The Internet of Things (IoT) devices are highly heterogeneous class of devices which are produced by different manufacturers with application-specific designs.

The increasing use of IoT devices with limited standardisation makes it difficult to analyse them with traditional techniques.

When encryption is involved, the task of IoT forensic investigation becomes even more challenging.

Forensic tool developers are unable to provide tools which can collect forensic evidences from IoT devices due to this reason.

The large variety of IoT devices in the market makes it virtually impossible to support all of them within a limited forensic tool set.

**Electromagnetic Side-Channel Analysis**

Any time varying electric current can cause electromagnetic waves to radiate into the space.

Characteristics such as frequency and amplitude of EM waves depend on the characteristics of the EM source hence giving away some clues about the source.

Different components on a computing device causes unintentional EM emission leaking different information.

Different analysis methods such as SEMA and DEMA can help to extract information.

**A Tool for EM-SCA in Digital Forensics**

In order to gather forensically useful information using EM-SCA techniques, a software tool should facilitate three main phases.

1. **Training/research phase** where IoT devices and their forensically useful software activities are profiled and added into the framework.

2. **Field investigation phase** where an investigator can collect EM data from a suspect IoT device in a real-world scenario and gather insights about the device on-the-spot.

3. **Further analysis** where the device is taken into a forensic laboratory and used to perform advanced EM-SCA methods such as cryptographic key recovery attacks.

**Future Direction**

- EMvidence is an open-source framework that facilitate EM-SCA inspection of IoT devices.
- Main component of EMvidence is its core GUI that provides the default interface to a user. It also manages the modules and plug-ins by establishing communication between them in a coordinated fashion.
- EMvidence facilitates data acquisition, data visualisation and report generation.
- Depending on the requirements, third-party users can develop and add plug-ins to the core GUI of the EMvidence framework.
- Such plug-ins may provide various data analysis capabilities such as software behaviour detection, cryptographic key recovery, etc.

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