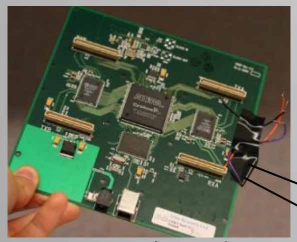
Pacemakers and Implantable Cardiac Defibrillators: Are they really secure ?

Attacks

1. Steal a Device Programmer

- Need for Reverse Engineering, Modifications
- Easy to get root mode
- Problem : difficult to set up

2. Build your own Device Programmer !



USRP board

- Total cost : 800 $

~10 cm

3. Eavesdropping on private Information

- What kind ? => Implanting physician, Diagnosis, Hospital, Device state, patient name, date of birth, serial N°, etc...
- The future holds some promises : devices more sophisticated ergo a lot more data to be divulged ?

4. Sniff Vital Signs

- Get the vital signs that the ICD emits
- Need to have an Eavesdropping setup

5. Drain energy

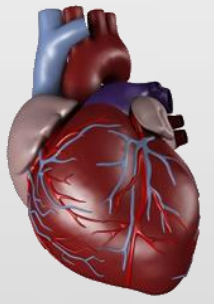
- Send multiple radio signals to the ICD
- => Battery lifetime decrease
- Simple : transmit-only

6. Turn off therapies ⚠

- "Stop detecting fibrillation"
- Problem : change of the device state

7. Affect patient's physiology ⚠

- Induce fibrillation, flood with drugs
- Problem : patient's safety at great risk



regulate

ICD

control

Device Programmer

Defense

Solutions ?

- Authenticate device programmers ?
- Encryption ? Passwords ?

Problems

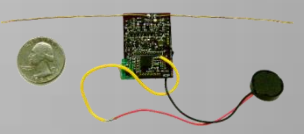
- Need emergency access !
- Patient's health : top priority

Prototypes defenses VS some of the attacks

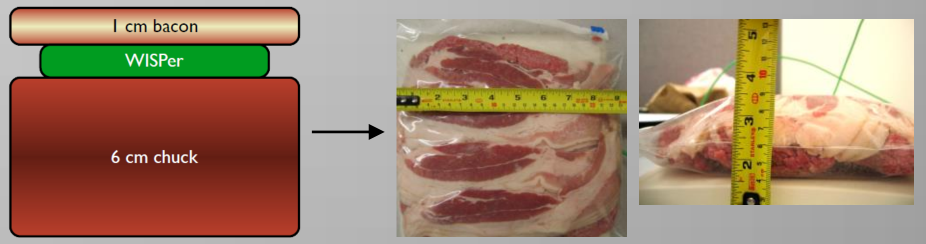
- Idea : defend without using battery
- External parties pays for power

Example of prototype : **WISP** = RFID + computation
WISPer = WISP + code

The WISP

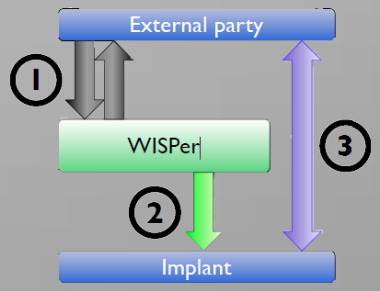


Experimentation : acoustic notification for the patient



WISPer emits a sound when it detects an access to the ICD
=> hearable withing 1m range (further than distance between ICD and patient's ears)

The Solution



1: External party authenticate through **WISPer**
2: If successful **WISPer** says to **ICD** "Ok you can use radio"
3: Then the External party can control the **ICD**

The patient is notified **acoustically** during the whole time.

http://www.secure-medicine.org/public/publications/icd-study.pdf http://www.halper.in/pubs/imdsecurity_slides_ransford_oakland08.pdf

POUVARET Line, TURNEL Mickaël