VÍCTOR HERNÁNDEZ BENNETTS received his BSc degree in electronics engineering from the Technological University of the Mixteca, México in 2003. In 2010, he obtained his MSc degree in Robotics and Intelligent Systems from Örebro University, Sweden. During 2011-2015 he has been a graduate student at the Centre for Applied Autonomous Sensor Systems (AASS) in Örebro University. His research interests include machine learning, artificial olfaction, mobile robotics and gas sensing.

Mobile Robotics Olfaction (MRO) is the research area that aims to incorporate gas sensing capabilities on mobile robots. Gas sensitive robots are of high interest in different real world applications such as environmental monitoring, search and rescue in emergency scenarios and urban air quality assessment. In order to operate in complex uncontrolled environments, MRO systems have to address several related tasks. Among others, gas sensitive robots should be able to detect the presence of gases, discriminate and quantify detected compounds, map the spatial distribution of gases and localise emission sources.

The contributions presented in this work are focused on the task of gas distribution modelling using in-situ and remote gas sensing technologies. Gas distribution modelling allows to create spatial representations of the gas concentrations in an area of interest. This task is critical since the generated maps can provide valuable information to human operators. For example, hazardous areas where high concentrations are present and the location of gas leaks can be inferred from gas distribution maps. By fusing different in-situ gas sensing modalities, the solutions presented in this work allow to conduct gas distribution modelling in real world scenarios where multiple chemicals are present. Moreover, the practical application of landfill emission monitoring is addressed in this thesis work using robot assisted gas tomography, a novel concept that fuses mobile robotics, 3-D perception and remote gas sensors to generate gas distribution maps.

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