

Lecture Forensic Digital IC Technology

By Mark Roeloffs, Netherlands Forensic Institute (NFI)

Abstract of the lecture:

Ever watched CSI or a similar police serie? And have you ever wondered how this works in reality? Then this lecture is an unmissable opportunity to take a look behind the scenes, especially in your field of microelectronics. Perhaps step into this life yourself. The reality of the Netherlands Forensic Institute matches the exciting labs that are staged in these series. And although the NFI is not involved in direct investigation, the forensic puzzles that are solved are at least equivalent.

The main task of the NFI in Den Haag is to provide forensic analyses, which play an essential role in tracing suspects and exonerating innocents. The police and the Public Prosecution Service use these analyzes to solve criminal and missing persons cases. In this lecture you will become acquainted with the Institute and the foundations of our research methods. Then we take you to the digital technology department, in particular the groups that deal with embedded systems and data. Many of the most valuable and most reliable forensic traces come from data that are extracted from all kinds of electronic equipment, with the smartphone as the most important and best-known data carrier. In this very personal device nowadays almost everyone, you included, willing or not stores almost all valuable information from your life. Because they contain so much privacy-sensitive information, these smartphones and the enclosed data are also increasingly secured by locking mechanisms and encryption. Criminals make good use of this to hide their data on criminal transactions and communications such as murder orders almost invulnerably.

You will see that this confidence in modern technology can often be betrayed by hacking into these devices. It goes without saying that this requires great effort. Where possible, you will be given insight into the methods that are developed and used to achieve this. We focus on those parts of the methods by which integrated memories and processors are attacked. It will not surprise you that you will see that modified equipment and methods from the world of IC processing and especially Failure Analysis are used. It will be explained to you what the differences are with the regular analyzes and why.

Our goal with this lecture is to draw attention to the field with the still explosively growing electronics and the related forensic questions about it, and thus to enthuse new and established brilliant researchers with a broad view in this field for a job. We therefore end by proposing possibilities to come and do an interesting internship with us or to apply for an open position.

The lecturer is an entertaining storyteller with a lot of practical experience and he will answer your questions where possible. After the lecture there is an opportunity to change minds with the lecturer and the project leader of the IC research. Of course we cannot open up about everything and no questions can be answered about current cases, but all in all, this promises to be an instructive presentation in a small area of IC technology that is a bit different than usual.

About the lecturer

Mark Roeloffs was born in 1981 in Gouda, in the water-rich mid-west of the Netherlands.

After completing secondary school, he graduated as a Bachelor of Engineering at the Hogeschool van Rotterdam

He started on January 22, 2004 at the Netherlands Forensic Institute, department of Digital Technology, as a forensic examiner of embedded systems. This field mainly comprises mobile telephones, but ranges from millimeter-sized chips in transport and telephone cards, digital locks and ATM manipulation systems via medical equipment and implants, IoT and bomb detonators to systems such as elevators in buildings, control systems for chemical plants and aircraft.

Mark mainly conducted research into repairing and cracking the systems of mobile telephones, in order to try to extract readable data from them. The used and self-developed repair and reading methods must be forensically justified, so that the data obtained can be used as evidence in court cases. These methods require a great deal of knowledge of both the hardware and the software of the equipment under examination. To further develop his skills in this area, he followed a follow-up study at the University of Dublin to become an MSc. in forensic digital sciences and followed the NFI internal training to become a permanent judicial expert. Mark is authorized to sign for NFI reports in his area of expertise.

With the more complex hardware and software architecture and the miniaturization of the mobile phone, Mark's interest shifted to the research of IC-based systems. That is why he now works for 75% as a researcher and assistant project leader in IMAM, a research project at NFI-DT since 2002, which focuses on basic and applied research in the field of invasive research of integrated memories. He now performs his work there for the EXFILES project, a European project in the field of rapid and consistent data extraction from encrypted mobile phone devices.

Mark is married, has a son and still lives in the mid-west of the Netherlands. He prefers to spend his free time with his family, on and in the water as a windsurfer and as a swimming instructor at the lifeguards.