

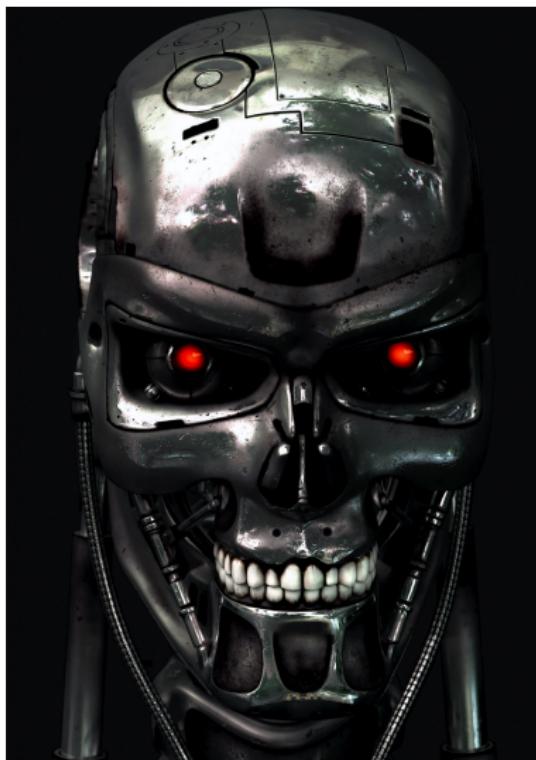
# O perigo dos Softwares Não Livres em Dispositivos Biomédicos

Marcel Ribeiro Dantas  
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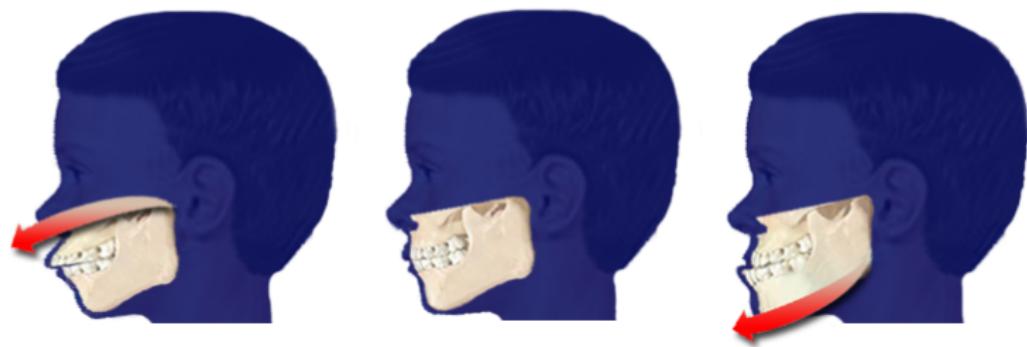
I CONSOLINE - Recife/PE  
9 de Novembro de 2013



I'm a Cyborg. How about you?







Maxillary  
prognathism

Jaw without  
prognathism

Mandibular  
prognathism

# How common is an implantable device?

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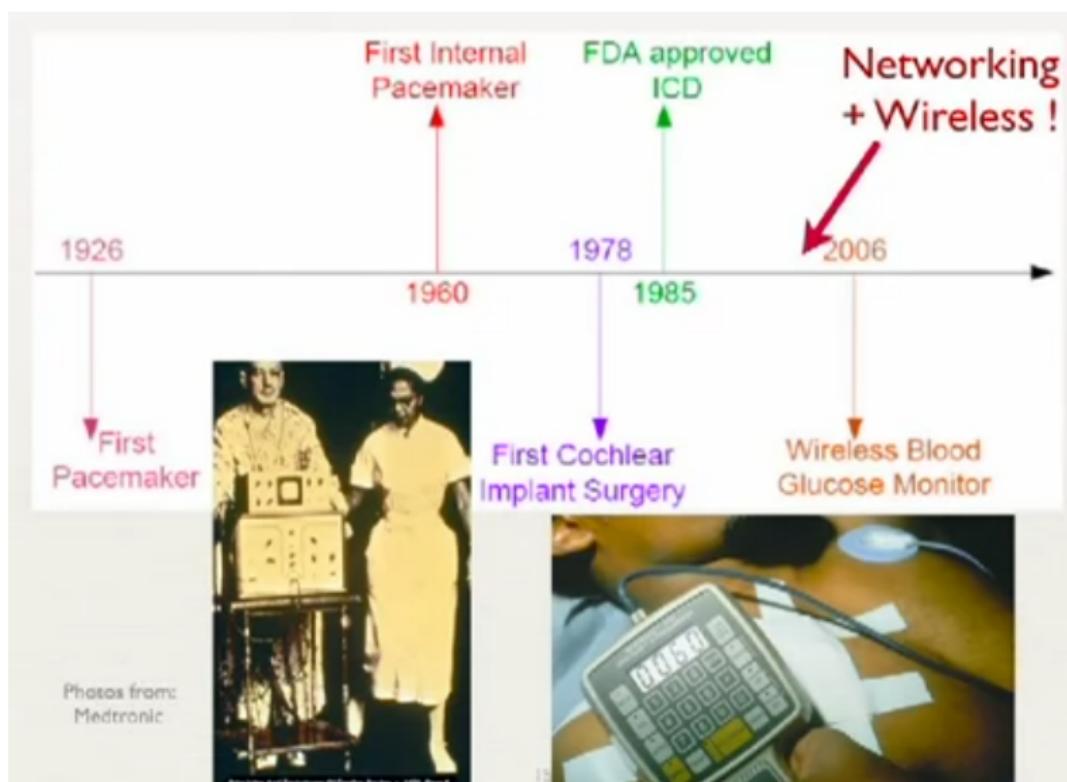
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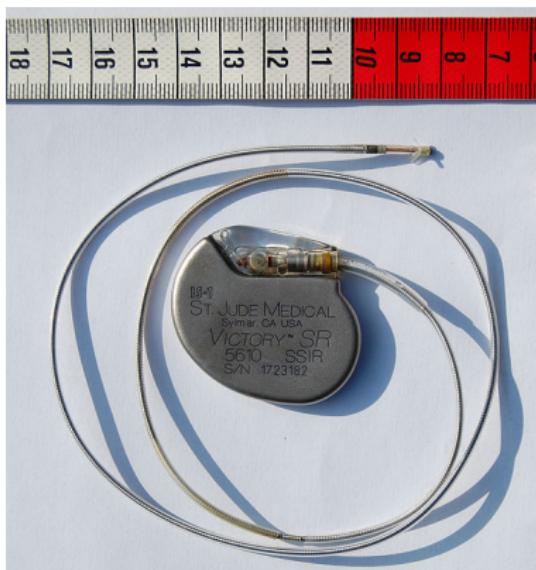
# How common is an implantable device?

- Over 3.000.000 people worldwide with pacemakers
- Each year 600.000 pacemakers are implanted
- Usually, 60 yo or older, but not necessarily
- Global market for pacemakers: USD 4.2 billion in 2008

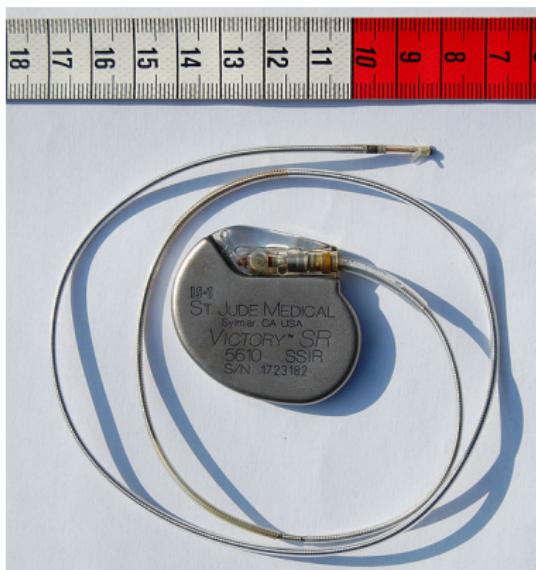
They're not new. They're just different now



# What is a pacemaker?

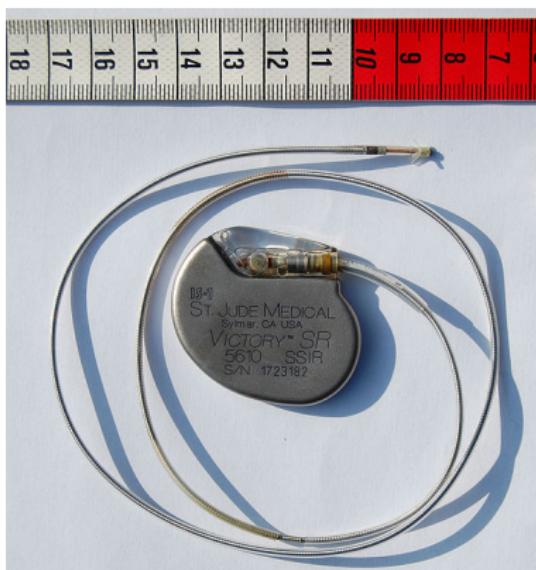


# What is a pacemaker?



- Artificial Cardiac Pacemaker

# What is a pacemaker?



- Artificial Cardiac Pacemaker
- Electrical impulses to regulate heart rate

# What is a defibrillator?



# What is a defibrillator?



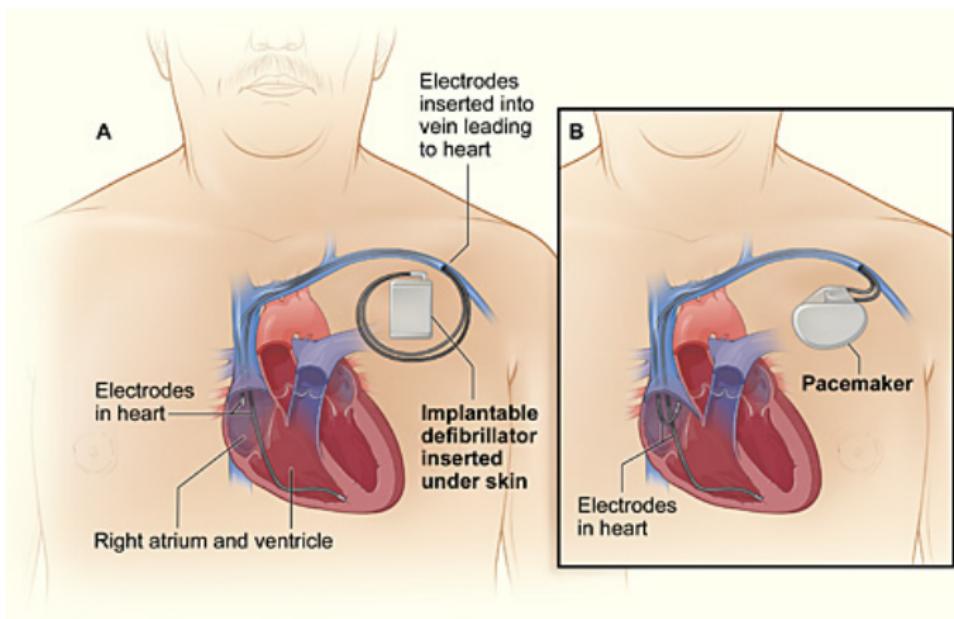
- Implantable Cardioverter Defibrillator (ICD)

# What is a defibrillator?

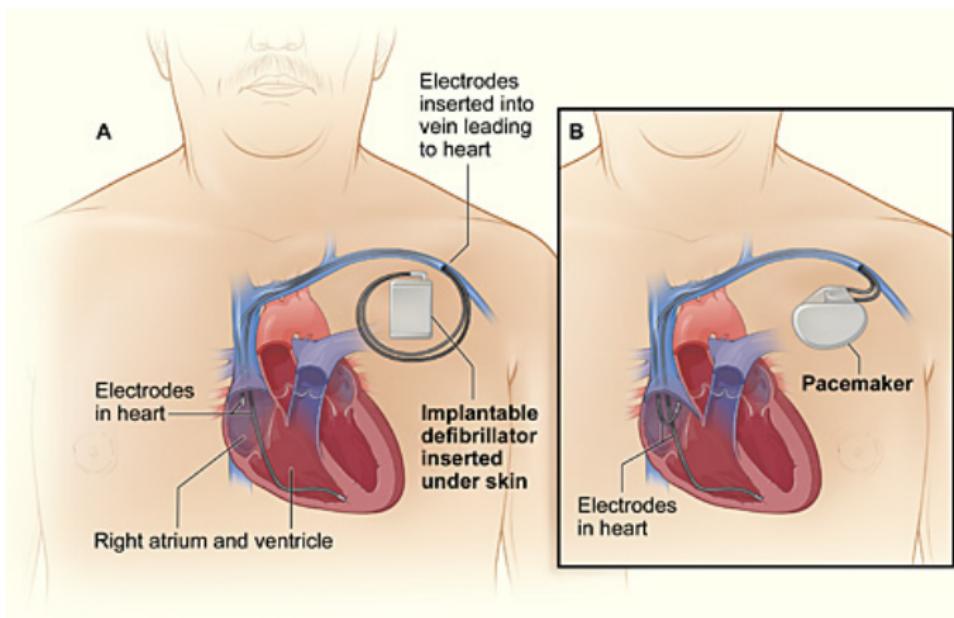


- Implantable Cardioverter Defibrillator (ICD)
- Electrical impulses to revert ventricular fibrillation

# Single unit



# Single unit



- Pacemaker + ICD

Mistakes happen

They do happen!

Anything wrong?

Arrhythmia Logbook Report						
Episode Query Selections						
Show All Episodes						
Episode	Date/Time	Type	Zone	Rate bpm	Therapy/ Duration	
1,230	23-JUN-05 19:10	Spont	VF	222	Diverted	
1,229	20-JUN-05 12:08	Spont	VF	216	Diverted	
1,228	21-MAY-07 21:22	ATR		130	???:??	
1,227	21-MAY-07 15:01	ATR		121	06:20 h:m	
1,226	21-MAY-07 15:01	ATR		119	00:45 m:s	
1,225	21-MAY-07 15:00	ATR		120	00:11 m:s	
1,224	21-MAY-07 15:00	ATR		119	00:16 m:s	
1,223	21-MAY-07 15:00	ATR		118	00:07 m:s	
1,222	21-MAY-07 14:59	ATR		119	00:09 m:s	

# Therac-25



But.. But.. it never happened

# The Tylenol Scare of 1982

## Fatal tampering case is renewed

FBI searches a condo in Cambridge

### The Tylenol Terrorist

By Rachael Bell

Print Email Link

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#### The Tylenol Terrorist: Death in a Bottle



Extra-Strength Tylenol package

On September 29, 1982, 12-year-old Mary Kellerman of Elk Grove Village, Illinois, woke up at dawn and went into her parents' bedroom. She did not feel well and complained of having a sore throat and a runny nose. To assuage her discomfort, her parents gave her one Extra-Strength Tylenol capsule. At 7 a.m. they found Mary on the bathroom floor. She was immediately taken to the hospital where she was later pronounced dead. Doctors initially suspected that Mary died from a stroke, but evidence later pointed to a more sinister diagnosis.



FBI agents carrying items, seized from an apartment building on Lister Lane in Cambridge, walk out of an office of pharmaceutical manufacturers. Five boxes and a computer were removed, but the FBI would not comment on their contents. (AP Photo/David L. Ryan)

February 5, 2009

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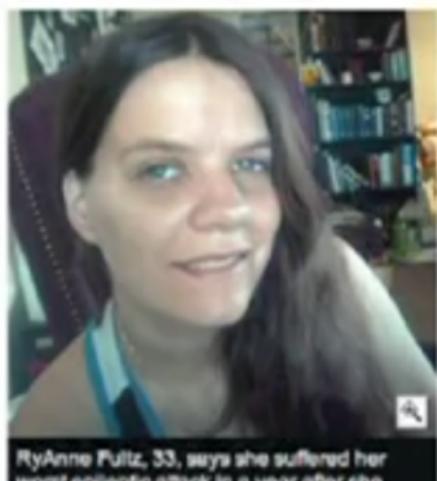
This story was excerpted by Jonathan Lehrman, John R. Ellerbeck, Milton J.

But.. But.. it never happened

## Bad People Do Exist

### Hackers Assault Epilepsy Patients via Computer

By Kevin Poulsen  03.28.08 | 8:00 PM



RyAnne Pultz, 33, says she suffered her

Internet griefers descended on an epilepsy support message board last weekend and used JavaScript code and flashing computer animation to trigger migraine headaches and seizures in some users.

The nonprofit [Epilepsy Foundation](#), which runs the forum, briefly closed the site Sunday to purge the offending messages and to boost security.

"We are seeing people affected," says Ken Lowenberg, senior director of web and print publishing at the Epilepsy Foundation. "It's fortunately only a handful. It's possible that people are just not reporting yet -- people affected by it may not be coming back to the forum so fast."

The incident, possibly the first computer attack to inflict

# But.. But.. it never happened

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## Dick Cheney Feared Assassination Via Medical Device Hacking: 'I Was Aware of the Danger'

Oct. 19, 2013

By DAN KLOEFFLER and ALEXIS SHAW via GOOD MORNING AMERICA



Former U.S. vice-president Dick Cheney is seen in this April 17, 2013 file photo leaving the funeral service of former British prime minister Margaret Thatcher at St Paul's Cathedral in London.

Olivia Harris/Getty Images

NEXT VIDEO »

Dick Cheney Feared Medical Device Assassination Plot

AUTO START: ON | OFF

For "Homeland" fans who have kept up with the series' twists and turns, the fear of medical device hacking by terrorists seems to have taken a real-life turn for one very public official.

### HOT RIGHT NOW

- 1  Missing Wisconsin Teen Found 9 Years Later In Mexico
- 2  Margot Robbie Addresses Will Smith Cheating Rumors
- 3  Khloé Kardashian Denies Reports She's Selling Her Home
- 4  Thousands Homeless After Typhoon Pounds Philippines
- 5  Doc 'Left a Number of Clues' Proving He's Guilty of Murder

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# Dangers

# Dangers

- Unauthorized use of Programmer

# Dangers

- Unauthorized use of Programmer
- Network analyzer

# Dangers

- Unauthorized use of Programmer
- Network analyzer
- Depleting battery

# Dangers

- Unauthorized use of Programmer
- Network analyzer
- Depleting battery
- Fatal commands

# Karen Sandler

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- Lawyer at Software Freedom Law Center

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- Lawyer at Software Freedom Law Center
- Executive Director at GNOME Foundation

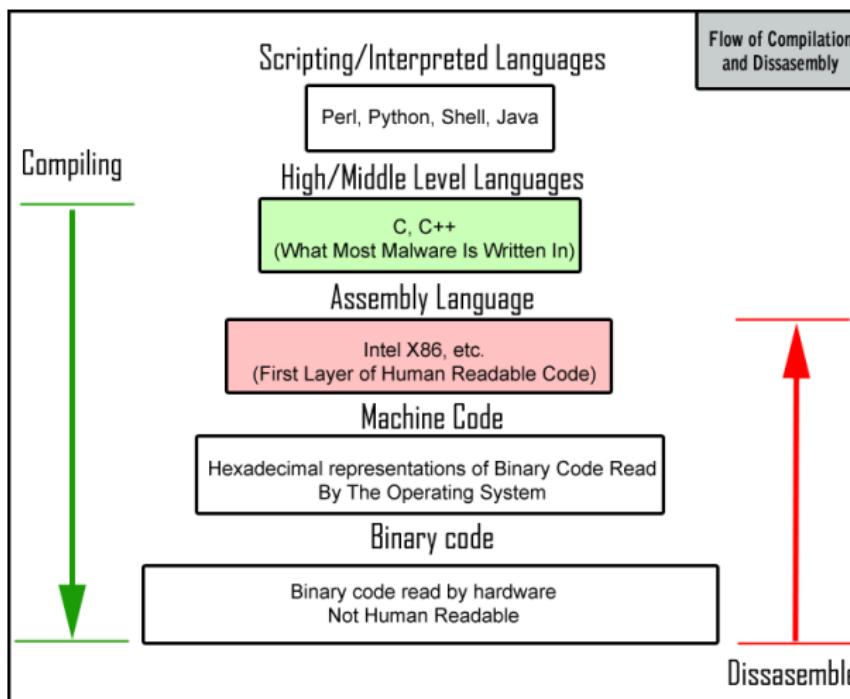
# Karen Sandler

- Lawyer at Software Freedom Law Center
- Executive Director at GNOME Foundation
- Cyborg running on proprietary software

# Karen Sandler

- Lawyer at Software Freedom Law Center
- Executive Director at GNOME Foundation
- Cyborg running on proprietary software
- What did she find out?

# Software running in the device



# Software running in the device

Non-free Software



# Security through obfuscation

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- Hide how it's done

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- Hide how it's done
- Don't worry, they won't find out

# Security through obfuscation

- Hide how it's done
- Don't worry, they won't find out
- Patent Encumbered

Surprise! You can't sue us :-)



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- The more eyes, the less bugs
- Makes sure it does what it say it does
- Change it according to your needs
- Audit your device's code. Or pay someone to do it!

Thank you for your attention

Questions?



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