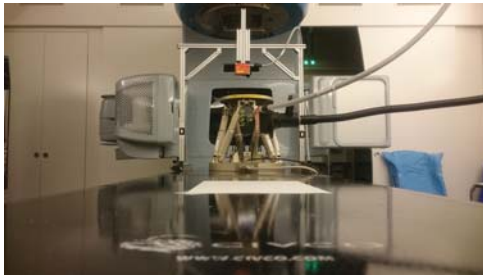


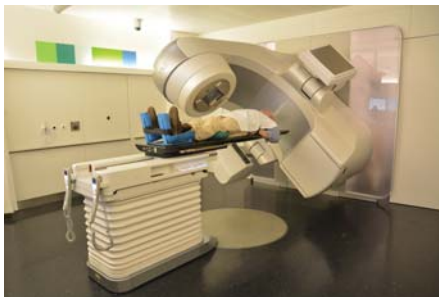
Master Thesis

Development of Prediction Filters for Respiratory Motion Tracking



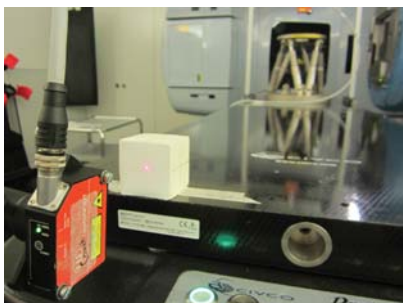
The Research

Radiotherapy uses ionizing radiation to treat tumor patients. The ionization destroys the DNA of the cells and should therefore only be deposited in the tumor tissue. A robotic treatment table is normally used for exact static positioning of the patient. This works well with static tumors, but some tumors move, e.g. lung tumors due to respiration. In these cases, the target volume to be irradiated is enlarged, such that the tumor is always inside this volume, resulting in an increase of irradiation of healthy tissue. Here, in collaboration with the University Hospital Zurich, an alternative method, real time tumor tracking, is investigated.



The Project

Real time tumor tracking requires measuring the tumor motion, which is carried out here indirectly by measuring the respiratory motion of the chest. The sensor used for this task may have considerable time delay, which results in increased tracking error. Prediction filters use models and past data to predict the respiratory motion a certain time ahead and thereby compensating the time delay of the sensor. Literature research reveals a lot of concepts for prediction filters and an overview and performance evaluation of these is needed.



You

- are interested in modeling dynamical systems
- are interested in filter theory, machine learning, dynamical systems theory
- like programming (preferably in Matlab)

If you are interested, write me an e-mail and we will make an appointment.

The chair's vision

The chair of Product Development and Engineering Design at the ETH Zurich considers itself a center for system-oriented product development and innovation. Our aspiration consists on the one hand of the advancement and investigation of methods and processes of product development and on the other hand of the development of new technical systems. The purpose of our daily work is to contribute to the innovative ability and competitiveness of Switzerland.

Facts

- Tumor Tracking
- Machine Learning
- lots of new theory to learn

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