

C. Fischer, D. Sancho-Pradel, K. Schill. *Towards a biometric-based system for characterisation and rehabilitation of patients with urinary incontinence*. *Gerontechnology* 2008; 7(2):104. Urinary incontinence is a typical symptom of a variety of diseases common to the elderly population that has a strong negative influence in the autonomy of the individuals suffering from it. Besides its physical consequences such as infections and skin damages, it also has a strong impact on the social life of the patient and his/her family. As a result urinary incontinence is one of the main reasons for elderly people to get transferred to nursing homes. A recent study carried out in four European countries and Canada¹ indicates that the prevalence of urinary incontinence rises with the age of the population group. The figures show that 10.4% of the male and 19.3% of the female population over 60 experience this problem. The fact that the European population is aging emphasises an otherwise already important problem. Taking the case of Germany for example, a population projection from 2006² estimates that by 2050 over 35% of the German population will be over 60. This could result in an intractable amount of individuals suffering from urinary incontinence. **Related work** Although the medical community is well aware of the problem of urinary incontinence, the engineering community has not yet paid sufficient attention to it. Furthermore, current available products focus mainly on two aspects, namely moisture detecting diapers³, and muscular stimulation/monitoring, leaving unexplored many important facets of the behavioural therapies, such as supporting voiding protocoling⁴ and voiding training. These therapies are commonly conducted by either professional caretakers or family members, since they are too labour intensive to be performed by the patient him/herself. To the best of our knowledge, there is currently no automated system intended to facilitate the application of these therapies. **Our approach** In this paper, we propose a methodology and architecture currently under development that we envision could increase the independence of the patient and could ease the tasks of the caretakers/caregivers, thus improving the lifestyle of patients and their families. The function of the system is two-fold. During the pre-evaluation period, the system will automate the data gathering of most parts of the voiding protocol such as voluntary and involuntary voiding, timings and sweating, thus increasing the accuracy of the data while reducing the workload of the caretakers. Once the data is obtained, the system can process it and assist the doctors in the diagnostic. After the evaluation period, the system will run in the background analysing different biometrics and activities of daily living in order to continuously update the next predicted voiding time. This information will be passed to the patient and caretaker and can be used for prompted voiding, for rehabilitation purposes or for the scheduling of activities. The system is divided into four modules. The first one is a biometric sensor module, which measures skin conductance, heart rate, temperature and movement. In order to register involuntary voidings, a diaper with an embedded humidity sensor is also included. The second module comprises a set of sensors embedded in the living environment such as sensor (pressure) pads³, RFID-Tags and temperature. The third module is in charge of the interaction between the user (patient, caretakers, and doctors) and the system. The final module is a standard personal computer running different software components developed by the authors, which are in charge of collecting data (wirelessly) from the previous modules. Based on the collected data this module will learn user patterns and perform the prognosis of the expected voiding time.

References

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Keywords: urinary incontinence, biometric sensors, rehabilitation, prediction

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