Title: Augmented reality framework for visualizing airborne infectious pathogens in the operating room during surgery

Description

The HumanIC network is composed by 8 universities, 2 hospitals and 9 companies/institutions) to train early stage engineers and scientists to enable a new approach to the human-centric indoor climate in Healthcare Environments. Rather than the traditional approach of focusing solely on the building and its ventilation/heating systems, the network will develop new approaches to integrate the multi-dynamic interaction between contamination sources and airflow distribution systems with the clinical, patient and energy requirements of the hospital environment. Through an ambitious research program and a tailored training program, HumanIC will provide a new generation of scientists and engineers who understand the implications of these complex interfaces in future hospital design. In building the HumanIC consortium we will actively promote healthcare environment engineering as an inclusive and diverse career option at all stages in the program.

St. Olavs University hospital/NTNU invite applicants for a PhD Fellowship related to mixed reality, to perform research related to “AR/VR based visualization of airborne infectious pathogens in the operating room during surgery”. The research topic will be contextualized in WP3 “Novel smart design, forecasting, monitoring and visualization tools”, being supervised by Associate Professor Gabriel Hanssen Kiss (NTNU/St. Olavs) and co-supervised by Professor Guangyu Cao (NTNU), and with secondments at NTNU: Prof. Guangyu Cao (3 months), to gain experience of real time field measurements of airborne contaminants to provide input values for AR modes and at the industrial partner Industria Project Sp., Poland (3 months), maintenance and hospital design experiences. The candidate is expected to develop an augmented reality platform for visualizing dynamic volumetric data such as airborne contaminants based on a grid of point-wise measurements. This will allow for increased awareness among medical personnel related to airborne particle contamination via a visualization framework for augmented and virtual reality devices that can visualize a complex 3D fields and merge it with the content of the operating room in a ubiquitous way. The candidate will acquire expertise in interdisciplinary fields, gaining through this training program a set of skills that are highly appreciated by healthcare corporations, providing him/her a valuable expertise background for a future career in the topics related to technical solutions for healthcare facilities. The DC will take part in the whole researching process, starting with the proposal of new ideas, going from the design to the measurements in the laboratory and industry facilities, and finishing with the developing of the guidelines.

Contextualization

The position is in the frame of a Horizon Europe Marie Skłodowska-Curie Innovative Doctoral Networks (DN) action for Doctoral Candidates within the project HumanIC (Human - Centric Indoor Climate for Healthcare Facilities). DC07 fellow to be recruited in May 2023. The grant covers up to 3 years of full time research according to salary table established in the grant for Norway.

APPLICATION

For consideration, interested applicants should submit the required information by completing the form in Webcruiter based on the instructions given. An attached document must be uploaded containing the curriculum vitae, Master's Degree title and scores, a letter of interest and letters by two references. All documentation should be in English and merged in a single PDF document. Please, note that applications which do not follow the announcement's guidelines will not be considered. After a first pre-selection stage, best candidates will be asked to apply to the second stage according to the St. Olavs regulation. Additional documents may be required in the second stage to give credit to merits. For further information, please contact Assoc. Prof. Gabriel Hanssen Kiss (gabriel.kiss@ntnu.no gabriel.kiss@stolav.no).

BENEFITS

HumanIC project is aimed to train 11 creative and innovative researchers in the field of civil engineering, mechanical engineering, computer science and environmental engineering. The researchers trained in this network will be able to convert state-of-the art knowledge and ideas into new products for human comfort, including patients and medical staff. As a trained researcher you will have many opportunities to develop an industrial career in any part of the world, but especially in the EU. You will be trained in air chemistry and biology, air pollution, air thermodynamics, human thermophysiology and psychology, air flow patterns, civil engineering, energy performance, smart buildings, civil engineering. You will conduct research under laboratory and actual conditions. You will learn numerical modelling and advanced visualization methods. You also will be in a very good position to join R+D departments of Air-conditioning Companies and to apply for a postdoc position in any of the top EU academic institutions. The selected candidates will receive a salary in accordance with the MSCA regulations for Doctoral Researchers. The exact (net) salary will be confirmed upon appointment and is dependent on local tax regulations and on the country correction coefficient (to allow for the difference in the cost of living in different EU Member States). The salary includes a living allowance, mobility allowance, and a family allowance (if applicable). The guaranteed PhD funding is for 36 months (i.e., funding from the European Commission; additional funding is possible depending on the local main supervisor, and in accordance with the agreed-upon timeframe for conducting PhD research in the hosting country)

ELIGIBILITY

Applicants must satisfy the eligibility conditions for MSCA Doctoral Networks, i.e., they must have obtained their master's degree in the past 4 years and must not have resided or carried out their main activity (work, studies) in Norway for more than 12 months in the past 3 years. Applications of candidates not fulfilling these eligibility conditions will not be considered. Be eligible to enroll or be enrolled in the Doctoral Studies program at the Norwegian University of Science and Technology.

SKILLS/QUALIFICATIONS

Applicants are required to have an excellent academic background with a master's degree in computer science or electrical engineering. Applicants who are in the final phase of their master's degree are also encouraged to apply but have to complete the master before starting the fellowship. Motivation and potential for research activities. Ability to work independently and in a team. Be innovative and creative. Keep an open mind. Expertise with the following topics: programming, computer science, virtual/augmented reality, game design. Expertise with the following engineering tools and programming languages: Python, C#/C++, Unity, Unreal Engine. Excellent English language skills (both oral and written). English level certification B2 will be required if English is not the native language. Publications in international journals/conferences will be valued.

Duties of the position

- Conduct high quality research in the field of extended reality, digital twins, and artificial intelligence.
- Report regular research progress in agreement with the supervisors.
- Engage and communicate with both academic partners and public stakeholders within HumanIC to realize the overall aim of the project.
- Actively participate in the design, implementation, and evaluation of the overall technological framework of HumanIC.
- Contribute to the dissemination and outreach of the research outcomes through public media, conferences, and publications
- Submit an application for admission to the PhD-program at NTNU no later than 3 months after the employment
- Undertake the necessary courses (30 ECTS) as part of the PhD program
- Contribute to the academic environment at department, faculty and NTNU

Required selection criteria

- International mobility requirements: Applicants of any age and any nationality will be eligible as far as they fulfil the mobility requirement of the COFUND program, namely, the applicants must not have resided or carried out their main activity (work, studies, etc.) in the country of the host organization (Norway) for more than 12 months in the 3 years immediately before the call deadline of PERSEUS.
  Candidates must at the date of the call deadline be within the first four years of their research careers and not yet be awarded a doctoral degree. Full-time equivalent research experience is measured from the date when the candidate obtained the degree entitling him/her to embark on a doctorate (e.g. from the Master's degree).

- Education requirements: 5 years of higher education (BSC and MSC) or education equal to (300 ECTS). The grade requirements are B or higher (based on NTNU's grading scale). Master degree must be completed by the call deadline. Education will have to be documented by diploma supplement or equivalent documentation in English and include a description of the educational system. International Relations do require Chinese diplomas to be verified using CHSI. The NTNU Office of International Relations will evaluate degrees and diplomas.

- Language skill requirements: The applicants will be asked to provide evidence of good English language skills, written and spoken. The following certificates may be used as such evidence: TOEFL, IELTS or Cambridge Certificate in Advanced English (CAE) or Cambridge Certificate of Proficiency in English (CPE).

- Export of Knowledge Control: The PhD candidates who, based on a comprehensive first-hand assessment, might come into conflict with legislation governing exports of knowledge, technology and services will not advance further from the first stage in the recruitment process. For further information, please refer to the Export Control Act.

In addition, the candidate must have

- A master's degree in computer science or equivalent with strong analytical skills.
- Relevant background with deployment in 3D environments and/or mixed reality.
- Relevant background and experience within modern computer vision
- Excellent programming skills and good knowledge of key programming languages and frameworks used for mixed reality.

The appointment is to be made in accordance with the regulations in force concerning State Employees and Civil Servants and national guidelines for appointment as PhD, post doctor and research assistant.

Preferred selection criteria

- Have an interest in and relevant experience related to digitalization, enabling digital twin technologies like IoT, GUI/HCI, XR/Viz
- Have a good understanding of the connection between technology, processes, and human interaction in society.
- Excellent written and oral English

Personal characteristics

- Be motivated and ambitious
- Ability to work independently as well as in cross disciplinary teams
- Ability to interact and collaborate with actors in academia, public sector and industry (e.g. Behave respectfully and value the inputs and opinions of others)
- Ability to thrive and contribute to the work environment
- Be self-motivated, focused and goal-oriented, be committed and keep deadlines, be flexible, reliable, and solution-orientated, be innovation driven, enthusiastic and ambitious
- Be scientifically curious and open to new research challenges, demonstrate persistence in addressing technical problems
- Good communication and dissemination skills.

FOR – ST Olavs

St. Olav's University hospital and FOR are international pioneers focusing on the development of new medical technology and applications in the field of image-guided minimally invasive treatment. The Operating Room of the Future is an infrastructure for research and innovation of excellent international quality. The purpose is to increase the scope and quality of clinical and technological research as well as innovation. FOR facilitates research and development within the surgical fields, with an emphasis on minimally invasive image-guided patient treatment and medical technology. The infrastructure currently has 6 operating rooms at St. Olav's hospital and 1 test room at NTNU. These operating theaters as well as the research tools available within the FOR infrastructure are in practice modern research laboratories. Everything is in place here so that prototypes and new treatment methods can be developed and tested in safe and controlled environments.

NTNU – Department of Computer Science

The Norwegian University of Science and Technology (NTNU) creates knowledge for a better world and solutions that can change everyday life. The computer science department is the leading academic IT environment in Norway, and offer a wide range of theoretical and applied IT programs of study at all levels. Our subject areas include hardware, algorithms, visual computing, AI, databases, software engineering, information systems, learning technology, HCI, CSCW, IT operations and applied data processing. The Department has groups in both Trondheim and Gjøvik. The Department of Computer Science is one of seven departments in the Faculty of Information Technology and Electrical Engineering.