

Voorstel MDO-opdracht

Opleiding Technische Geneeskunde

Universiteit Twente

A. Algemeen

1. Titel MDO-opdracht: **Development of an MR-compatible device for transperineal interventions.**
2. Gegevens instelling/indiener:
Naam indiener: Dr. J.J. Fütterer
Instelling/afdeling: Radiology, UMC St. Radboud, Nijmegen
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Medisch begeleider: Dr. J.J. Fütterer
Technologisch begeleider (UT): Dr. S. Misra

B. Faciliteiten

1. Welke faciliteiten zijn nodig voor een adequate uitvoering van de vraagstelling?
Frequent discussion with al partners (Department of Radiology, Clinical Physics, Control Engineering Group, and Institute of Biomedical Technology and Technical Medicine).
2. Wat zijn daarbij mogelijke risico's voor de voortgang van de opdracht?
None.

C. Overige opmerkingen

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D. Inhoudelijke informatie MDO-opdracht

Omschrijving van de technisch geneeskundige vraagstelling:

Background:

Prostate cancer is the most frequently diagnosed malignancy in the western male population, and the associated socio-economic impact on health care is more than worrying. Focal therapy for prostate cancer is a nascent treatment strategy. Maximizing cancer control and minimizing morbidity (e.g. urinary continence and potency) is its main goal.

Up until the present urologists have used transrectal ultrasound (TRUS)-guided biopsy in sampling the prostate and diagnosing prostate cancer. This technique of choice has a substantial risk of sampling error. High false-negative biopsy rates and underestimating true Gleason score makes TRUS-guided prostate biopsy an improper patient selection method for focal therapy. In the era of whole-gland therapy under staging has been less of an issue. Nowadays with novel therapy forms such as active surveillance and focal therapy under staging is our biggest concern.

More rigorous biopsy schemes such as brachytherapy template-guided transperineal saturation biopsy, which samples at 5 mm intervals, have shown to augment cancer detection rates. The ideal selection method should be able to localize the tumour, determine its extent (local as well as distant), and aggressiveness in a non-invasive fashion. Magnetic resonance (MR) imaging has the potential of being such an ideal selection method. Not only does it have the potential of selecting these patients, but it can also serve for directing focal therapies and interventions such as intensity modulated radiation therapy, cryotherapy, and biopsies respectively.

De opdracht valt binnen de Research, Development en Innovation agenda van het MITeC.

Assignment:

The purpose of the assignment is the development of an MR compatible device for transperineal interventions. The development of techniques for adequate lesion detection and MR guided treatment planning. Specifically, the student would be responsible for the following tasks:

Task 1: Develop MR-compatible template: Design and prototype an MR-compatible template that can be used for prostate biopsies. This template must have fiducial markers that are visible in MR images.

Task 2: Quantify target accuracy of procedure: Perform prostate needle insertions using standard and designed template, and measure targeting accuracy. This task involves data collection and analysis.

Required skills:

- Self-motivated
- Knowledge of some mechanical design software