# Non-destructive testing of aircraft structures

## Ultrasonic device evaluation and security requirements analysis for a remote inspection robot

### Student

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### Problem:

- The company IMITec GmbH has a working robot system that is used to scan damaged parts of an airplane to detect possible material defects. A continuing increase in composite components demands that the system be expanded to include an ultrasonic sensor. In this project, an ultrasonic module that is available on the market needs to be integrated into the existing system.
- This robot system works with sensitive data and because this data needs to be transmitted to a remote location, it needs to be handled in a secure way. Therefore, an analysis is to be conducted to gain an understanding of the system and its needs regarding security.

### Approach:

- The ultrasonic module is examined with regard to suitability for integration into the existing system. Unfortunately, it turns out that it cannot be used for the application at hand for various reasons. A thorough market analysis shows that there is no device on the market that solves these problems. In order to integrate an ultrasonic measurement utility into the existing system, a new ultrasonic module needs to be developed in the future.
- A Threat Model and Security Analysis (TMSA) is carried out in order to get a clear understanding of the assets that need to be protected and the possible threats to the system. The TMSA gives an overview of the measures that must be taken to ensure the safety of the system. It is structured in a modular way and can be adjusted in the future, should this be necessary.
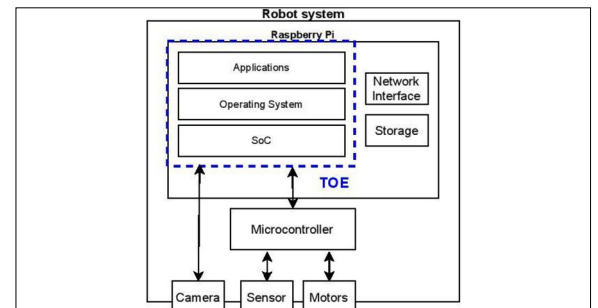
**Robot system**
https://www.imitec.ch/
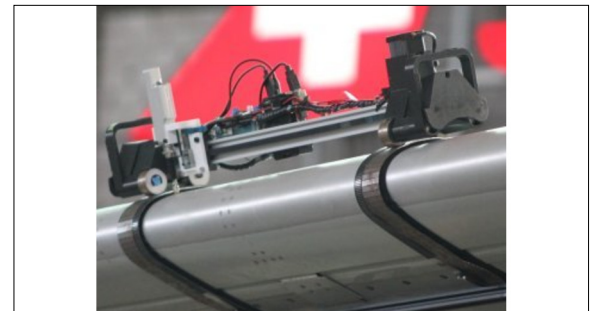


**Target of evaluation (TOE)**
Own presentment



**Security objectives rationale**
Own presentment

| | OT.Access-Control | OT.Secure-Storage | OT.Firmware-Authenticity | OT.Communication | OT.Secure-State | OE.Credentials-Management | OE.Trusted-Admin |
|---|---|---|---|---|---|---|---|
| T.Impersonation | X | | | | | X | |
| T.MITM | | | | X | | | |
| T.Firmware-Abuse | X | | X | | X | | |
| T.Tamper | | X | | | X | | |
| P.Keys-Management | X | | | | | X | |
| P.Credentials-Management | X | | | | | X | |
| A.Trusted-Admin | | | | | | | X |

### Examiner
**Prof. Reto Bonderer**

### Subject Area
**Electrical Engineering**

### Project Partner
**IMITec GmbH, Meilen, ZH**