Abstract. It is not always easy to depict the benefits of RFID and the Internet of Things. Especially in research, it is sometimes challenging to find illustrative scenarios that grab the attention of the audience and convey a positive message of technology usage. Fortunately, researchers around the world are imaginative enough to come up with creative and sometimes – at least in the first impression – funny approaches. This humorous effect should not be underestimated in a world where new technologies raise a lot of fear, uncertainty and doubt. The “Internet of Drinks” is an obvious play on words related to the Internet of Things. This paper will describe some example scenarios that utilize Internet of Things technologies to produce, control and monitor beverages and will show some obvious and easy to understand demonstrators.

Keywords: Internet of Things, Automation, Sensor Networks, RFID.

1 Introduction

A classic example of utilizing a beverage scenario to illustrate a new technology is the Trojan Room Coffee Pot at the University of Cambridge [1], which became famous in 1991 as a first application to utilize a webcam. With the development of ubiquitous computing, the “Smart Coffee Machine” seems to be a very motivating topic for researchers. It includes automation effects, such as activating the coffee-machine when leaving the bed after 7 a.m. [3]. Coffee capsules may communicate with the coffee machine via barcodes [4]. We even see Internet accessible coffee makers, which even may be misused as a security leak into connected Windows systems [5]. Consequently, there is a book entitled “The Spy in the Coffee Machine: The End of Privacy as We Know It” [6]. Furthermore, other beverages have inspired researchers and practitioners alike. RFID is being used to track beer kegs [7]. Coca Cola supplies RFID-based dispensers to provide a higher level of customer choice and to collect consumption data over a private wireless network [8]. Self-service “pour-your-drink” stations have been developed [9]. But why should people order a refill, if automatic liquid level detection can automate this process [10]? In case of alcoholic beverages,
RFID-wristbands may be used to verify a customer’s age [11]. Automated wireless beverage tracking solutions [see, e.g., 12, 13, 14], ensure that beverage shrinkage is avoided. The workflow of producing a cocktail has been analysed [2]. Bartenders gestures have even been used for mobile interaction systems [15].

A question to ask is: Why are beverages so interesting to researchers in ubiquitous computing, practitioners and end-users alike? For the coffee maker, one answer lies in the so called “Smart Home” that includes connectivity and control of everyday objects (see, e.g., [16]). A second reason is that a coffee machine is one of the best demonstrators for ubiquitous computing, as it does not require explanation itself and it has a positive connotation. The latter is also true for cocktails.

In this paper the integration of Internet-based monitoring and control in these two different beverage scenarios will be shown. Demonstrator one will show a fill level sensing application that uses Pachube1 – an Internet application that allows flexible integration of sensors for defined locations – to monitor a milk carton at a cappuccino machine, whereas in demonstrator two a self-service cocktail machine, that allows access through RFID-cards and individual mixtures through a web-based interface is shown.

2 Demo-Case 1: Monitoring the Fill Level of a Milk Carton for a Cappuccino Machine

The following section shows how easily sensors can be integrated into the Internet of Things in a prototypic application. As an example, the fill level of a customary milk carton is measured, for hygienic reasons, by its weight $m$ (in kg) and made retrievable via Internet. A technical development is described to process the physical information of the carton’s weight as well as wirelessly transfer them into the Internet and make them retrievable there.

2.1 Developing a Sensor Integration

There are different methods for sensory acquisition of a fill level. Technically, the measurement can be done mechanical (e.g., by measuring the differential pressure) and/or electrical (e.g., by measuring the capacity between two electrodes). In the following, a hybrid approach of both mentioned methods will be shown.

A resistance change, resulting from a change in weight due to a fill level change, can be measured sufficiently accurate by a force-sensitive resistance (FSR). In detail, an FSR varies its electrical resistance depending on the pressure that is applied on the active sensor area.

In this example application, a square FSR of Sparkfun Electronics with an active sensor area of 437 x 437 mm was chosen. The advantage of a square FSR is that even in edge areas a reliable resistance change can be detected. Thereby, positional changes of the beverage carton can be compensated by the sensor.

1 www.pachube.com