still take time. In the mean time we think there is already business potential for our semi-autonomous solution.



The next generation Rose will be based on the Tiago platform

The market

In the Netherlands, about 15% today of the people are receiving care and this is predicted to double in the next 20 years. Half the people will be over 65 in 20 years and care for them is a basic need. Singapore has similar demographic developments.

Right now the product costs 100,000 Euros; which is too expensive for most people to buy. In the next two years we expect the price to come down steeply, and we expect to see the first business. So we are looking for investors to help us make the final steps to the market as well as for more hospitals and care-giving homes to try out the product. We are looking for financial support in Singapore as well as in the Netherlands."



Dr Cornelis "Cook" Heemskerk MSc is CEO and owner of Heemskerk Innovative Technology ("HIT"). After he obtained his MSc in Mechanical Engineering at the University of Delft in 1985, Dr Heemskerk worked as a visiting scientist in the robotics lab at Carnegie Mellon University. Back at the University of Delft, as research assistant working in the field of methodology development for computer aided process planning for robotic assembly. After completing his PhD in Technical Sciences in 1990 he started to work for Fokker Space (now Airbus Defence & Space) as lead engineer with responsibility for the technical coordination of software development of the ESA European Robotic Arm project. He started his own consultancy company in 2007 and became intimately involved in a remote handling and robotic control programs for the International Thermonuclear Experimental Reactor, European Space Agency and the Nuclear Research and Consultancy Group. Dr Heemskerk is a member of the Review Board that oversees the development of the Laser Coating removal Robot.

<https://biotechnin.asia/2016/05/25/hit-heemskerk-innovative-technology-semi-autonomous-care-robot-sacro/>