



TITLE

Study of a new RF antenna. Application to Roller shutter

LAB & PEOPLE

- **Name of the hosting lab:** Lab-STICC/UBO UMR 6285, MATRF department, DH team.
General activities of the lab: DH team: Microwave Devices for telecommunications systems, sensor systems and radar imaging.
Website: <https://labsticc.fr/en/teams/dh>
Number of staff / PhD: DH team : 26 permanent members (Professors, Assistant Professors, Engineers and Technicians), 6 Postdoctoral researchers, 12 PhD.
- Supervisor name and contact: Pierre-Marie MARTIN (pierre-marie.martin@univ-brest.fr)

TOPIC OF THE INTERSHIP

- **Scientific context of the internship (max 20 lines)**

This is a collaborative project between the Lab-STICC and the company CGWi (<http://www.cgwi.bzh/>) for a research study on Antennas technologies operating in the 2405 MHz – 2480 MHz band, compatible with the mechanics of the Rolling Shutter. The objective is to be able to directly use the motor's power cable as an antenna. This will eliminate the coaxial cable currently used as an antenna which is often damaged when installing the shutter. A previous collaborative study between CGWi and Lab-STICC, carried out in 2020, showed that the electrical power cable could be used as an antenna for controlling rolling shutters in the ZigBee frequency band at 2.4 GHz. An optimal theoretical solution for coupling the 2.4 GHz RF signal to the power cable allowing the transmission of information to the electronic motor control card has been proposed. The simulations and modeling carried out by the LAB-STICC made it possible to validate the concept. Based on these simulations, CG-WIRELESS produced a first prototype and initial tests have shown that this coupling solution could be improved.

The objective of this second collaborative study would be:

- (i) Based on the existing coupling solution, simulate, and analyze the EM radiation mode of the power cable in the 2.4Ghz band
- (ii) From a more prospective point of view, find a mechanical solution to improve the RF radiation of the antenna/power cable, by adding an equipment on this power cable.

Keywords

Antennas, Home Automation, Radio-Frequency, Wireless technologies



Bibliography

[1]: “Device for control by Radio-Frequency signals of a domestic electrical appliance, associated domestic electrical appliance and home automation installation comprising such an appliance.” - Brevet SOMFY – W02016/079056A1 - 2016 - Inventeur : Michel Ramus.

[2]: Bastien HILAIREAU. « Recherche de nouvelles solutions d’antennes intégrées appliquées à la commande de volets roulants motorisés ». – Internal Intership report – CGWI/LabSTICC - 2020

- **Tasks and duties entrusted to the student:**

1. Resume the work carried out during the first collaborative study.
2. Study and models the EM radiation on the 2.4 Ghz power cable:
 - a) Modeling by electromagnetic simulation of the antenna integrated on the cable.
 - b) Define an electromagnetic field measurement set-up to validate the theoretical study and test and measurement campaign.
 - c) Search for a solution to improve the radiation of the antenna/power cable, by add-on placed on this power cable.

- **Skills to be acquired or developed:**

Electromagnetic propagation: simulation and measurement

PROFILE OF THE DESIRED STUDENT

- Minimum level of study required: in 2nd Year of Master (1st year of Master fully validated)

- Field(s) of study: Electronics, Physics, Applied Mathematics

- Scientific skills: Electromagnetism, Microwave Technology, Antennas

Language skills required: English

THE INTERNSHIP ASSIGNMENT:

Desired duration of the internship (in months): 4 months

Desired Starting date of the mission: March 11, 2024

Indicative weekly schedule: 35h / week

Remuneration: 600€/month, paid on national SEA-EU funds for a maximum of 5 months

Internship agreement: *an internship agreement will be signed.*

To SEA-EU students:

If you're interested please send your CV and letter of motivation to the scientist in charge, email pierre-marie.martin@univ-brest.fr before the 29 February 2024.