Eötvös Loránd University
Faculty of Informatics
Contact: ifros@inf.elte.hu

LETTER OF REFERENCE ABOUT INTERNSHIP ACCOMPLISHMENT

*The reference letter is to demonstrate that the student at the **Intelligent Field Robotics System MSc** course of ELTE Faculty of Informatics has accomplished his/her complusory internship according to the training and graduation requirements of the programme at the chosen institution and along the framework detailed below.*

1. Information about the student

Student's name: Rahaf Abu Hara
Phone number: + 34647513810
Student's code: z8b9k4

Year studies were commenced: 2021-2022 2022-2023

E-mail: rahafy34@gmail.com

2. Information about the selected institution

Name of institution: Fundació Eurecat

Address: Av. Universitat Autònoma, 23, 08290 Cerdanyola del Vallès, Barcelona

Phone number: 935 94 47 00 Web page: https://eurecat.org

	Contact	Student's professional supervisor
Name	Adriana Cruz	Julián Cayero Becerra
Department	Human resources	Robotics and Automation
Post	Av. Universitat Autònoma, 23, 08290 Cerdanyola del Vallès, Barcelona	Av. Universitat Autònoma, 23, 08290 Cerdanyola del Vallès, Barcelona
e-mail	adriana.cruz@eurecat.org	julian.cayero@eurecat.org
Phone	935 94 47 00	935 94 47 00

3. Information about the internship

Internship commence: February 27th 2023 finish: May 29th 2023

duration: 12 weeks schedule: ~27 hour/week total: 320 hours

TOTAL: 320 hours

Department name: Robotics and Automation Unit

3.1. Employer's general feedback, comments for the university (ELTE Faculty of Informatics):

The Rahaf's thesis objectives were aligned with an internal project we are running at Eurecat. Those objectives are not focused on fine-tuning a specific algorithm, but on to make a robot to complete a whole operation without further requirements defined. Rahaf was always hungry for knowledge, which is something that I really appreciated. During the internship time, Rahaf has been able to adapt her working rhythms to the company inertia. She always maintained a good attitude and was open to suggestions, advices and feedback about her work.

3.2. Short evaluation of the internship, summary from the student:

My internship was an incredibly enriching experience, specifically highlighted by the opportunity to work on an industrial project that offered practical application of theoretical concepts. This chance not only reinforced but also deepened my understanding, making the learning process particularly insightful.

The entire experience was made possible by a dedicated and supportive team who fostered a friendly and conducive work environment. Despite the time constraints, I was able to gain substantial knowledge, thanks to my supervisor and colleagues. Their unwavering dedication and assistance significantly eased the stress related to the compact work schedule.

However, the project's tight timeline did present certain limitations, particularly restricting further development and comprehensive testing on the actual robot. Despite these challenges, I view the entire experience as a valuable opportunity and look forward to utilising the knowledge and skills gained in my future endeavors.

3.3. Short evaluation of the internship, summary from the employer:

The work of Rahaf has been focus on automatizing the data gathering of sewer deployed sensors by means of aerial platforms. The operation to cover considers an operator, an aerial robot and a sewer manhole as small as 60 cm. In order to relax the complexity, Rahaf worked into a simulator able to reproduce the environment, sensor outputs and an aerial platform with the same controller interface. When moving to the real robot, the work carried out by Rahaf has allowed Eurecat to test for the first time an aerial platform, and overcome the troubles that came with that, discovering dependencies issues and helping to clarify and refine the overall operation. Rahaf's solution considered two phases: during the first one the drone take off, detect from the video feed the manhole and is guided to the manhole center; in the second phase the descent is conducted by means of the depth feed. Of importnace is the algorithm she has been working on to solve phase two. While descending, the aerodynamic perturbations are huge in small tunnels and controlling the drone is difficult. Rahaf has managed to contribute firmly in the implementation of a reactive trajectory planner able to cope with localization errors and drifts, and studied deeply how to tune it and to make it work. Rahaf's results have contributed to settle the basis of the operation and her conclusions will be impacting the developments inside the project that act as framework for Rahaf's thesis.

4. Statement

In the name of the institution (organization, company) above I certify that the named student has carried out his/her internship at our institution with the goals stablished, on an expected level and quality and along the conditions detalied above.

Date: May 29th 2023 Readable name, signature: Julián Cayero

Seal

eurecat
Centre Tecnològic de Catalunya

The Letter of Reference is valid only with the Master Thesis Topic Declaration Form. ELTE Faculty of Informatics certifies the completed internship.

Date: 31 May 2023

Signature: dr. Kaelbre A.

Vice-dean for Education

Eötvös Loránd Tudományegyetem Informatikai Kar
Oktatási dékánhelyettes