



Cheers Final Demo

Master Practical: Edge Computing and the Internet of Things - Team GAD

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DEMO



Initial Idea

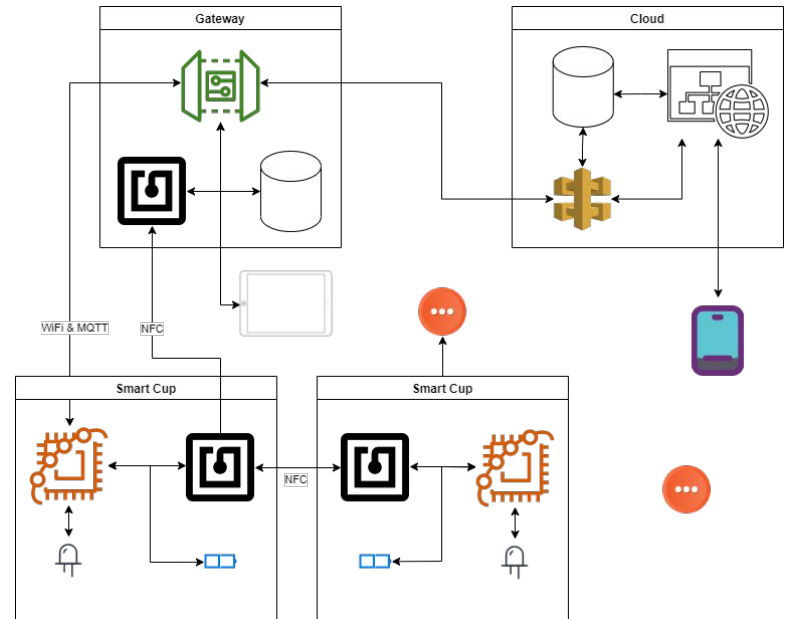
- Why this project?
 - Have fun to build it and learn a lot
 - People want to interact and have fun at parties, but how?
- General idea: Smart cups
 - Change/improve bar experience
 - Provide games and useful functionalities

Product Structure & Edge Computing

- Cloud communication only when:
 - Cup \leftrightarrow user registration
 - Push data upon user deregistration

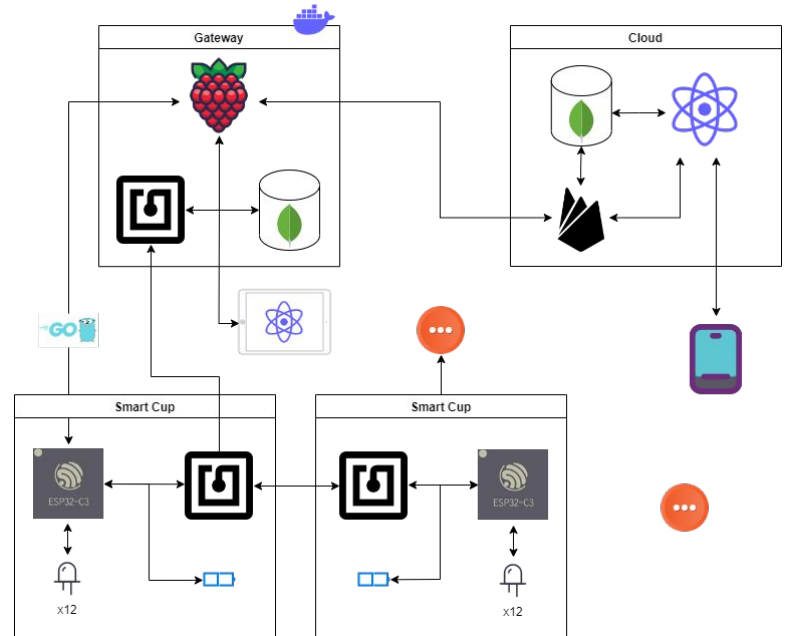
→ Mostly local communication

- >10 hours use per cup + induction charge
- Local database on gateway



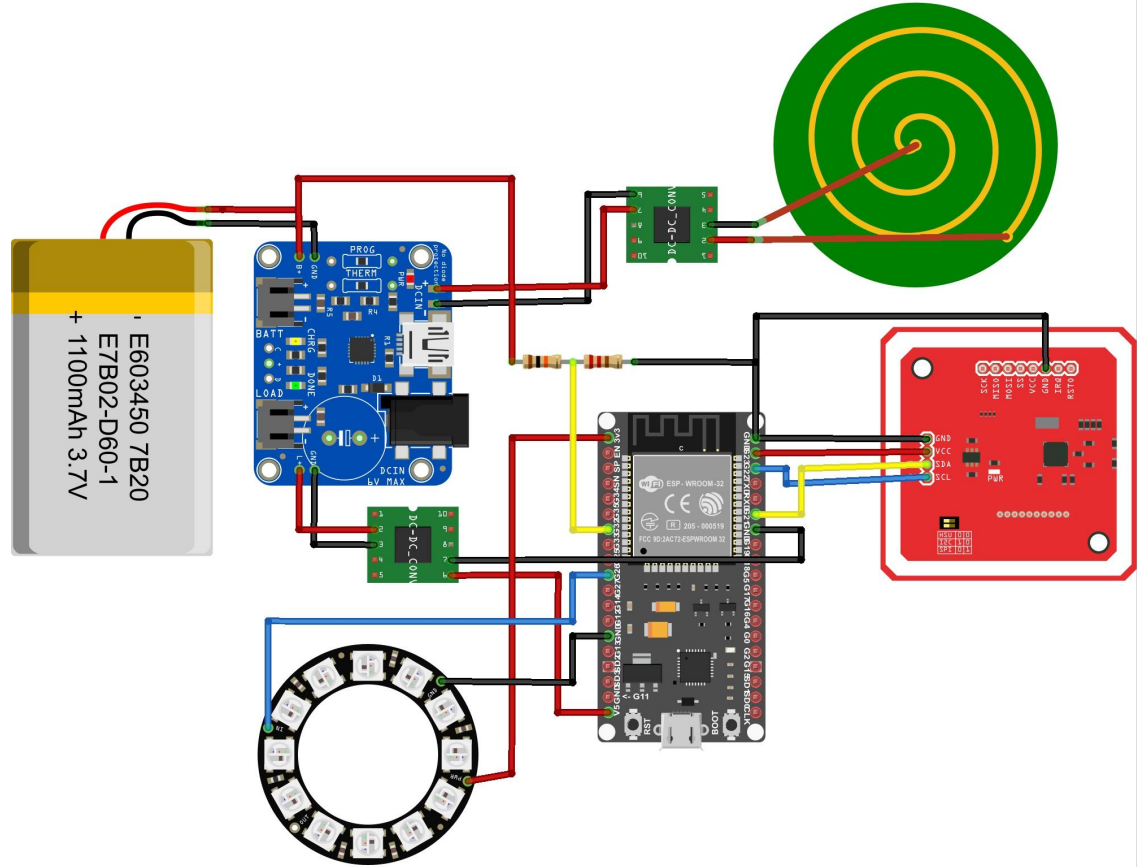
Tech Stack

- Gateway
 - Raspberry Pi
 - Dockerized
 - Golang
 - Local MongoDB
 - ReactJS
- Smart Cups
 - ESP32 (Arduino)
- Cloud
 - Firebase (JS, NoSQL)
 - ReactJS



Hardware

- ESP32
- LED Ring
- NFC Module
- Battery
- Induction Charger
- Inverters





Benefits

User

- Fun activities
- Make new friends or a date
- Win free drinks
- Track all bar visits: Gamification

Bar

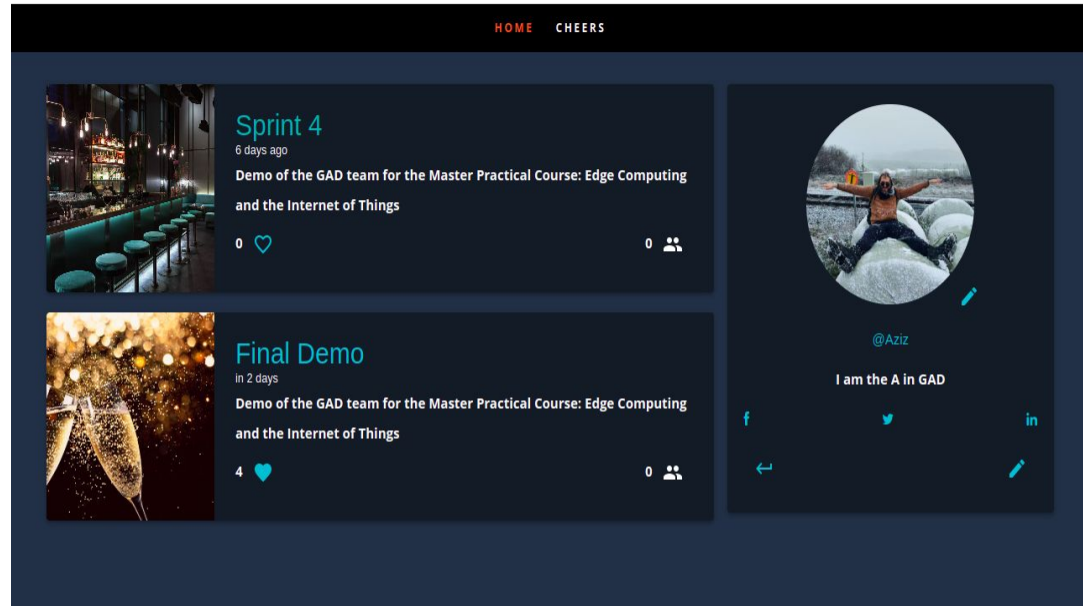
- Track beverage quantities
- User and beverage analytics
- Games = more ordered drinks
- New → Interesting bar



Functionalities

User functionalities:

- Keep track of the events you attended

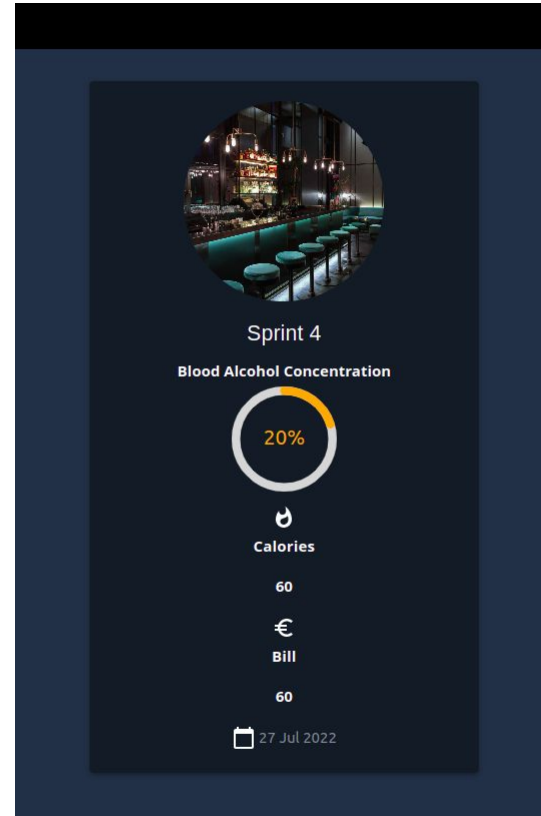




Functionalities

User functionalities:

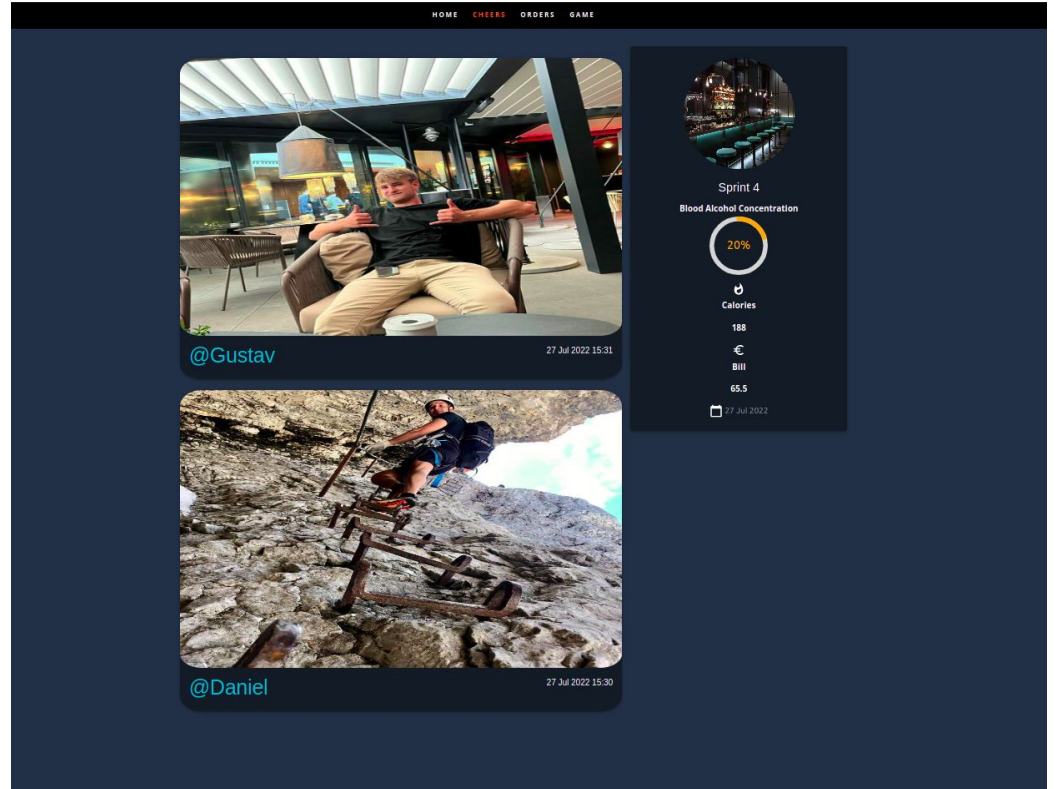
- Keep track of the events you attended
- Keep track of your alcohol and calories consumption



Functionalities

User functionalities:

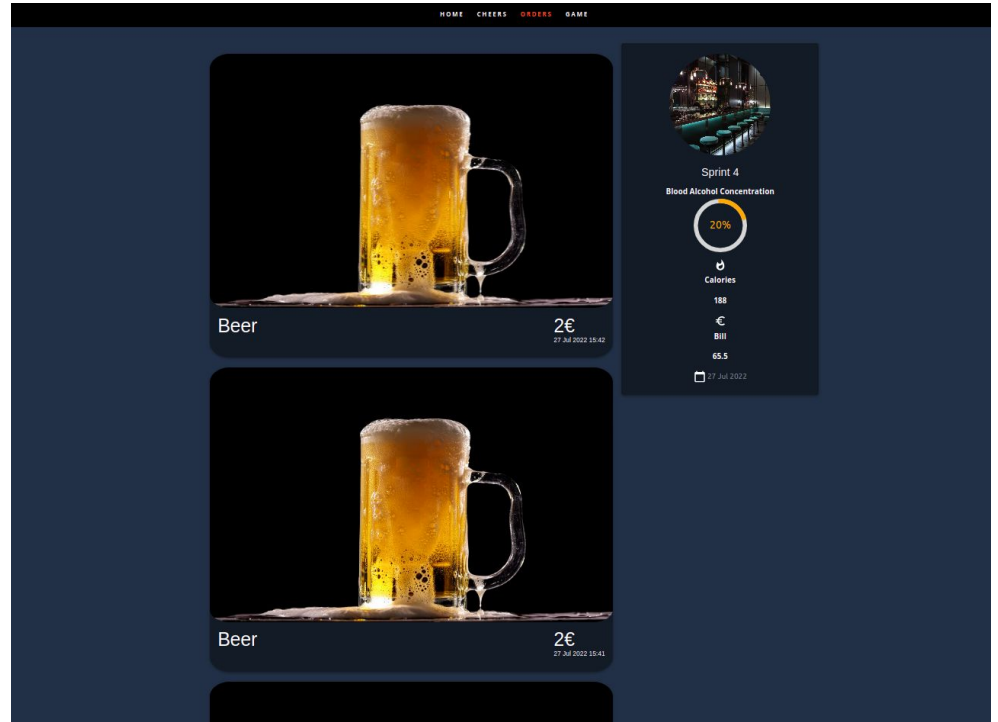
- Keep track of the events you attended
- Keep track of your alcohol and calories consumption
- Stay in contact with the people you meet just by cheering with them



Functionalities

User functionalities:

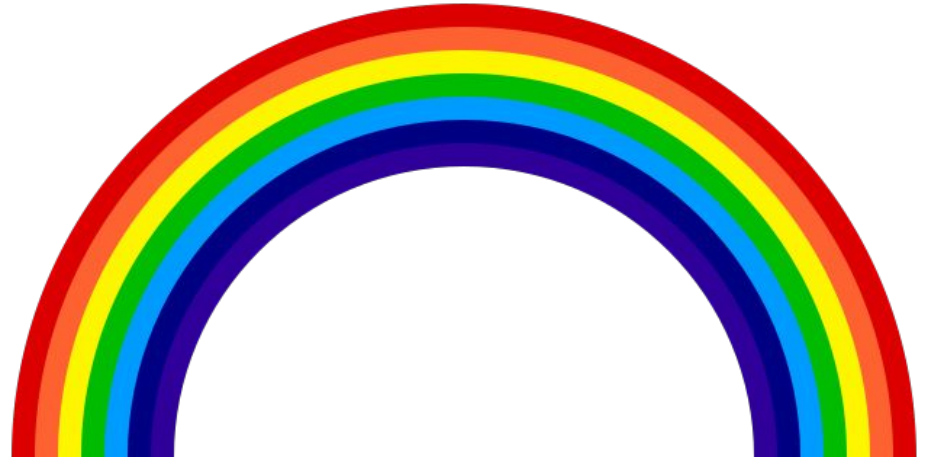
- Keep track of the events you attended
- Keep track of your alcohol and calories consumption
- Stay in contact with the people you meet just by cheering with them
- **Keep track of your orders and your bills and pay with the cup**





Games

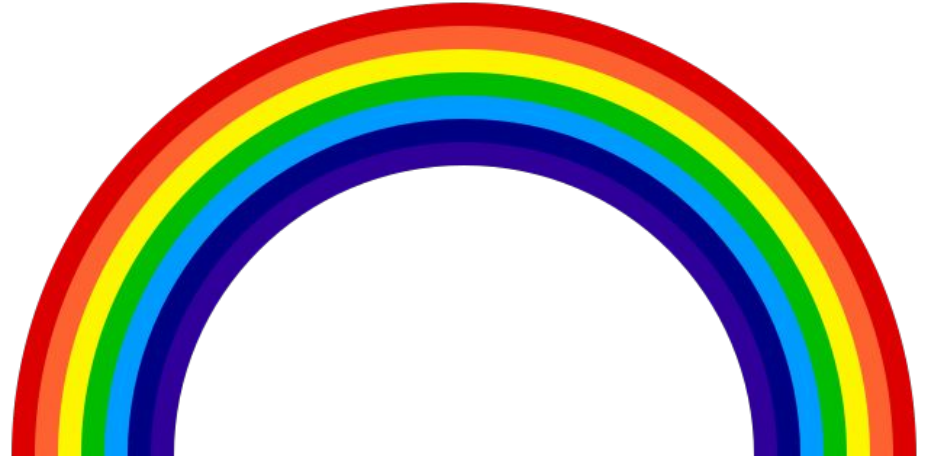
- Rainbow dance mode
- Team cheer
- Guess Who
- Drunkness
- Leaderboard
 - Get points for every drink
 - Get points for every won game





Drunkness

- Light up according to the current promille
- Rainbow colors in relation to alcohol traffic violations
- Auto-update after purchasing new drinks



Guess Who

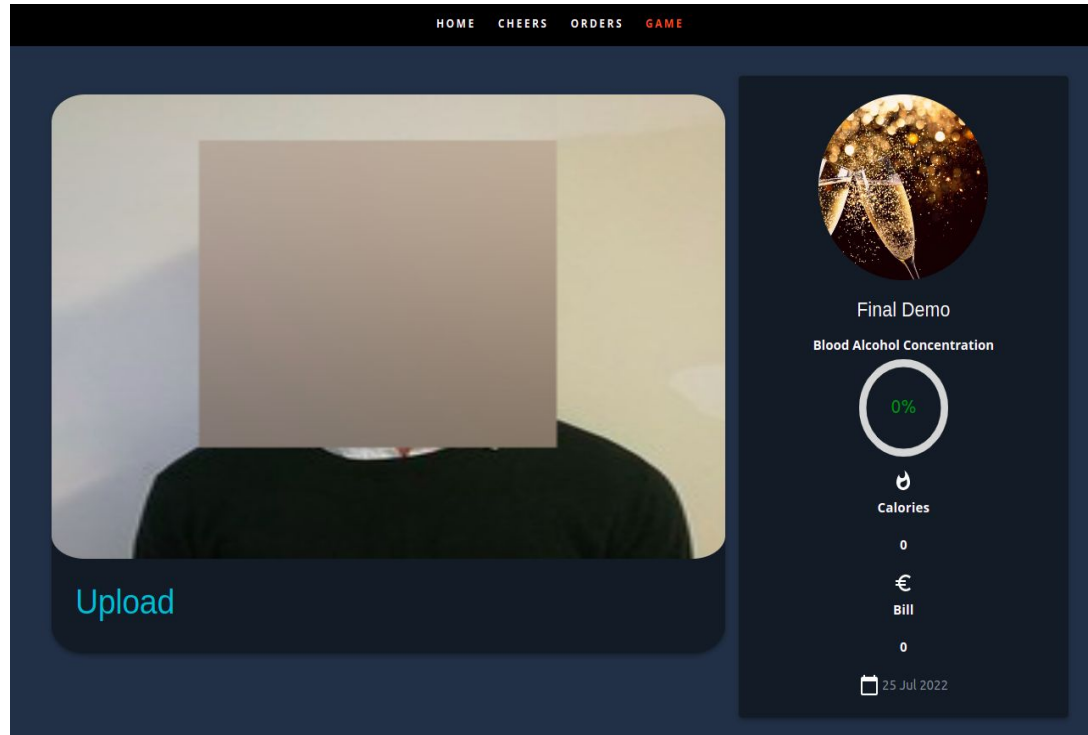
- The barman asks the players to upload a picture of themselves





Guess Who

- The barman asks the players to upload a picture of themselves
- **To stay fair, each participant has to upload a picture where his face is clearly visible**



HOME CHEERS ORDERS **GAME**

Upload

Final Demo

Blood Alcohol Concentration

0%

Calories

0

€ Bill

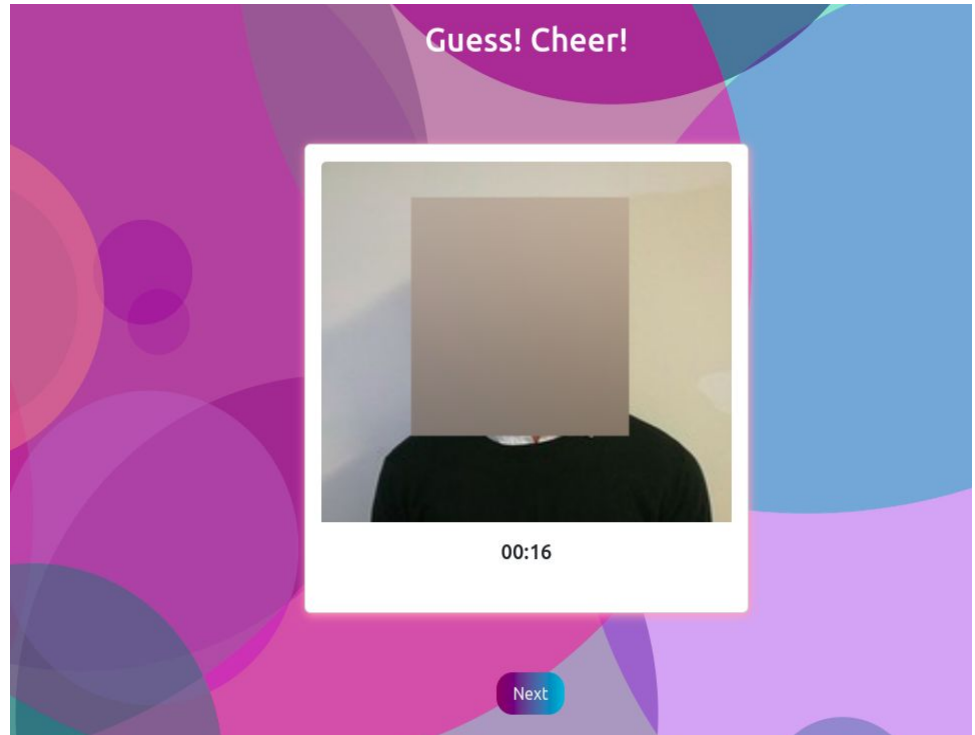
0

25 Jul 2022

The screenshot shows a mobile application interface for a game. At the top, there is a navigation bar with the following items: HOME, CHEERS, ORDERS, and GAME (highlighted in red). The main content area is split into two columns. The left column features a large image of a person whose face is obscured by a grey square. Below this image is a blue button labeled 'Upload'. The right column displays a circular profile picture of two champagne glasses. Below the profile picture, the text 'Final Demo' is shown. Underneath that is a circular progress indicator for 'Blood Alcohol Concentration' which is currently at 0%. Below the progress indicator are three rows of data: 'Calories' with a flame icon and the value '0', '€ Bill' with a Euro symbol icon and the value '0', and a date '25 Jul 2022' with a calendar icon.

Guess Who

- The barman asks the players to upload a picture of themselves
- To stay fair, each participant has to upload a picture where his face is clearly visible
- **We choose a player randomly and make it a target**



Guess Who

- The barman asks the players to upload a picture of themselves
- To stay fair, each participant has to upload a picture where his face is clearly visible
- We choose a player randomly and make it a target
- **If someone cheers with the target before the timer stops, the winner gets points**

Guess! Cheer!



Gustav

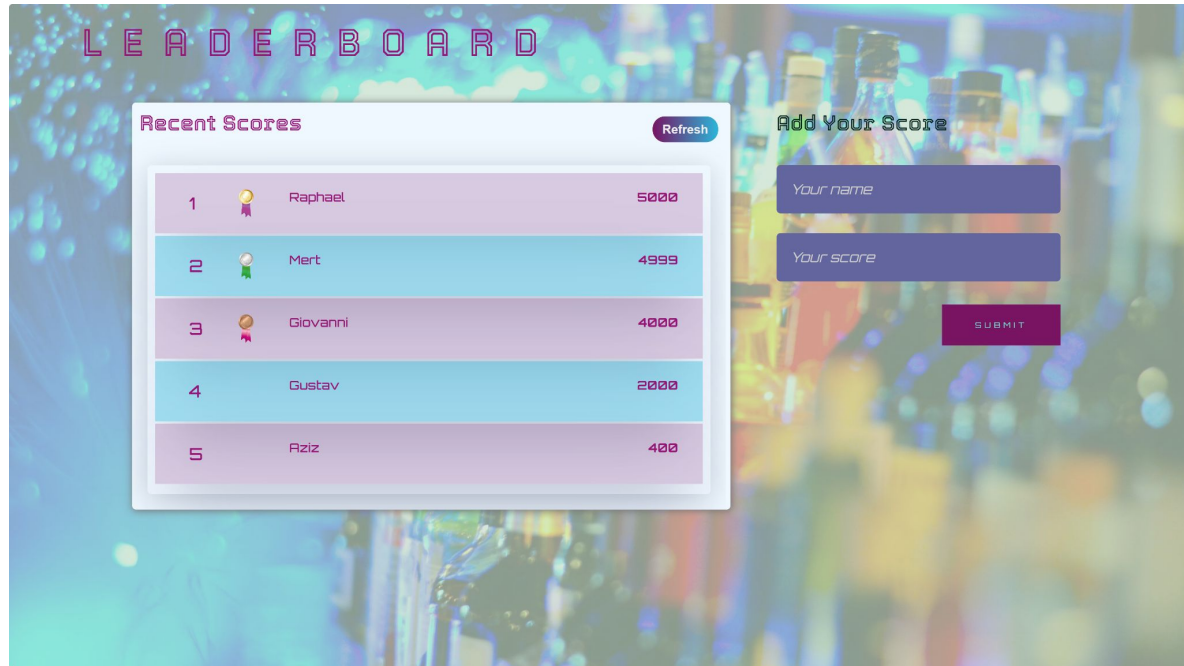


Daniel guessed right !

Next

Leaderboard

- Best one gets a gift
- Get points per win or order



Evaluation

- Wireshark
- ZigBee
- Power Consumptions
- More detailed in the documentation



Wireshark

- Standard packages that were expected:
 - DHCP
 - TCP Handshake
 - MQTT Connect
- Update GW <-> Cup
 - 123 Byte Frame

The image shows a Wireshark capture of network traffic. The top pane displays a list of packets. Packet 10 is a TCP segment from 192.168.137.1 to 192.168.137.39, Seq=1, Ack=1, Win=64478, Len=69. Packet 11 is a TCP segment from 192.168.137.39 to 192.168.137.1, Seq=1, Ack=70, Win=5586, Len=0.

The middle pane shows the details of the selected packet (Frame 10):

- Frame 10: 123 bytes on wire (984 bits), 123 bytes captured (984 bits) on interface \Device\NPF_{9469459E-ABE9-44AF-B8F0-463EC29E4CC9}, id 0
- Ethernet II, Src: 4a:45:20:90:c2:66 (4a:45:20:90:c2:66), Dst: Espressi_e8:16:40 (24:0a:c4:e8:16:40)
- Destination: Espressi_e8:16:40 (24:0a:c4:e8:16:40)
- Source: 4a:45:20:90:c2:66 (4a:45:20:90:c2:66)
- Type: IPv4 (0x0800)
- Internet Protocol Version 4, Src: 192.168.137.1, Dst: 192.168.137.39
- Transmission Control Protocol, Src Port: 10003, Dst Port: 65307, Seq: 1, Ack: 1, Len: 69
- Data (69 bytes)
- Data: 304300156375702f32343a30413a43343a45383a31363a34307b0a202022636f6c6f7222...
- [Length: 69]

The bottom pane shows the raw packet data in hexadecimal and ASCII:

```
0000 24 0a c4 e8 16 40 4a 45 20 90 c2 66 08 00 45 00  $...@JE .f.E:
0010 00 6d 40 0f 40 00 80 06 27 02 c0 a8 89 01 c0 a8  n@.@:'.
0020 89 27 27 13 ff 1b 43 49 87 32 d7 17 5b fd 50 18  ""...CI -2-[-P
0030 fb de ab 9d 00 00 30 43 00 15 63 75 70 2f 32 34  ....0C -cup/24
0040 3a 30 41 3a 43 34 3a 45 38 3a 31 36 3a 34 30 7b  :0A:C4:E 8:16:40{
0050 0a 20 20 22 63 6f 6c 6f 72 22 3a 20 22 72 67 62  - "colo r": "rgb
0060 28 32 35 35 2c 30 2c 30 29 22 2c 0a 20 20 22 6d  (255,0,0 )", "m
0070 6f 64 65 22 3a 20 22 31 22 0a 7d  ode": "1 "-"}
```



ZigBee

- Can easily transmit 123 bytes
- Connection problems
- Advantages:
 - Hash Network
 - Low power consumption

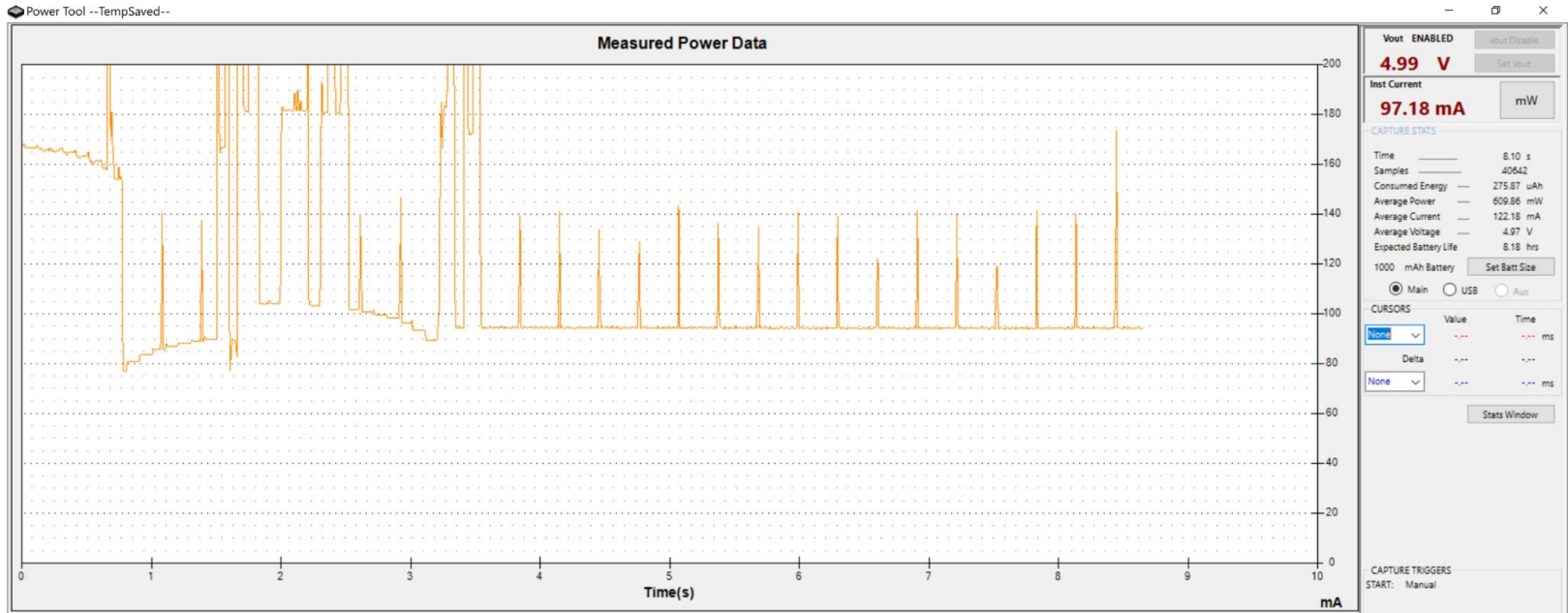


Power Measurements (Monsoon)

- Very accurate measuring device
- All different functions were measured:
 - NFC scan, LED change, WIFI...
- Over 40 min of measurements

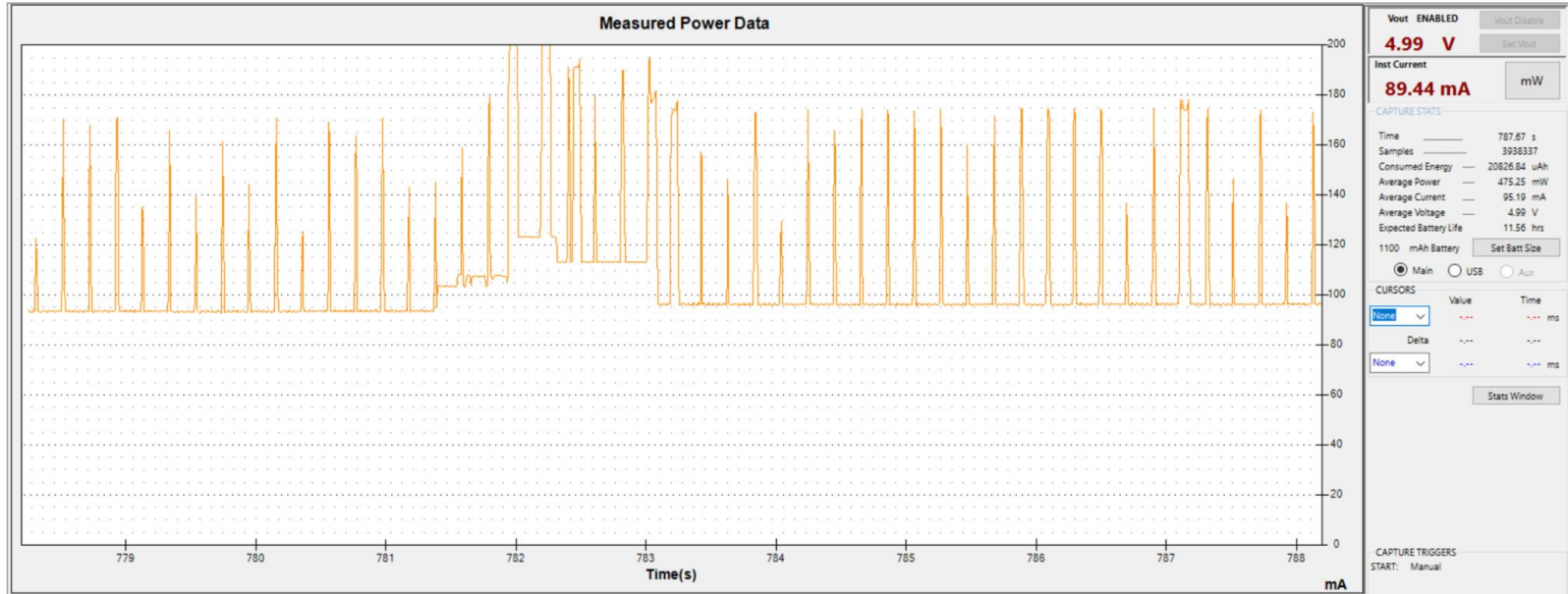


Power Consumption - Startup (WiFi, MQTT)



Power Consumption - NFC Scan

Power Tool --TempSaved--



Power Consumption - Summary

- 10 hours are enough for an entire evening.
- Possibility to add a bigger battery

CAPTURE STATS		
Time	_____	2490.61 s
Samples	_____	12453063
Consumed Energy	—	74251.81 uAh
Average Power	—	535.77 mW
Average Current	—	107.33 mA
Average Voltage	—	4.99 V
Expected Battery Life		10.25 hrs
1100 mAh Battery		<input type="button" value="Set Batt Size"/>
<input checked="" type="radio"/> Main	<input type="radio"/> USB	<input type="radio"/> Aux



Questions?