



"This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 813884".



## **PhD Student Vacancy for the Lowcomote Project**

### **Scaling Up Citizen Development with Recommender Chatbots**

The Universidad Autónoma in Madrid is hiring a PhD Student for its Lowcomote Project.

#### **The Lowcomote project**

The MSCA ITN 2018 project Lowcomote will train a generation of experts that will upgrade the current trend of Low-code development platforms (LCPDs) to a new paradigm, Lowcode Engineering Platforms (LCEPs). LCEPs will be open, allowing to integrate heterogeneous engineering tools, interoperable, allowing for cross-platform engineering, scalable, supporting very large engineering models and social networks of developers, smart, simplifying the development for citizen developers by machine learning and recommendation techniques. This will be achieved by injecting in LCDPs the theoretical and technical framework defined by recent research in Model Driven Engineering (MDE), augmented with Cloud Computing and Machine Learning techniques.

The Lowcomote project will train the first European generation of skilled professionals in LCEPs. The 15 future Early Stage Researchers (ESRs) will benefit from an original training and research program merging competencies and knowledge from 5 highly recognised academic institutions and 8 large and small industries of several domains. Co-supervision from both sectors is a promising process to facilitate agility of our future professionals between the academic and industrial world.

#### **Partners**

IMT Atlantique (FR), University of York (UK), Universidad Autónoma de Madrid (ES), University of L'Aquila (IT), JK University of Linz (AT), British Telecom (UK), Intecs (IT), Uground (ES), CLMS (UK), IncqueryLabs (HU), SparxSystems (AT), Metadev (ES), The Open Group (UK)

#### **Training activities**

The training program of Lowcomote aims at enabling the recruited ESRs to develop a broad range of scientific, technical and transferable skills that will prepare them for fruitful careers in academia and industry, namely thanks to training led by world experts in the field and timely and high-quality feedback by all co-supervisors.

In particular, the network will provide training for the three main competences needed for developing future LCEPs:

- MDE, for domain analysis, language construction and code generation;
- Cloud computing, for an efficient use of the Cloud infrastructure to manage a large number of users and artefacts;
- Machine learning, for building smart assistants for citizen developers.

Other training activities will include communication, career development and plan, and entrepreneurship.



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## Phd. research topic: Scaling Up Citizen Development with Recommender Chatbots

Within the context of the Lowcomote project, the PhD candidate will work to the following specific research subject.

**Objectives:** The users of LCDPs (so called citizen developers) frequently lack a technical profile. This is a practical factor that hinders the applicability of LCDPs to create complex systems.

In order to support citizen developers to create applications beyond toy apps, we propose the concept of software development chatbots. We envision that these chatbots will be addressed in natural language to issue queries on how to achieve some goals ("I want the application to do X, Y and Z"), or how to perform some task within the current project ("How do I make the app to send an e-mail to all registered customers?"). The chatbots will include a query answering component, and will provide example fragments and templates. Such fragments will be extracted from repositories of existing application descriptions, using information retrieval (IR) techniques. The chatbots will be proactive as well, suggesting artefacts specifically designed for LCEPs and IDEs. For this purpose, chatbots will use conversational recommendation techniques that will exploit preferences of the target user and like-minded users, artefact attributes, and contextual (action-based) data.

The use of bots has been identified as a possible disruptive technology in software engineering, with high potential to improve developer performance through automation and natural interaction. Developers use bots, e.g., to automate deployment tasks, schedule tasks like sending reminders, integrate communication channels, or for customer support. Bots have also been proposed to access API documentation, to analyse software projects, or to assist in modelling activities using natural language (by our team). However, a system to build chatbots for domain-specific artefact recommendation – able to process queries in natural language and use information retrieval and machine learning techniques – is novel.

**Expected results:** This project will develop novel concepts to create systems that combine recommendation, information retrieval and query answering for specific domains and platforms. The systems will be able to scale for recommendations in repositories of millions of artefacts, and will be embeddable in platforms like Lowcomotive, and social networks like Slack or Telegram. We target at empowering citizen developers to create more complex apps, and in these scenarios, we will target at improvements in development times in the order of 30%.

## Requirements

**Degree:** Master degree in Computer Science or equivalent providing access to PhD programs.

**Language:** English proficiency must be attested either through a previous English language diploma, or an internationally recognized proficiency test (at least C1 level of the Common European Framework of Reference for Languages i.e. IELTS, IBT, TOEFL or Cambridge).

**Career:** When starting their contract (September 2019), selected researchers should be within the first four years of their careers. This means being both within a four years window following their most recent graduation and not having been awarded a prior doctoral degree so far.



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**Mobility:** At the time of recruitment, the researcher must not have resided, or carried out his/her activity in Spain for more than 12 months in the 3 years prior to recruitment date.

### Employment conditions

Full-time Equivalent Position

**Duration:** 36 months, including 2 secondments of 3 months each at other consortium members’ premises (see Hosting institution section)

**Starting date:** 1<sup>st</sup> September 2019

### Remuneration:

The monthly gross remuneration will amount to €2.790 (approx), with an extra family allowance, if applicable.

### Research, Training and Networking costs:

All relevant expenses linked to the research and training activities (travel, accommodation, etc.) will be paid by the project budget. PhD tuition fees are fully covered.

### Hosting institution

The Universidad Autónoma in Madrid is a medium-sized, public University located in the north of Madrid. UAM offers degrees in science, business, law, philosophy and arts, psychology, education, medicine and engineering. It hosts about 24.000 students, with over 550 PhD theses completed per year. The UAM campus also hosts research centers from the Spanish Research Council (CSIC). UAM is one of the top Universities in Spain in terms of teaching and research, being regularly ranked among the top four. UAM’s excellence is also recognized world-wide, as it is ranked 10th in the QS ranking of Universities younger than 50 years old.

The ESR will be hosted at the Modelling and Software Engineering research group (<http://miso.es>), at the computer science department of the UAM, in Madrid:

Universidad Autónoma de Madrid  
Campus Cantoblanco  
C/Francisco Tomás y Valiente, 11  
28049 Madrid, Spain

The ESR will spend 2 secondments of 3 months at the premises of 2 project members as detailed below.

	Planned Secondments	Hosting Partner	Start – End Date
1	Collaboration with ESR6 on aligning machine learning techniques with the structure of the repository.	University of L’Aquila (Italy)	M15-M17 (March – May 2020)
2	Collaboration with ESR3 on applying recommendation techniques in the data science domain.	British Telecom (UK)	M24-M26 (Dec – Feb 2021)



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## Supervisors

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## Application process

All applications shall be sent before 12<sup>th</sup> April 2019 by filling in the form on the Lowcomote website: <https://www.lowcomote.eu/esr/1/>.

Applications are composed of the following documents in English (and when necessary a certified translation of official documents):

1. a complete CV with references to past research and training experiences;
2. a motivation letter highlighting the consistency between the candidate's profile and the chosen ESR position for which they are applying;
3. at least 2 reference contacts (could be substituted by a reference letter, which should be in English or in certified translation)
4. scan of the degree qualification.
5. scanned copy of valid identification document (identity card or passport)
6. proof of proficiency in English (either through a previous English language diploma, or an internationally recognized proficiency test - at least C1 level of the Common European Framework of Reference for Languages i.e. IELTS, IBT, TOEFL or Cambridge).