ACMIT

Austrian Center for Medical Innovation and Technology

Main location	Wiener Neustadt, Lower Austria
Other locations	
Thematic field	R&D for medical robotic systems, workflow optimization for medical processes, new technologies for minimally-invasive procedures

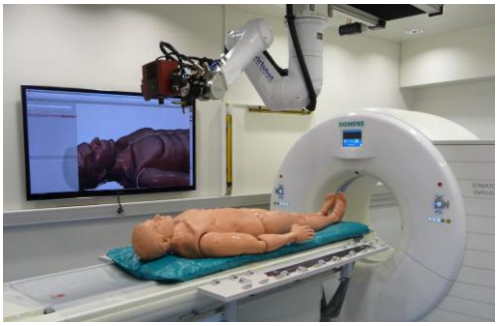
Success story summary

Virtopsy – robot performs autopsy without opening the corpse

Performing a Virtopsy® (virtual autopsy) to determine the exact cause of death helps to eliminate the need to open the corpse and to take out organs for further examination. The Virtobot system developed in the cooperation between ACMIT and the Forensic Institute at the University of Zürich allows to automatically capture comprehensive image data as well as taking tissue samples in a minimally invasive manner. Based on these information a forensic case can be virtually reconstructed and upcoming questions can be examined in an ongoing court case also after many years.

Success story

A Virtopsy® (virtual autopsy) comprises the application of imaging methods like surface scanning, computed tomography or magnetic resonance tomography enhanced with minimally invasive tissue sampling. These combined results can be used to determine the exact cause of death to support or in some cases even replace a classical postmortem autopsy. Based on the process developed by the Virtopsy-Team (Forensic Institute, University of Zürich), the ACMIT center developed a Virtobot system to perform the main tasks.



The Virtopsy control center software can be used to plan a complete examination process which then will be automatically processed by the system. A robot arm is combined with a ceiling-mounted linear stage which is located above the CT gantry and the table. This manipulator is able to fetch corresponding end-effectors to perform certain tasks of the Virtopsy process. At the moment three different end-effectors are included. A precise 3D-surface scanner generates surface models of the corpse which can be further enhanced by adding texture data captured with a dedicated SLR camera. Finally a custom made biopsy tool allows to accurately place introducer needles to biopsy regions in question in order to harvest tissue or liquid samples. The CT-data set is used to define the target point and the trajectory in cooperation with a special planning software.

All captured image data (CT, MRT, 3D-surface, pictures) can be merged using dedicated software and allow completing a forensic survey. In case of a car accident a surface scan of the damaged car could be merged with a virtual model of the corpse that is composed of CT and surface-scanning data in order to compare the injuries of the skeleton and the skin surface with the damages of the car and thus examine the driving direction or braking manner.

Impact and effects

An autopsy often causes extra stress for the relatives of the dead person which can be reduced by introduction of this novel Virtopsy technology. Depending on religious aspects it is not allowed in some cultures to perform an autopsy. Also here, examination by Virtopsy without opening the corpse would be helpful to increase the possibility to solve forensic cases. The data acquisition and storage of all data of a forensic case can help to answer future questions also after years during an ongoing court case. After all, the quality assurance of hospitals can be increased by using the Virtopsy technology in their pathology department.

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