Self-checkout for supermarket

Project and Laboratories on Communication Systems

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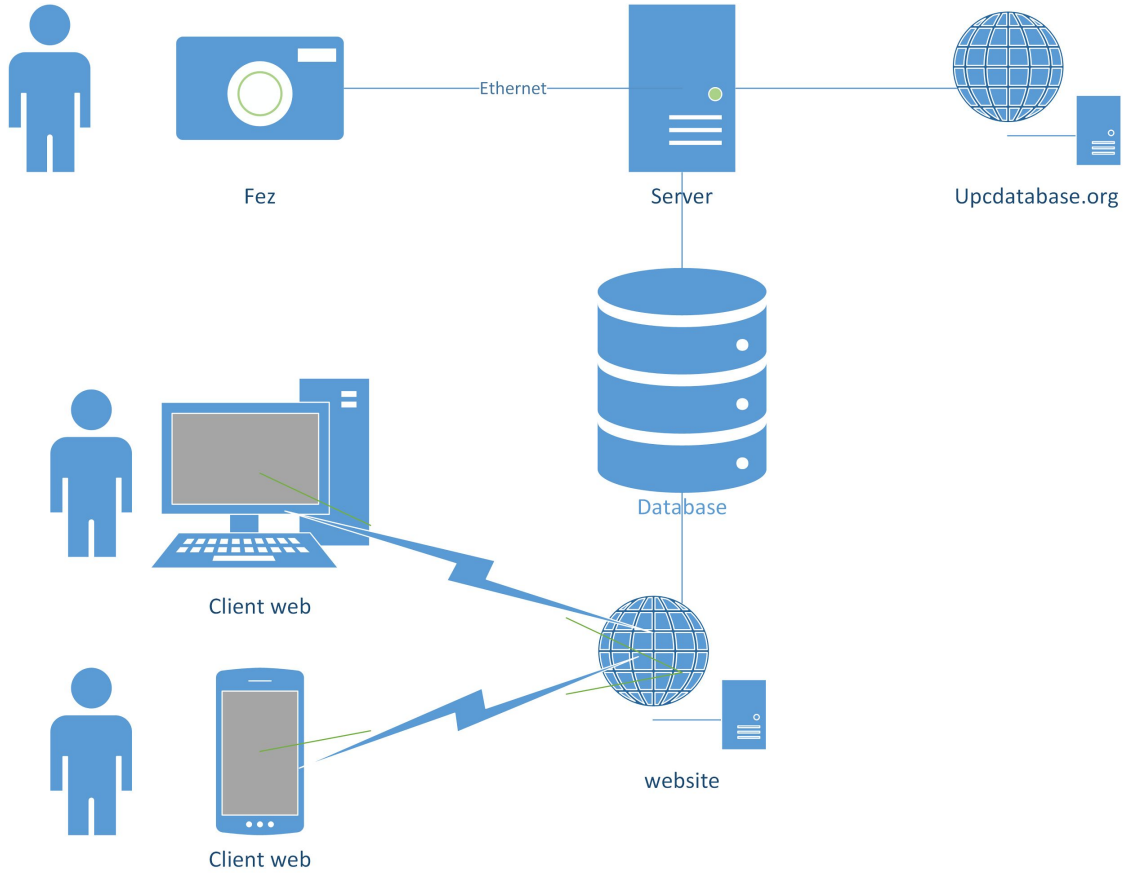
Objectives

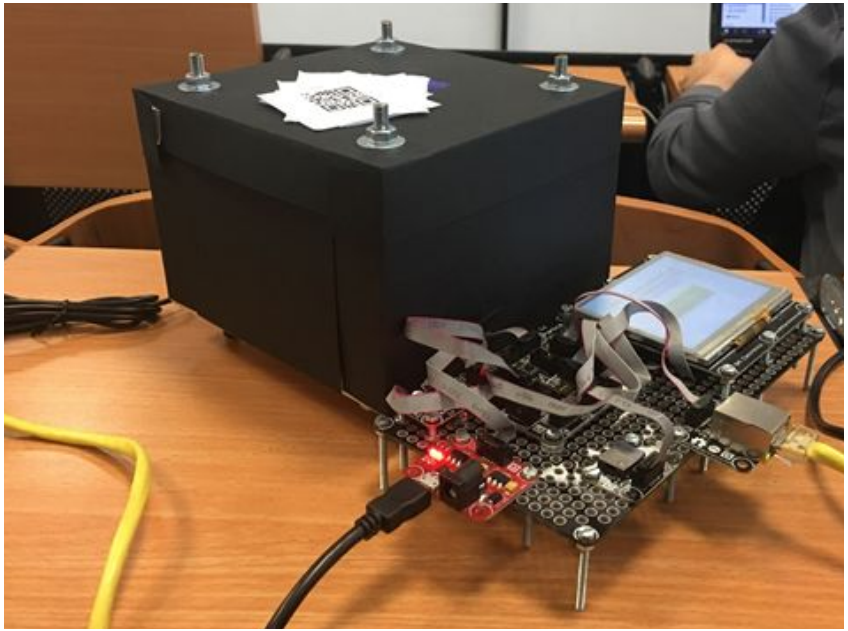
Prototype for automatic cash register

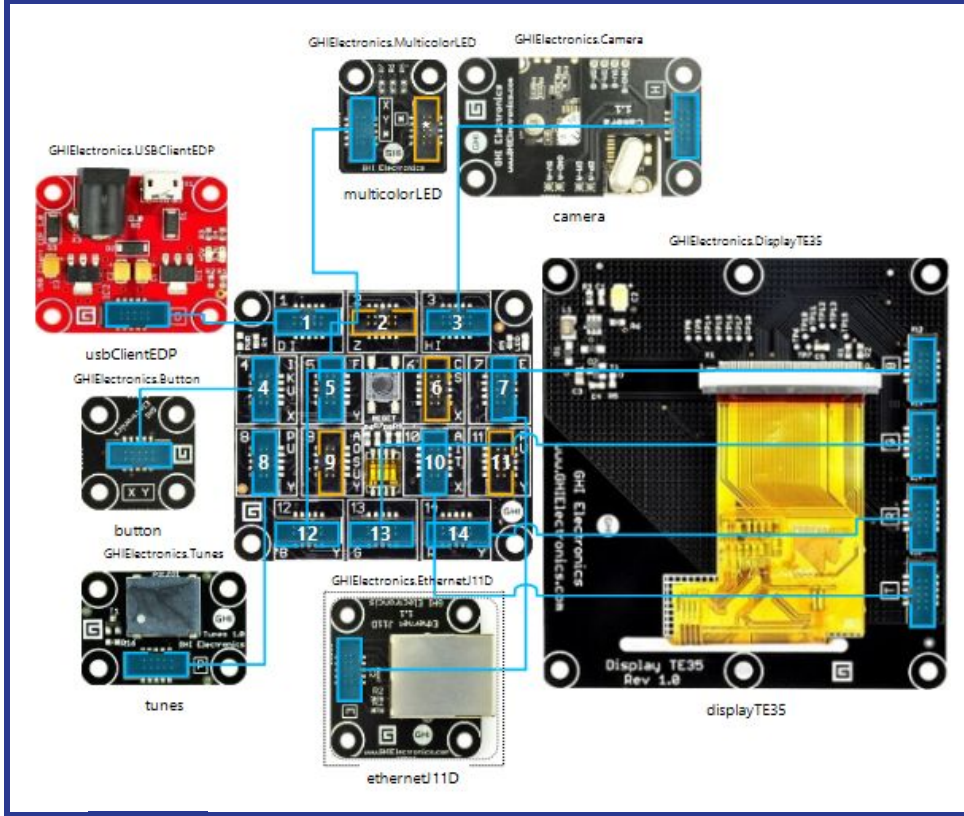
- identification of user and products
- creation and saving of receipts
- management of the inventory and shelf-refilling

System overview



Client side

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button
GHIElectronics.Tunes
GHIElectronics.EthernetJ11D
tunes
displayTE35
ethernetJ11D

Steps for executing a purchase

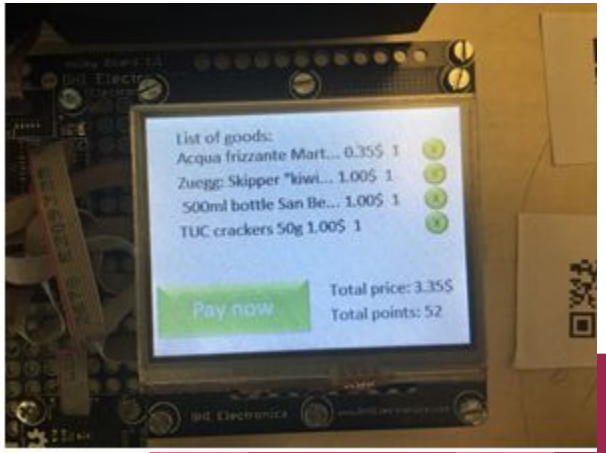
User authentication

Identification of products

- The user takes the picture of the barcode.
- The picture is sent to the server.
- The server sends the information about the product.

Product removal features

- Scenario: the user wants to remove “coca cola”, because he has not enough money to buy it.

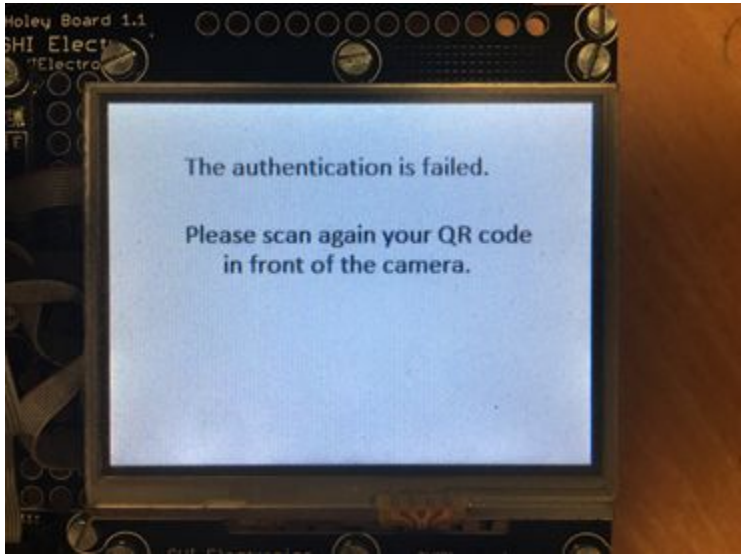


Proceeding with payment and storing receipt

Error management

User authentication failed

- Bad quality of QR code picture.



Identification of product failed

- Bad quality of bar code picture.

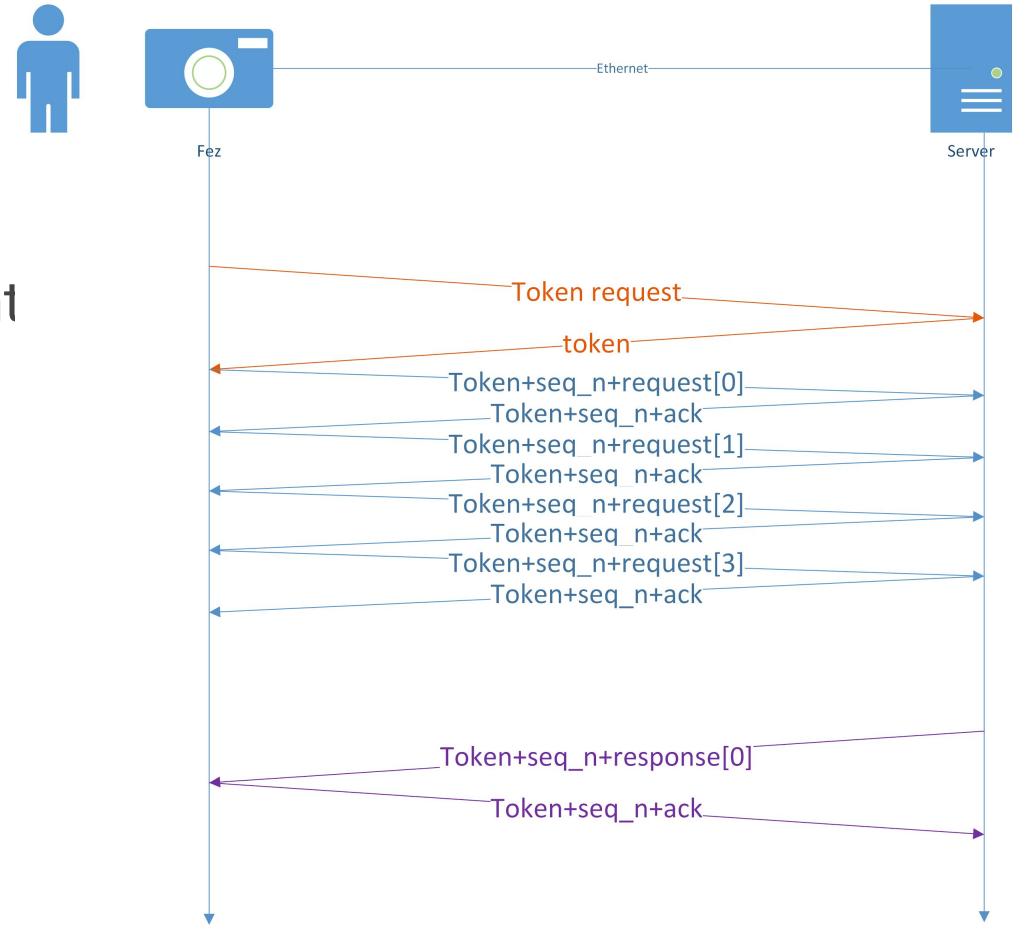
Connection down

- The ethernet cable is disconnected.

Server side

Communication with the board

- UDP channel
- stateless communication: each request is independent from the others



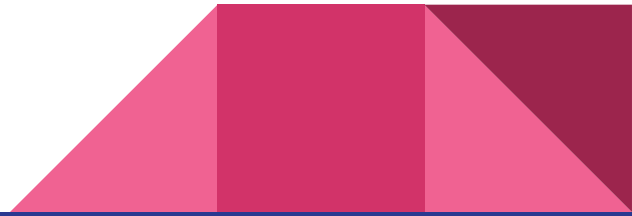
Code recognition and processing

Types of codes:

- 1D codes: for the products
- 2D codes: for customers

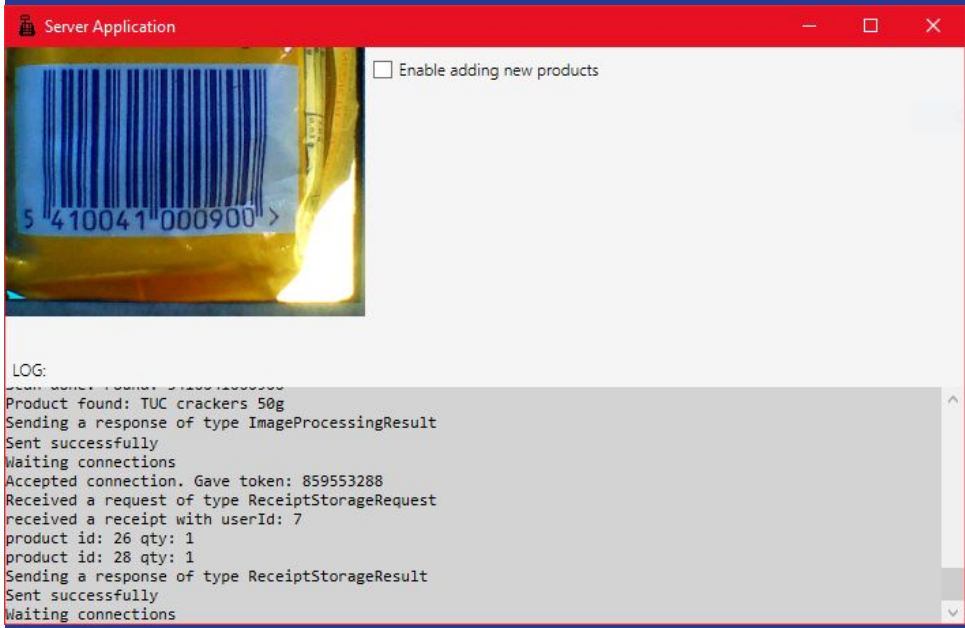
Steps:

- receive image
- Zebra-crossing library to detect code
- lookup in the database
- provide result back to the board

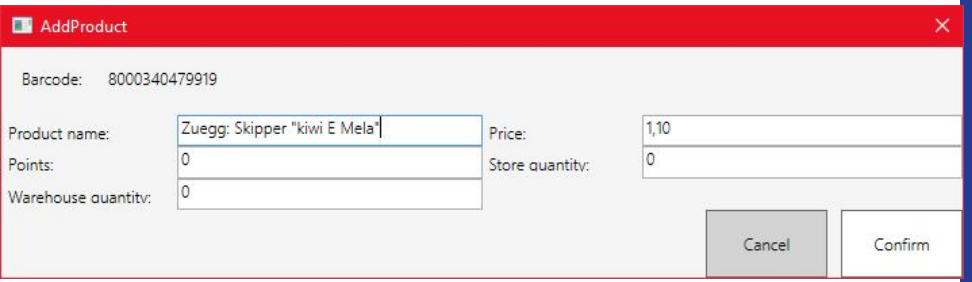


GUI

basic logging features



Interaction with third-party service



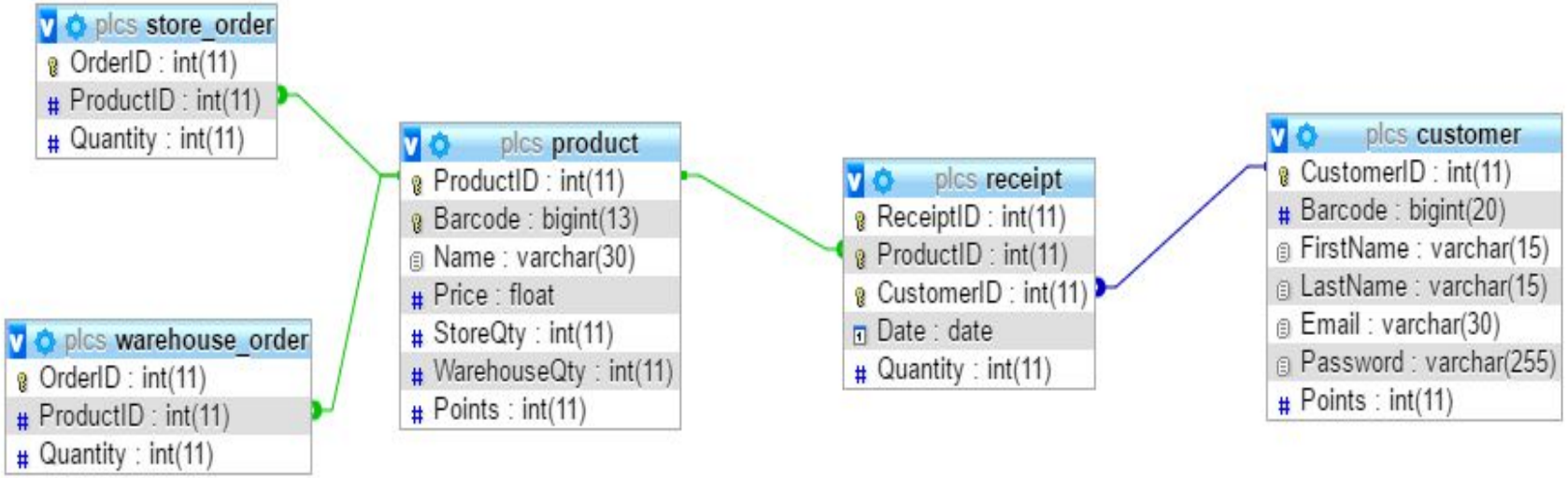
https://upcdatabase.org/

Missing products in the local database

- only for operators
- fast insertion

Website and database

Database Design



Buy&Buy.com

New User?

Register Here

Already Registered?

Login Here

System analysis

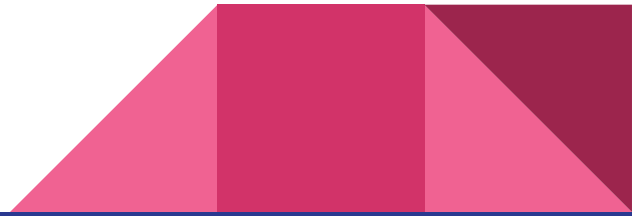
Ease-of-use, Applicability and Marketing perspective

- User-friendly both on customer and administrator side.
- A lot of functionalities to execute the purchase.
- Each single step of the purchase is well explained.
- Automatic shopping in supermarkets with high attendance.
- Speed up the buying phase of customers.

Quick estimation of costs

Estimation

- LCD: 80$
- Tunes module: 10$
- FEZ Spider II: 60$
- Button: 5$
- Camera: 30$
- Ethernet module: 20$
- Firmware on the processor: 500$
- Server Side: 500$
- WebSite and database: 1000$
- Assistance: 300$ per year and it also covers damages for two years.
- Total cost: 2505$



Conclusions

Dedicated hardware for code recognition would be much better (barcode reader)

- fast image→ code
- fast interaction with server
- accuracy