

Feasibility Study of Location Authentication for IoT Data Using Power Grid Signatures

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Abstract

Ambient signatures related to the power grid, such as the Electrical Network Frequency (ENF) have been exploited for multimedia authentication in terms of time and location, motivating the investigation of power grid signatures for the Internet-of-Things (IoT) data verification. In this paper, Electrical Network Voltage (ENV) is proposed as a more refined signature than ENF for IoT data verification in terms of location. ENV reflects the variations of the power system's supply voltage over time and is also present in the optical sensing data, akin to ENF. A physical model showing the presence of such power grid signature, ENV, in the optical sensing, is presented, along with the corresponding signal processing mechanisms to estimate and utilize ENV signals present in the power and optical sensing as location stamps. Experiments are conducted within the state of Maryland in the United States to demonstrate the feasibility of using ENV signals for location authentication of IoT data.