J. FELICIEN IHIRWE

Software engineering & Low-code engineering

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BIO

I'm Felicien, a final year Ph.D. student in the Department of Information Engineering, Computer Science, and Mathematics (DISIM) at the University of L'Aquila/Italy. I work for Intecs Solutions S.p.A's as an research assistant in the R&D department of the Innovation Technology Service lab (Pisa-Italy). I graduated from Carnegie Mellon University with a Master's degree in Electrical and Computer Engineering. My research interest includes Low-code Engineering (LCE), Software Engineering, and the Internet of Things (IoT) at the Edge/Fog/Cloud. Low-code Engineering integrates the theoretical and technical research in Low-code Development Platforms, Model-Driven Engineering, Cloud Computing, and Machine Learning to automate the development of more complex application in the domains such as system engineering, IoT, industrial automation and cyber-physical systems. My current work focuses on developing a robust domain-specific environment for developing, analysing and deployment of engineering IoT systems by employing Low-code Engineering principles.

EDUCATION

P.h.D in Information Science and Engineering

Nov 2019 – Ongoing — **University of L'Aquila**

Interest: *Low-code engineering & Domain-specific languages & IoT*

M.Sc. in Electrical and Computer Engineering

July 2017 – June 2019 — **Carnegie Mellon University**

Interest: *Software engineering & Machine Learning*

B.Sc. in Electronics and Telecommunication Engineering

Oct 2012 – June 2016 — **College of Science and Technology-University of Rwanda**

Interest: *Embedded Systems*

RESEARCH EXPERIENCE

PUBLISHED PAPERS

2022

- **"Assessing the Quality of Low-Code and MDE Platforms for Engineering IoT Systems"**. **Felicien Ihirwe** , Davide Di Ruscio, Simone Gianfranceschi, and Alfonso Pierantonio. *In Proceedings of the 22nd IEEE International Conference on Software Quality, Reliability, and Security (QRS22)*. 12 Pages 1–8. November 2022 [Online]

2021

- **"Cloud-based modeling in IoT domain: a survey, open challenges and opportunities"**. **Felicien Ihirwe** , Arsene Indamutsa, Davide Di Ruscio, Silvia Mazzini, and Alfonso Pierantonio. *In the Proceedings of 2021 ACM/IEEE International Conference on Model Driven Engineering Languages and Systems Companion (MODELS 2021)*. October 2021 DOI: 10.1109/MODELS-C53483.2021.00018.
- **"A domain specific modeling and analysis environment for complex IoT applications"**. **Felicien Ihirwe** , Davide Di Ruscio, Silvia Mazzini, and Alfonso Pierantonio. *In the 7th Italian Conference on ICT for Smart Cities And Communities (I-CiTies'21)*. September 2021. [Online]
- **"Towards an MQTT5 geo-location extension for location-aware applications"**. **Felicien Ihirwe** , Giovanni Iovino, and Davide Di Ruscio. **In the 44th IEEE International Conference on Telecommunications and Signal Processing (TSP'21)**. DOI: 10.1109/TSP52935.2021.9522590. July 2021 [Online]
- **"Towards a modeling and analysis environment for industrial IoT systems"**. **Felicien Ihirwe** , Davide Di Ruscio, Silvia Mazzini, and Alfonso Pierantonio. *In the International workshop on MDE for Smart IoT Systems co-located with Software Technologies: Applications and Foundations (MESS@STAF21) conferences*. June 2021. [Online - DOI]
- **"Model-based Analysis Support for Dependable Complex Systems in CHESS"**. Alberto Debiasi, **Felicien Ihirwe** , Pierluigi Pierini, Silvia Mazzini, and Stefano Tonetta. *In Proceedings of the 9th International Conference on Model-Driven Engineering and Software Development - MODELSWARD'21*. ISBN 978-989-758-487-9; ISSN 2184-4348, pages 262-269. DOI: 10.5220/0010269702620269. February 2021 [Online]

2020

- **"Low-code Engineering for the Internet of things: A state of research"**. **Felicien Ihirwe** , Davide Di Ruscio, Silvia Mazzini, Pierluigi Pierini, and Alfonso Pierantonio. *In Proceedings of the 23rd ACM/IEEE International Conference on Model Driven Engineering Languages and Systems: Companion Proceedings (MODELS'20)*. Article No.: 74 Pages 1–8 DOI:10.1145/3417990.3420208. October 2020 [On-line]

TEACHING ACTIVITIES

Carnegie Mellon University

Fall 2018 — Kigali-Rwanda

- **Graduate Teaching Assistant:** 04-330 Foundations of Software Engineering and Problem Solving.

July-Aug 2018, 2019, 2021 and 2022 — Kigali-Rwanda

- **Graduate Teaching Assistant:** Introduction to Linux-Java programming orientation course.

The African Centre of Excellence in Data Science (ACEDS)

Fall 2019 and 2020 — Remote

- **Graduate Teaching Assistant:** DSC6231 Computer Systems and Data Analytics.

High school teaching (ACEC)

February 2012 - June 2015 — Nyabihu-Rwanda (Part-time)

- **Teacher:** Mathematics and Physics for Advanced level studies.

PAPER REVIEWS CONTRIBUTIONS

- **External Reviewer:** Journal of Object Technology (JOT)
  Topics: *MDE, IoT, communication protocols, QoS.*
- **Invited Reviewer:** IET Software journal
  Topics: *IoT and Machine learning applications, edge computing, communication protocols.*
- **Shadow Program Committee:** Mining Software Repositories conference (MSR'21)
  Topics: *Mining android apps software repositories.*

VOLUNTEER

- **Student Volunteer:** The 49th ACM SIGPLAN Symposium on Principles of Programming Languages (POPL 2022). Sun 16 - Sat 22 January 2022
- **Student Volunteer:** The 36th IEEE/ACM Int. Conf. on Automated Software Engineering (ASE 2021). Sun 14 - Sat 20 November 2021
- **Student Volunteer:** ACM / IEEE 24rd Int. Conf. on Model Driven Engineering Languages and Systems (MODELS'21) 10-15 October 2021
- **Student Volunteer:** 25th ACM International Systems and Software Product Line Conference (SPLC 2021) Sept 6-11, 2021
- **Vice-president:** Energy and embedded system community - Carnegie Mellon university-Africa Dec 2017-Feb 2019

SPEAKER AT CONFERENCES

- *"Cloud-based modeling in IoT domain: a survey, open challenges and opportunities"* at the ACM/IEEE 24rd Intl. Conf. on Model Driven Engineering Languages and Systems (MODELS'21) **(Speaker)** October 10 - 15, 2021
- *"A domain specific modeling and analysis environment for complex IoT applications" 7th"* at the Italian Conference on ICT for Smart Cities and Communities (I-CITIES 2021) **(Speaker)** 22-24 September, 2021
- *"Towards an MQTT5 geo-location extension for location-aware applications"* at the 44th IEEE International Conference on Telecommunications and Signal Processing (TSP'21) **(Speaker)** July 26-28, 2021.
- *"Towards a modeling and analysis environment for industrial IoT systems"* at Software Technologies: Applications and Foundations conferences (MESS@STAF21'21) **(Speaker)** 21-25 June 2021.
- *"Low-code Engineering for the Internet of things: A state of research"* at the ACM/IEEE 23rd Intl. Conf. on Model Driven Engineering Languages and Systems (MODELS'20) **(Speaker)** Oct 16-23, 2020

PROFESSIONAL EXPERIENCE

Research Assistant

Intecs Solutions S.p.A

December 2019-Current — Pisa,Italy

- Computer Science applications in LowCode Engineering with MDE practices for engineering IoT systems.

- Working on CHESSIoT framework for development, analysis and deployment of IoT systems.
- Model-based safety analysis of engineering IoT systems employing Fault Tree Analysis approaches.
- Platform-specific code generators *(C/Arduino/ThingML)*.
- Automated deployment and monitoring of generated services
  ***Technologies**: Java, UML, EMF, Acceleo, Qvto, Xtext, ETL, Docker.*

Technical Consultant

BIRGER

June 2019-November 2019 — Kigali, Rwanda

- BIRGER. is one of the leading professional IT services firm in the Indian Ocean Region, covering 9 countries.
- I was in charge of consulting services in the area of Technology, Security and Resiliency for Rwanda and towards the East Africa region.

Software Engineer

WYS ltd

Jan 2019 - June 2019 — Kigali, Rwanda

- Contributed to the software development lifecycle by adopting agile principles until effective deployment.
- End-2-end software development using Java-based SpringBoot, JPA, Security, Thymlearf, JQuery and Bootstrap.
- Worked on an integration framework with different multipurpose consumer services.

Co-Founder & Developer

TaagMind ltd

September 2018 - October 2020 — Kigali, Rwanda

- TaagMind aim is to offer Augmented & Virtual reality (AR&VR) experience to client.
- ***Technologies** used: Unity3D, Node.Js, React Frameworks, SparkAR Studio.*

Data Scientist (Internship)

Rwanda Revenue Authority

May 2018 – September 2018 — Kigali, Rwanda

- Worked on Electronic Billing Machine (EBM) data to improve the VAT tax payment compliance and service quality.
- Developed a Machine Learning model to predict non-reporting EBM machine.

Administrative Support Officer

Carnegie Mellon University - Africa

Jan 2018 – May 2018 — Kigali, Rwanda

- General office support for various administrative functions of the organization.

Electronics & Repair Engineer

BBOXX Capital

May 2016 – August 2017 — Kigali, Rwanda

- Efficiently provided a great working commitment to the company product refurbishment processes, unshipping, product quality check and deployment to the market.
- Close collaboration with the ongoing product design team to improve client's satisfactions.

IT & Automation officer (Internship)

BRALIRWA - Part of Heineken

May 2015 – August 2015 — Kigali, Rwanda

- Contributed to the design and implementation of new system wiring optimization of brewery expansion.
- Effectively identified and fixed faults which arose in company electrical and automotive network.

PROJECTS

Lowcomote (EU H2020-ITN n. 813884)

November 2019-Current — Pisa, Italy

Lowcomote aims to train a generation of professionals in the design, development and operation of new LCDPs, that overcome the limitations above, by being scalable (i.e., supporting the development of large-scale applications, and using artefacts coming from a large number of users), open (i.e., based on interoperable and exchangeable programming models and standards), and heterogeneous (i.e., able to integrate with models coming from different engineering disciplines).

TECHNICAL SKILLS[*:BASIC]

Programming Language

Java, Python (Flask), JavaScript*, Node*, SQL, C++/C, Assembly*, MATLAB, UML, Xtext, ETL, Acceleo, Xtend*/Qvto*

SWD Framework

PyTorch, Keras, SpringMVC, SpringBoot, Flask, Django, Anaconda, Unity3D

Data Science

Python/Matlab, Appplied Machine Learning, Deep learning

Front-end

JQuery, BootStrap, Thymeleaf, React360*, AngularJS*

Deployment

Docker(DockerFile, Docker Compose), Kubernetes*

Editor

Eclipse, IntelliJ IDEA, VS Code, Sublime, Vi

Linux

Linux Administration, Bash Scripting

OS

MacOS, Linux (Ubuntu, Kali), Windows

Database

MySQL, Postgres, MongoDB*

Source Control

Git, SVN

Languages

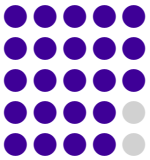
English, French, Italian*, Kinyarwanda, Kiswahili*

Driving Licence

B(EU)

INTEREST

Software Development Engineer
Research Scientist
Post-doctoral research
Machine learning engineer
Applied Scientist



ACADEMIC REFERENCES

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