# Warsjawa NFC Case Study

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# Introduction

#### Timeline

- march prototype is ready (@Adam Chudzik)
- august decision about NFC at Warsjawa
- august/september designing & hacking!
- 25 september intensive hacking...
- 26 september Warsjawa!

### Goals

- sponsor boxes × 13
  single NFC reader
- voting machines × 17
  two NFC readers
- connected via Ethernet
- powered from the wall mains
- talks online to REST endpoints





#### Results

- all sponsors boxes!
- 3 voting machines...



fritzing

#### Prototype



#### Hardware

- 30 x Raspberry Pi
- 60 x RFID-RC522 reader
- 700 x RFID wristband
- cables, LEDs, buzzers, etc.



#### Software

- Powered by Python
- RPi GPIO
- Linux Kernel SPI driver
- deployment with Ansible

# **Pitfails**

## **Raspberry Pi model B+**

,,[...] but I think the current architecture is still more than adequate, and using the same ballic architecture as previous models main ains backwess compatibility, which is important."

http://www.rs-online.com/designspark/electronics/eng/blog/introducing-the-raspberry-pi-b-plus

#### Enclosure





#### Enclosure





#### **Custom PCB - reverse engineering**



#### **Custom PCB - schematic**



#### **Custom PCB - design**



#### **Custom PCB - manufactured**



# **Custom PCB - failed**

- bad QFN footprint for NFC chips
  - always check if auto generated footprint matches documentation
- connector collision
- unrouted path to top chip pull-up
  - can be fixed by bodging wire during assembly

#### **Custom PCB - connectors**



#### **NFC** wristbands



## **NFC wristbands - overview**

- Quantity: 700
- Price: 3,99 zł netto
- Standard: MIFARE
- Chip and antenna can be glued to anything:
  - o furnitures, walls
  - equipment (printers, computers)
  - outdoor

#### NFC wristbands - chip & antenna



#### **NFC wristbands**



# Manufacturing

- 40 minutes for one complete product
- various issues:
  - loose cables tend to disconnect
  - duct tape does not stick well to perforated cardboard
- supply chain failures





Thank you!