

# EMI Free Electric Golf Carts and Robotic Lawn Mowers

## Master Thesis Assignment / Student Assignment



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|------------------------|--|
| Theme:                 | Electromagnetic Compatibility                                      |
| Application:           | Shielding  |
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| External collaborator: | Herinneringscentrum Kamp Westerbork - RYSE Adviseurs in vastgoed   |

- I. **Introduction:** The Westerbork Camp Memorial Center, a key site for Holocaust remembrance and education, is undergoing renovation to modernize its facilities and programs. Plans include electric golf carts for visitors with physical disabilities and electric lawn mowers. A crucial requirement is preserving the EMI-free environment near the camp grounds to avoid interference with Astron's nearby radio telescopes. All equipment, including golf carts and robotic lawn mowers, must comply with this standard (ITU-R RA.769-2).

## II. Description

### Method:

- Investigate existing technologies and methods for reducing or eliminating EMI in electric vehicles.
- Develop a prototype for EMI-free electric golf carts and/or robotic lawn mowers, adhering to the EMC requirements.
- Assess the impact of the new technologies on both the performance of the vehicles and the environment surrounding the telescopes, including a cumulative analysis of all electronic devices on the premises.

### Contact Information

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### Research objectives:

- The equipment must comply with the international standard ITU-R RA.769-2, which protects radio telescopes. This standard applies to all devices located within the radio-quiet zone (3 km) and consultation zone (7 km) around the dishes.
- The EMC impact analysis must be conducted not only for individual devices but also cumulatively to ensure that all installed equipment collectively meets the standards.
- For initial tests, it is recommended to measure against the EN55032 Class B standard in the frequency range of 30 MHz to 8.5 GHz, with additional emission suppression measures, such as using a Faraday cage, considered.

### III. Requirement courses, skills and supervision:

The student has followed the EMC course.

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