



# Simulation of UV-Light Irradiation for Room Disinfection (incl. CoViD-19)

Project Management and Software Development

## General Info

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## Project Abstract

**Goal:** Implement a stand-alone software including GUI for estimating UV light irradiation in rooms.

## Background and Motivation

In the middle of the second wave of the CoViD-19 pandemic, means for fast and effective inactivation of its pathogen SARS-CoV-2 viruses are desired. Current preliminary research shows SARS-CoV-2 behaves similar than SARS-CoV in terms of resistance in air and surfaces [1].

UV C disinfection of surfaces possibly contaminated with SARS-CoV-2 viruses has and is been applied already during the current crisis [2, 3, 4].

At Klinikum rechts der Isar we have recently proven that UV-C inactivates SARA-CoV-2. In order however to deploy this technology proper planning, testing and simulations are needed.

## Student's Tasks Description

The student will implement a preliminary software to load 3D models of rooms (for example an examination room) and simulate the deposited light dose on its surfaces assuming several UV-C lights are placed in the room.

The result will be a 3D model that enables optimizing the positioning of UV-C lamps and quantifying the needed time to inactivate SARS-CoV-2 to a high percentage.

The student will use techniques of ray-tracing, 3D rendering and texture baking to estimate where light hits objects and with how much power. The student will then measure and use power distribution of UV-C lamps to estimate the real dose.

## Technical Prerequisites

The student should be familiar with

- Python or C, C++
- 3D computer graphics / rendering / raytracing (helpful)
- Optics (helpful)
- Blender or similar 3D rendering engines/software (helpful)

The student should be keen to invest time speaking with physicians and possibly collect data within tests at Klinikum rechts der Isar.

## References

- [1] <https://www.medrxiv.org/content/10.1101/2020.03.09.20033217v1.full.pdf>
- [2] <https://spectrum.ieee.org/automaton/robotics/medical-robots/autonomous-robots-are-helping-kill-coronavirus-in-hospitals>
- [3] <https://spectrum.ieee.org/tech-talk/aerospace/aviation/germfalcon-coronavirus-airplane-ultraviolet-sterilizer-news>
- [4] <https://www.deccanherald.com/specials/coronavirus-effect-samsung-offers-uv-c-sanitizing-service-for-galaxy-devices-813324.html>
- [5] <https://www.blender.org/>