

Abstract

Security Applications in Internet of Things

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Internet of Things (IoT) is a subject of great interest for both academia and industry, due to the increased development in the field and to the interest provided by end-users. Moreover, it has evolved greatly over the years and projections reveal that more is to come. With such motivation in mind, the current thesis focuses on IoT with the end goal to contribute to existing developments and create the premises for future contributions.

IoT applicability extends to a variety of domains. It starts from agriculture (where sensors monitor crops to determine the humidity and temperature level in different moments of the day) and continues to industry (where certain gases can be detected with sensors or temperature can be monitored with dedicated devices), security (proximity sensors can detect movement in secure areas) and even healthcare (to monitor the heart rate or temperature of patients). Moreover, household devices start to integrate smart features to help a person in its daily activities (e.g. remote control of ambient temperature). With such diversity, all environments in which devices are installed may become vulnerable. It is known that the security level of an environment is given by the most vulnerable device in the infrastructure. As a result, if an attacker would gain access to a device, it may then compromise further layers of the infrastructure. Due to the limited nature of IoT devices, these are considered the perfect way to gain access to more complex systems. With this consideration in mind, one needs to carefully implement security features to prevent such scenarios from happening.

In consequence, the objectives of the current thesis split in two directions, but with correlations between them. The first is to define an efficient data gathering proposition that offers reliable communications and reduced energy consumption. The second is to provide security features for the identified vulnerabilities in the data gathering proposition. These need to prevent attacks that initiate from outside the network and from within.