Review of “IoT Technologies for Embedded Computing: A Survey”

Stewart Schuler
George Mason University ece508
sschule@gmu.edu

I. Summary

Advances in IoT devices have opened up many new frontiers for application. When applying an IoT solution, it is paramount for the designer to be aware of the trade-off between, size, power, and computing performance for the available hardware. In most applications IoT solutions will be implemented in a distributed manner, when low cost and power microcontrollers and sensors can be used to interact with the physical environment. The collected data should then be pushed into the fog or cloud where more powerful devices can compute the desired solution.

The ubiquity of IoT solutions has led to the development of Electronic Design Automation (EDA) tools and an increased focus in the development of IoT IP cores. When applied these tools will speed up the design process of IoT solutions and reduce the risks associated with development. The paper also details the various data rates and physical ranges of a multitude of wireless communications technologies. Illustrating some of the tradeoffs that must be made when designing an IoT solution.

II. Praise

The authors of this paper repeatedly make the case that when designing IoT solutions all chosen technologies will come with a tradeoff when compared to other products with a similar end functionality. These tradeoffs are can be easily apparent when discussing difference in size, or power, however the authors also present the less obvious tradeoffs - things such as, computation power, data rates, etc. – in an easy to digest manner. Which for a paper such as this, where the goal isn’t to present a new technology but rather present a wide array of information in a condensed format, being digestible is the desired outcome.

The generality of the paper allows it to coverer and extremely wide range of devices and applications without getting stuck on details. As the paper says, its introduction to IoT sensors provides a “comprehensive” list of high-level categories. While remaining at a high level, the paper assumes the reader has enough background knowledge to understand the specifics of how to implement the discussed solutions in practice. This greatly increases the utility of the report to serve as a reference for someone with IoT experience in researching specific tradeoffs associated with technologies for their problem. This shines through the best in Section 5.1 when discussing wireless techniques.

Section 3 of the report covering generalized architectures of IoT solutions provides a useful starting place for somebody building their own IoT centric solution. Specific the material covering Figures 2, 3, and 4. Figure 2 provides a block diagram level model for data transfer. Once that is figured out, the designer can move onto two Figures 2 and 3 which inform the user which tool may be available to them on the IoT device itself, and upstream respectively.

III. Criticism

A specific criticism of this report comes from the dichotomy between Tables 2 and 3. When discussing the difference between wireless communications technologies the report presents an analytical comparison in Table 2. Since throughout the paper they cite specific complicated technologies, without further explanation, that the lay reader may be unaware of. The authors are clearly assuming the reader has at least cursory understanding of IoT technologies. With that being considered, Table 3 is far too vague to be useful, present results in terms of “very low”, “low”, “medium”, etc. To differentiate between technologies given the same discretion the read must understand Table 2, that being the case what benefit does Table 3 add? I would exclude the table.

IV. References

[1] F. Samie, L. Bauer and J. Henkel, "IoT technologies for embedded computing: A survey," *2016 International Conference on Hardware/Software Codesign and System Synthesis (CODES+ISSS)*, Pittsburgh, PA, USA, 2016, pp. 1-10.