X-Ray Fault Injection on Power OFF devices

Paul GRANDAMME[1,2], Lilian BOSSUET[1],
Jean-Max DUTERTRE[2]

[1]Université Jean Monnet Saint-Etienne, CNRS, Institut d Optique
Graduate School, Laboratoire Hubert Curien UMR 5516, F-42023,
SAINT-ETIENNE, France
[2]Mines Saint-Etienne,CEA Leti, Centre CMP, 13541 Gardanne,
France

Abstract

For several years, electronic components have taken an increasingly important place. Their security has become an important matter as they can contain sensitive data. To assess their security new means of attack were set up. X-ray effects on electronic devices have been studied for space applications but only a few recent papers deal with the security point of view. The state of the art shows that X-ray can easier have an effect on power off device in contrast to other means of fault injection like laser injection or electromagnectic waves injection.

This presentation gives practical results on X-ray fault injection campaign on power off devices. We mainly focus on microcontroller embedded non-volatile memory. This study shows that it is possible to corrupt the content of unpowered memories with an X-ray source. A fault model is proposed according to the results of experimental campaign. A thermal recuperation is also highlighted.

Keywords— Permanent fault injection, Flash memory, X-ray, Power off attacks, Total Ionising Dose