VACANCY FOR ELECTRONICS ENGINEER FOR MEDICAL SYSTEM DEVELOPMENT (WITH POSSIBILITY FOR PHD)

Ghent University – IMEC, Photonics Research Group
Tech Lane Ghent Science Park – Campus A
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The Photonics Research Group is active in the field of integrated photonics. This is the field in which optical and photonic functions are implemented in the form of an integrated circuit, similar to how electronic functions are implemented. Such Photonic Integrated Circuits (PICs) are used in large numbers in optical datacommunication and telecommunication. In recent years the application span has broadened dramatically to include LIDAR, medical devices, optical fiber sensors, optical computing and more.

The Group is involved in an international research project geared towards the development of a system for the **detection of bacterial infection in blood samples**. Bloodstream infections (BSI) are an important cause of morbidity and mortality worldwide. BSI diagnosis relies on blood cultures, the inoculation and subsequent incubation of blood in blood culture bottles (BCBs). In high-income countries there are performant automated systems for this diagnosis, but that is not the case in low-income countries. The project aims to develop a robust, simple and low-cost universal reader prototype that detects bacterial growth in BCBs. This "turbidimeter" assesses blood optical turbidity in the broth. The development is done in close collaboration with the **Institute of Tropical Medicine in Antwerp**. During the project field tests with the prototypes will be executed in two African countries.

JOB DESCRIPTION:

The selected applicant will develop, trouble shoot and optimize the hardware (analog and digital, electronic and opto-electronic) as well as the software of the prototype system. A first generation has already been developed. On the basis of the feedback from users of this system a second generation will be developed. Depending on the preference of the applicant the tasks for the project can form the basis for a **PhD in industrial engineering** (but this is an option).

PROFILE:

The candidate has a master degree in industrial engineering in electronics /ICT and has hands-on experience with electronic design and build. More specifically he/she combines as many as possible of the following knowledge elements and skills:

- Analog electronic design
  - Strong affinity with analog design, typically depending on multiple design constraints including e.g. high bandwidth or low SNR.
  - Knowledge of amplifier design – inverting, non-inverting, differential, transimpedance topologies, … is a must.
  - Experience in designing laser diode and LED-driving circuitry as well as in transimpedance amplifier design is a plus.

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- o Analog filtering.
  - o Analog-to-digital and digital-to-analog conversion systems (existing, on-chip IC's, e.g. Analog Devices' ADC and DAC IC's).
  - o Experience simulating analog electronic designs using simulators (e.g. SPICE).
  - o Experience in layout of these analog electronics on printed circuits board, keeping in mind the targeted application (e.g. Altium Designer, EAGLE).
- Digital electronic design
  - o Experience with microcontroller development, both with existing development boards and with systems designed yourself (PCB's).
  - o Experience with other embedded systems (SOC's, e.g. Raspberry Pi, ESP-32) is a plus.
  - o Experience designing these digital electronics on printed circuits board, keeping in mind the targeted application (e.g. Altium Designer, EAGLE).
- Software development
  - o In relation to microcontroller development: experience in embedded software: C/C++.
    - STM32: Keil/Atollic/STM32IDE
    - Visual studio
    - Arduino
    - …
  - o Develop basic-level software to transmit sensor/actuator data processed by the microcontroller/embedded system in a bigger system (PC) using various protocols (USB, UART, WiFi, …), using appropriate programming languages.
  - o Good knowledge of Python

Prototyping skillset
- Affinity and agility, especially in the context of prototyping work (proof-of-concept, using off-the-shelf development boards, breadboard circuit building, …).
- Experienced in assembling small-quantity PCB's (soldering/hot air rework/ reflow soldering) by yourself.
- Having know-how of various (additive and subtractive) manufacturing methods in order to evaluate the most suitable one for a given project. Typically, these include custom pieces of mounting hardware (e.g. milled in aluminum) or brackets and adapters (e.g. 3D-printed parts). You are able to select the suitable method for the given application.
- Knowledge of a 3D-CAD(CAM) package (Fusion360, SolidWorks, Inventor, …) is a plus.

Others
- Ability to plan ahead. From time to time, research and prototyping work on the bigger system happens concurrently. You should be able to anticipate possible problems and discuss them with your colleagues doing the research.
- Being able to do the prototyping work independently. You interact with colleagues from the Photonics Research Group as well as third parties discussing requirements or high level features. However, it is expected that you're able to do the prototyping work yourself.
- Excellent communication skills, also in a multi-cultural context.
- Eagerness to learn.

APPLICATION:

Apply online at http://photonics.intec.ugent.be/contact/vacancies/Application.htm

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MORE INFORMATION:

Contact: prof. Roel Baets (roel.baets@ugent.be)

ABOUT THE PHOTONICS RESEARCH GROUP

The Photonics Research Group (about 90 people) is part of the Department of Information Technology of Ghent University and is associated with IMEC. The group is chaired by Prof. R. Baets and has been active in integrated photonics research for many years. The other professors in the group are P. Bienstman, W. Bogaerts, S. Clemmen, B. Kuyken, Y. Li, N. Le Thomas, G. Morthier, G. Roelkens, K. Van Gasse and D. Van Thourhout. The main research directions are silicon photonics, heterogeneous integration, optical communication and computing, photonic (bio)sensors and photonic integrated circuits for biomedical applications in wavelength ranges from the UV up to the mid-IR.

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