Faculty of Engineering Technology

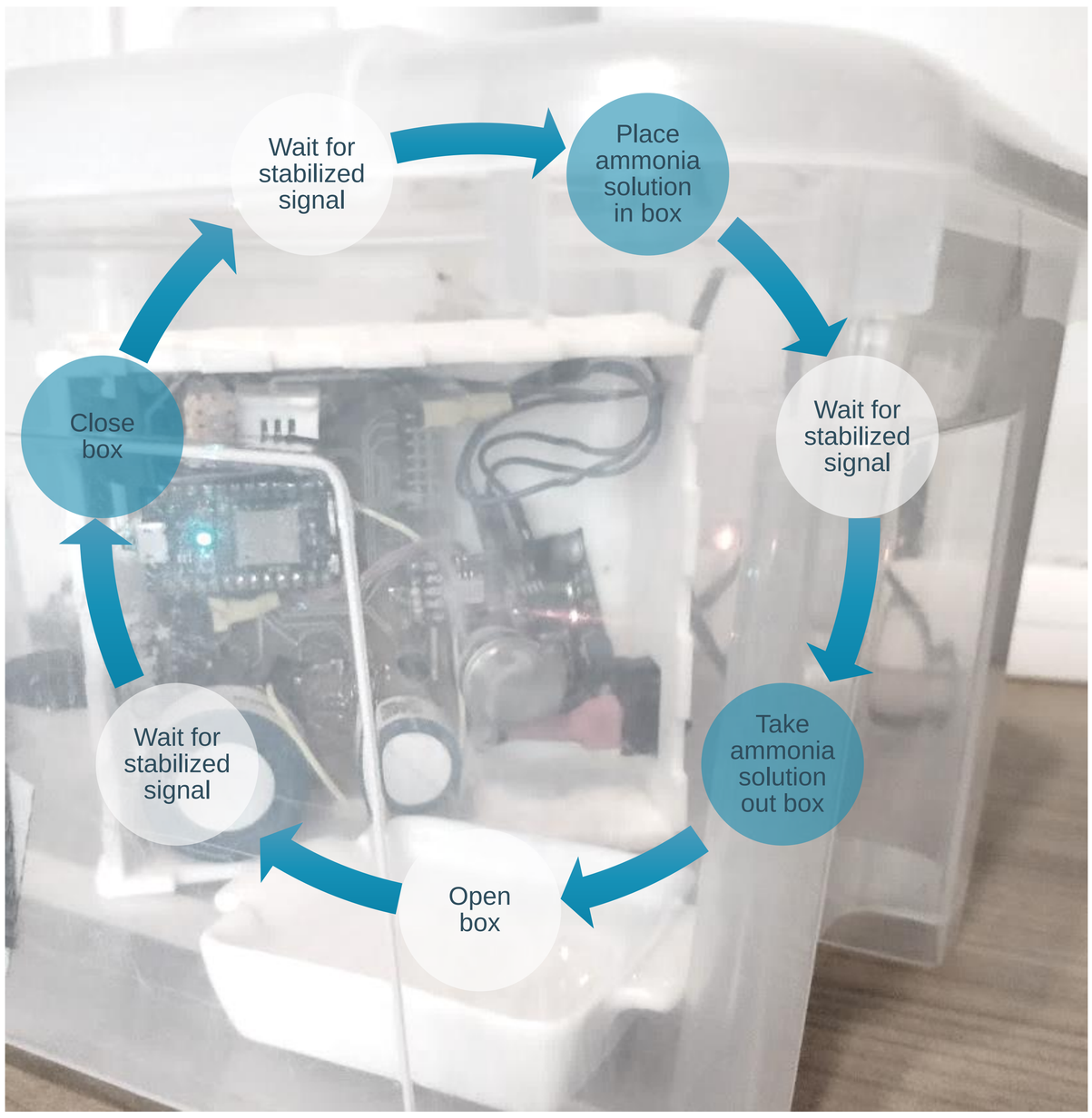
DESIGN AND DEVELOPMENT OF AN AMBIENT SENSOR SYSTEM TO DETECT INCONTINENCE

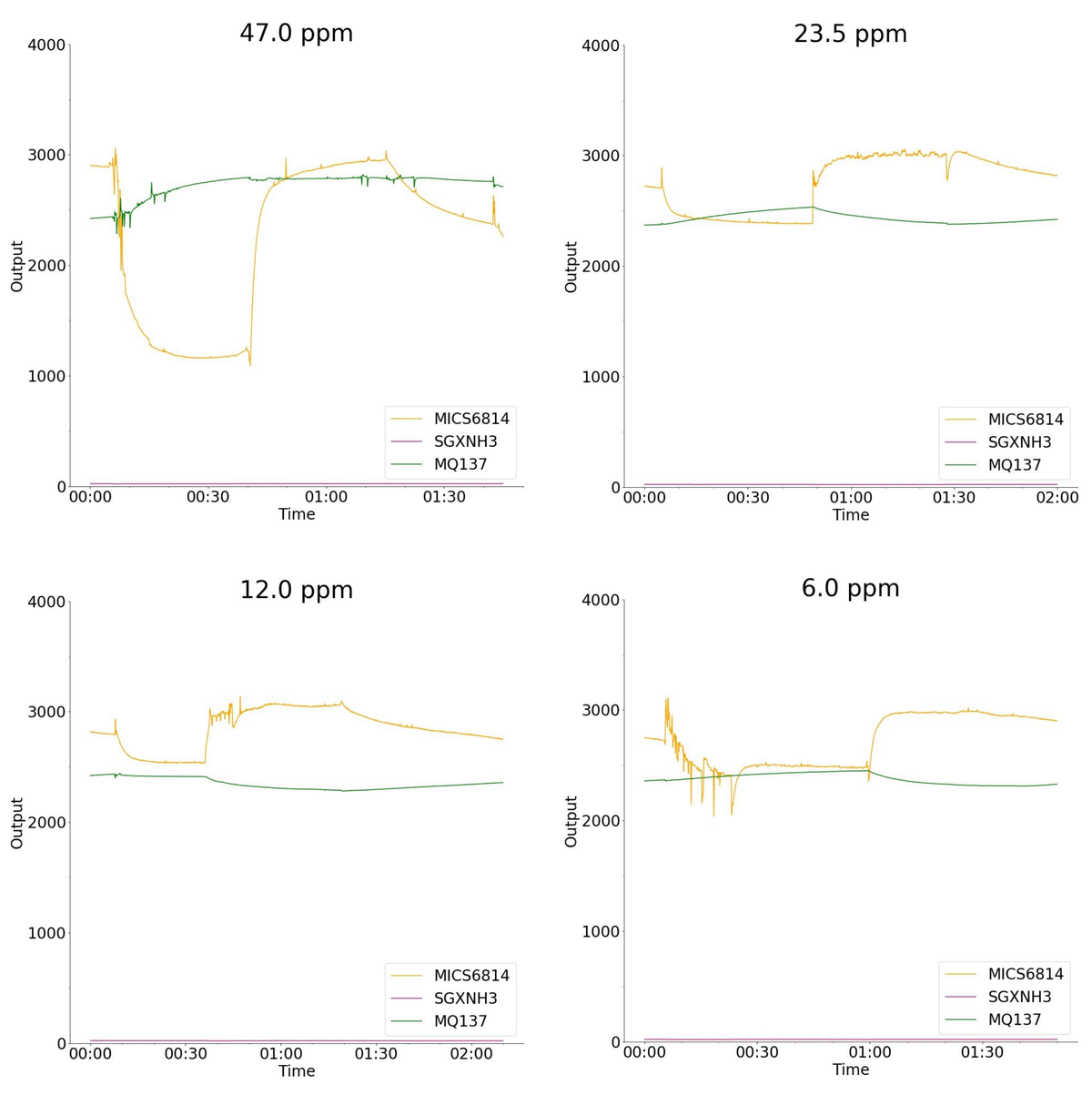
Hannelore Strauven[1,2], Hans Hallez[3], Vero Vanden Abeele[1] and Bart Vanrumste[1,2]

[1]KU Leuven, e-Media Research Lab, Belgium
[2]KU Leuven, imec-STADIUS, Belgium
[3]KU Leuven, imec-DistriNet, Belgium

Introduction. Over 50% of nursing home residents suffer from incontinence. Effort has been made to improve incontinence care management in nursing homes, by measuring incontinence episodes and saturated incontinence material automatically. Although, most research uses sensors that are integrated in the incontinence material or attached to or implanted in the patient, here, an **unobtrusive** alternative is presented.

Materials and Method. To detect urinary incontinence episodes in the air, off the shelf ammonia (NH_3) gas sensors are implemented in the sensor system design [1]. Additionally, sensors to detect ambient parameters such as temperature and humidity are integrated to improve the reliability of the sensor system. Through an ammonia dilution process, from a concentration of 47 ppm to 6 ppm (in line with the typical NH_3 concentration of urine), the possibility to detect urinary incontinence episodes in the air is validated.





Results. The output signal of the gas sensors is proportional to the presented NH_3 concentration in the dilution process. Furthermore, semiconductor gas sensors show a higher sensitivity than electrochemical cells for this application.

Discussion and Conclusion. An ambient sensor system is presented that is able to detect NH_3 to concentrations comparable with the NH_3 concentration in urine. Since the system is unobtrusive, it has little direct impact on the nursing home resident and does not require extra operations from care personnel. Further research should include urine detection, sample preparation in incontinence material and measurements in the field.

[1] Vanhoren, K and Kupers, S. (2018). *Design and development of an incontinence management system*. Leuven: KU Leuven. Faculty of Engineering Technology.

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