

Contactless Attendance Logger

Faculty of Electrical Engineering and Informatics
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**Design and implementation of portable device
for creating RFID tag lists**

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Thesis goals

1. Depict general information about RFID technology and microcontrollers
2. Design and creation of printed circuit board
3. Design and implementation of microcontroller program according to instructions provided by the thesis supervisor

Solution proposal

- information gathering
- solution requirements
- suitability of individual hardware components
- minimal working example
- printed circuit board
- firmware finalization
- documentation

Device requirements

- show information on the display
- receive commands from user interface
- maintain real time and date
- obtain tag information from RFID reader module
- store tag information along with time and date in a memory
- process communication with PC

Problems involved

- power supply and battery level
- microcontroller and clock source
- communication (internal, external)
- display and user interface
- time/date tracking
- RFID reader
- Storage memory

Problems solutions

- power supply and battery level
 - **pack of AA batteries**
- microcontroller and clock source
 - **ATmega328P with external oscillator**
- communication (internal, external)
 - **SPI for components, USB for PC**
- display and user interface
 - **dot-matrix LCD, push-button based rotary encoder**
- time/date tracking
 - **external RTC chip**
- RFID reader
 - **pre-built module**
- Storage memory
 - **MicroSD card**

PCB design

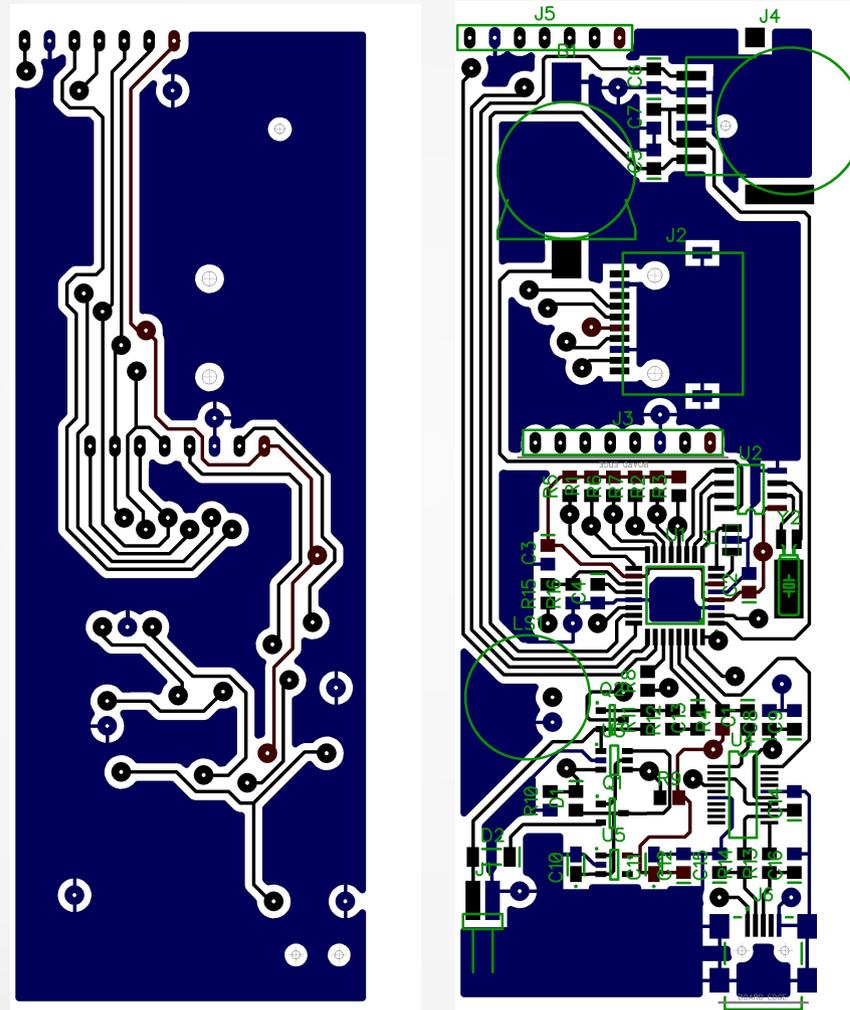


Fig 1 Contactless Attendance Logger – PCB design

Final product

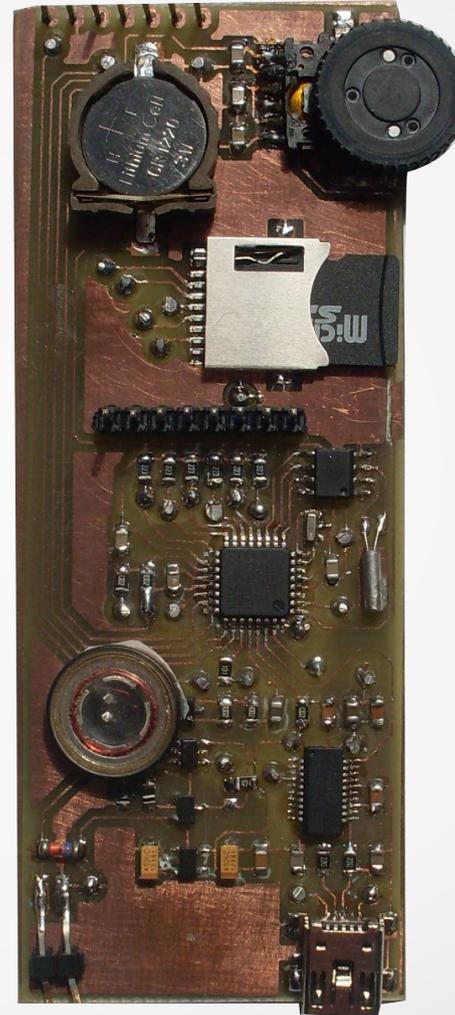


Fig 1 Contactless Attendance Logger – final product and bare PCB with components

User interface / display

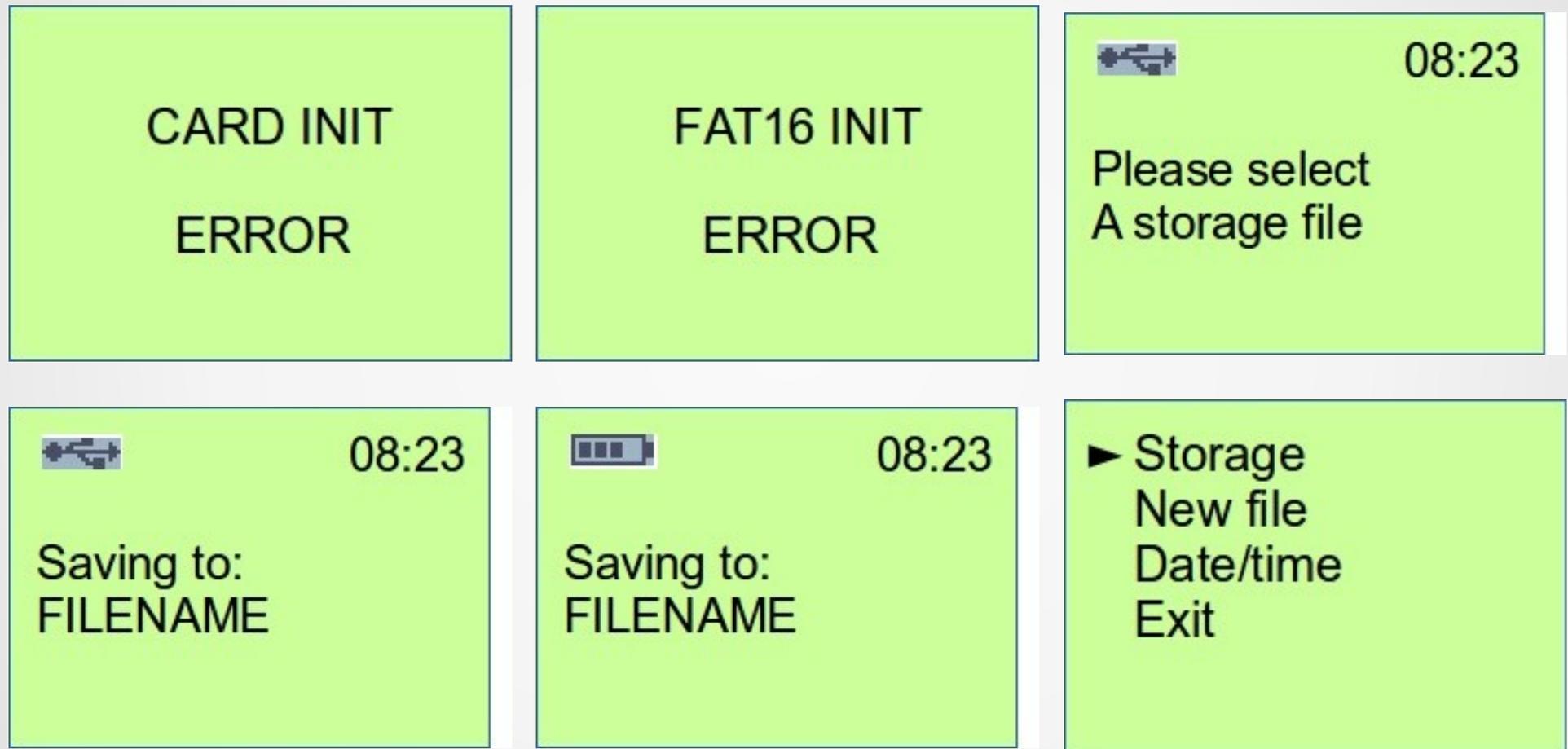


Fig 3 Contactless Attendance Logger – information displayed on a LCD display

Conclusion

Use cases

- Gym, terrain, unfeasible conditions for handwriting
- Requirement for fast attendance
- Attendance data logging / analyzation

Possible improvements

- One-board implementation
- Rechargable batteries
- Display backlight

Demonstration

Thank You for Your attention.

Opponent's question

Prof. Ing. Dobroslav Kováč, Csc. asked:

"Mifare cards are powered by an internal antenna as the card moves into a magnetic field."

Is this sentence valid also for strong permanent magnet fields?

For which fields it is valid?

Short answer:

No. The magnetic field of a permanent magnet is a equivalent of a DC – no frequency. For a RFID tag to activate, there must be an electro-magnetic field with a matched frequency.