



Integrating innovative TECHNOLOGIES along the value Chain
to improve small ruminant welfare management

Promising innovations UHF app

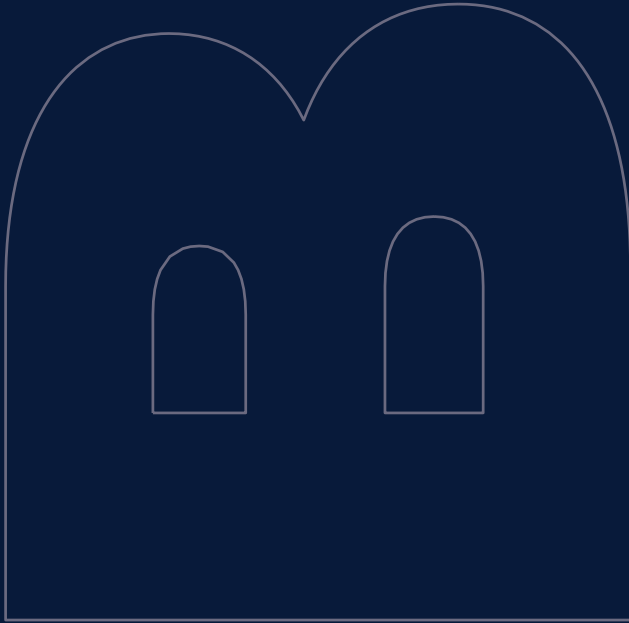
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*17 - 18 June 2025
University Foundation - Brussels*



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 862050





SOLUTIONS

- 1** Hardware
- 2** Cloud
- 3** Mobile app
- 4** Next steps



1. Hardware

Solar panels / battery

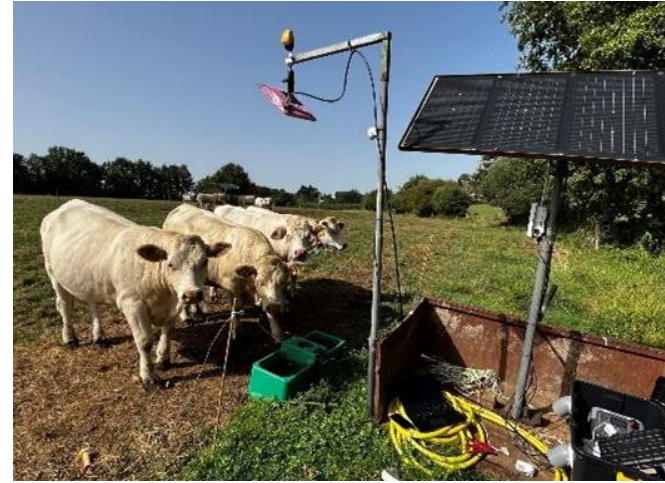
RFID UHF Case :

- Reader UHF Impinj R420
- Beagleboard Linux running software
- Electrical equipment for 12/24V power supply
- Real time lock (RTC)

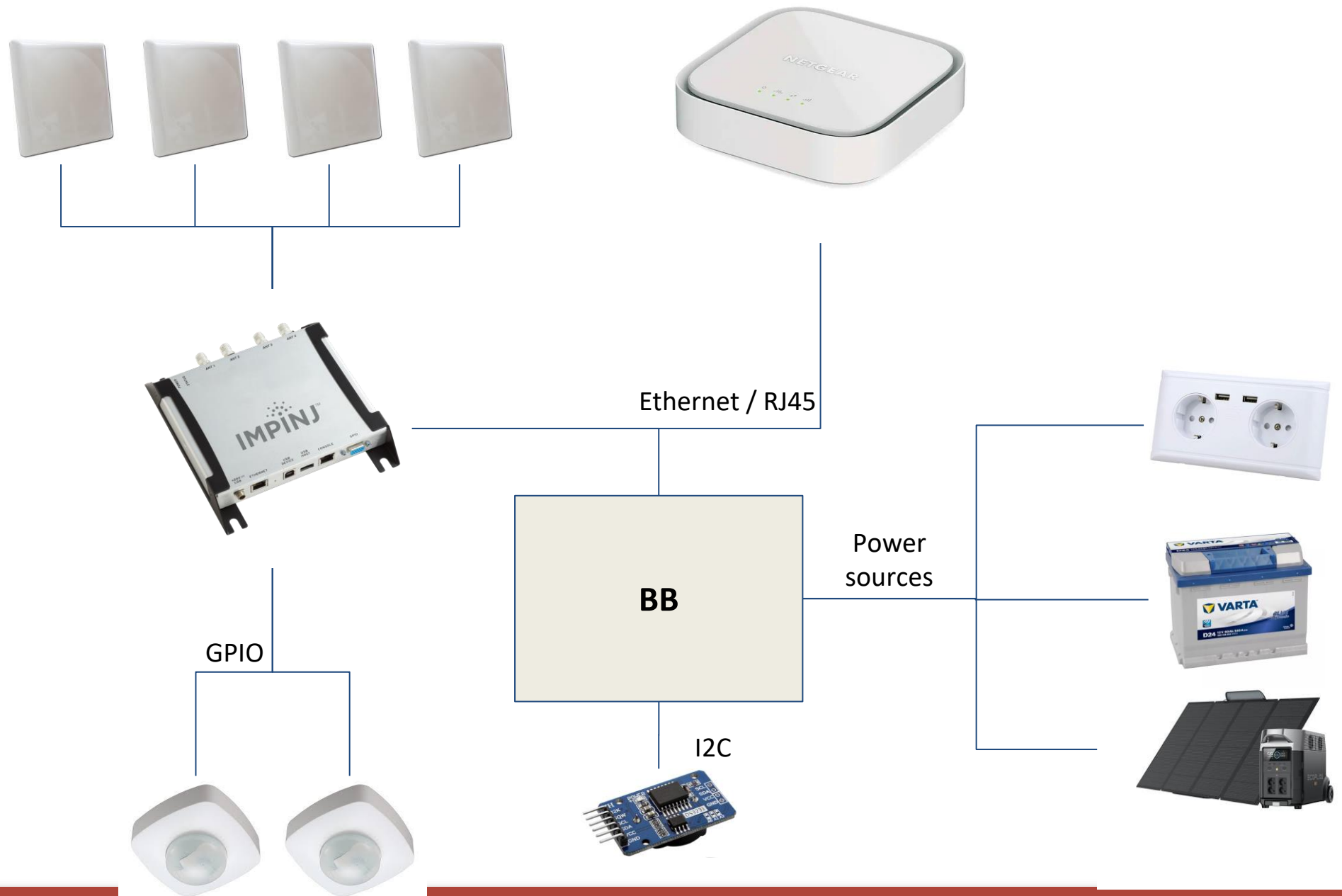
4G Router

Up to 4 antennas

Up to 2 movement sensors



1. Hardware



1. Hardware

Operation modes:

- **Driven** - Case is driven by the mobile app. No data are stored in memory nor sent to the Cloud
- **Continuous** - Case is reading and data are stored in the local database before being retrieved by the mobile app.
- **Connected** - Case is reading and data are stored in the local database before being automatically sent to the Cloud
automatique vers la plateforme Web

Reading conditions:

Up to 2 motion sensors can be attached to the case to start/stop reading.



2. Cloud

Main functionalities

Main functionalities

- Hardware monitoring
- Access to raw data provided by UHF cases
- Algorithms to value raw data
- Export (CSV)
- Remote configuration and updates of UHF cases



2. Cloud Monitoring

My cases

RESET SEARCH

Search

+ ADD

Name	Description	Site	Last comm	Status	Actions
CASE-A220	Cloud, projet TechCare	Site 1	2022-02-21 13:47:25		☆ ⌚ ✎ 🗑
CASE-A221	CASE-A221	Site 1	2022-03-21 15:54:40		★ ⌚ ✎ 🗑
CASE-A223	CASE-A223	Site 1	2022-03-21 15:53:50		★ ⌚ ✎ 🗑
CASE-A224	CASE-A224	Site 1	2022-02-14 17:02:32		☆ ⌚ ✎ 🗑
CASE-A226		Le Rheu	2022-03-21 15:54:41		☆ ⌚ ✎ 🗑
CASE-PROTO01	Test PU	Site 1	2022-03-04 13:38:09		☆ ⌚ ✎ 🗑
PROTO-A21E	Proto Cloud, projet TechCare	Le Rheu	2022-03-14 15:41:02		☆ ⌚ ✎ 🗑
PROTO-XXX3	Valise Page Up, projet TechCare	Site 1	2022-03-21 15:54:33		☆ ⌚ ✎ 🗑

Rows per page: 10 1-8 of 8 < >

Monitor case CASE-A220

☒ Remotely monitor the case

☒ Remotely monitor read tags

Send alert if no tags have been read since

1 hours

Send alert if less than X antennas are connected

2

Along with having realm-time information on cases, it's possible to subscribe to some email alerts:

- Connection/Disconnection of a case
- No data received
- Antenna loss

Monitoring of case CASE-A226 - Last comm: 2024-10-03 20:00:45

RESET SEARCH

Search

+ CREATE A COMMAND

GENERAL	
id	AE3F22-A226
uptime	781293618629
uptime_human	9042 day(s) 18 hour(s) 0 minute(s)
NETWORK	
PROPERTIES	
READER	
reader.mode	connected
reader.connectedAntennas	4
reader.readingPower	30
reader.status	Reading

CANCEL

RECORD

TIONS

2. Cloud

Raw data

Any tag read by a case is sent to the cloud platform.

Note that the case will consolidate readings for one second before sending a tag to the Cloud :

- Animal ID
- UTC reading time
- Minimum RSSI - minimum RSSI detected during the one-second consolidation period
- Maximum RSSI - maximum RSSI detected during the one-second consolidation period
- Average RSSI - average of all RSSI received during the one-second consolidation period
- Number of reads - number of reads during the one-second consolidation period
- Case ID
- Antenna ID

RSSI - Received Signal Strength Indicator - Strength of received signal from the tag. May represent the distance of the animal.



2. Cloud

Raw data

Raw data

Query...

By group or animal:

Groups

Search for tags

By site or case:

Sites

Case

AE3F22-A221

X

&

Antenna

On dates:

01/03/2022

X

&

21/03/2022

X

Graph:

Aggregation

per day

X

RESET

SEARCH

DOWNLOAD CSV

SAVE QUERY

Date ↓	Reader	Antenna	Tag id	Read count	Instantaneous RSSI	Average RSSI	Min RSSI	Max RSSI
2022-03-21 18:46:25	AE3F22-A21D	2	250 99999900168	1	-63	-63	-63	-63
2022-03-21 18:46:24	AE3F22-A21D	2	250 99999900168	46	-59	-59	-59	-59

```
Date;Antenna;Animal;"Read count";RSSI;Site
"2022-03-11 00:00:37";2;"250 99999900157";2;-62;
"2022-03-11 00:01:08";4;"250 99999900194";1;-61.5;
"2022-03-11 00:01:09";4;"250 99999900194";49;-60;
"2022-03-11 00:01:10";4;"250 99999900194";25;-60;
"2022-03-11 00:01:11";4;"250 99999900194";27;-57.5;
"2022-03-11 00:01:12";4;"250 99999900194";41;-59;
"2022-03-11 00:01:13";4;"250 99999900194";17;-61.5;
```

2. Cloud

Algorithms - Visits

Parameters :

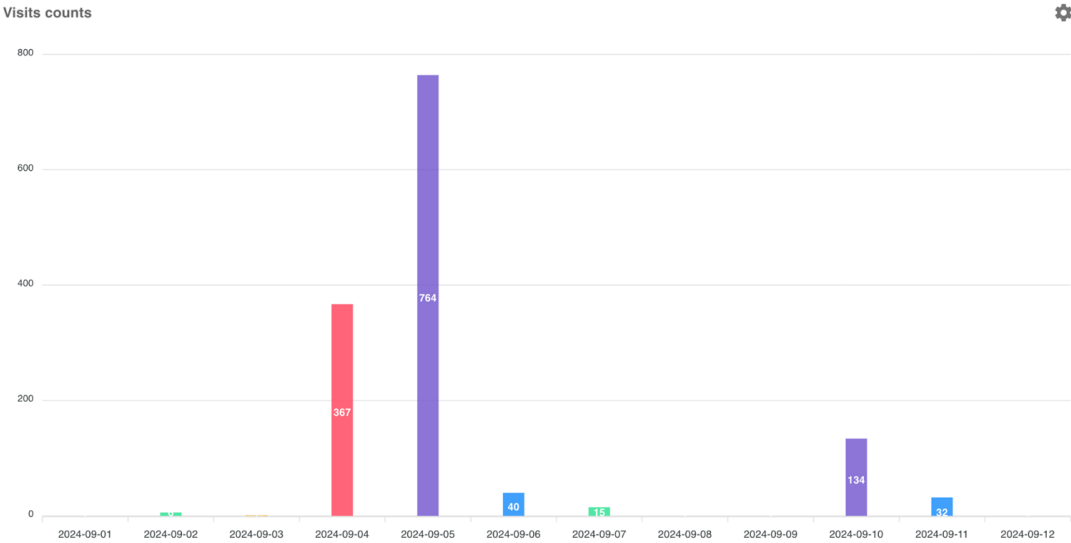
- **Minimum visit duration (in seconds):** Minimal visit duration. Below that limit, visit is automatically discarded.
- **Delay between visits (in seconds):** Minimum delay between two visits. Below that limit, visits are automatically merged.

Inputs

- Bunch of animals
- And/Or a site, a reader and/or one or several antennas
- And a period of time (start and end dates)

2. Cloud

Algorithms - Visits



DOWNLOAD VISITS

DOWNLOAD RAW DATA

SAVE QUERY

Start ↓	End	Tag ID	Duration (s)	Read count	Average RSSI	Min RSSI	Max RSSI	Median RSSI
2024-09-11 15:02:03	2024-09-11 15:02:11	992 4000000101	8	6	-49.416666666666664	-48.5	-48	-49
2024-09-11 07:02:17	2024-09-11 07:02:25	992 4000000101	8	6	-67.08333333333333	-64	-64	-66.25
2024-09-11 07:02:06	2024-09-11 07:02:14	192 237065809968	8	6	-62.083333333333336	-62.5	-62	-62.5
2024-09-11 07:01:13	2024-09-11 07:02:04	992 4000000101	51	30	-69.23333333333333	-70.5	-66.5	-69.5
2024-09-11 06:57:22	2024-09-11 07:01:08	992 4000000101	226	131	-69.63358778625954	-70	-69.5	-69.5
2024-09-11 06:55:22	2024-09-11 06:57:17	992 4000000101	115	72	-69.18055555555556	-70.5	-67	-69.5
2024-09-11 06:55:06	2024-09-11 06:55:12	992 4000000101	6	3	-69.16666666666667	-71	-66	-69.5
2024-09-11 06:54:14	2024-09-11 06:54:59	992 4000000101	45	26	-69.96153846153847	-70	-70	-70
2024-09-11 06:53:50	2024-09-11 06:54:09	992 4000000101	19	15	-69.93333333333334	-70	-69.5	-70
2024-09-11 06:50:20	2024-09-11 06:53:44	992 4000000101	204	113	-69.96460176991151	-70	-69.5	-70

2. Cloud

Algorithms - Detections

Inputs :

- A bunch of animals
- And/Or a site, a reader and/or one or several antennas
- A period of time (start and end days)

2022-03-18 06:50:32	992 4000000378	✓	Le Rheu	CASE-A226	1
2022-03-18 06:54:21	992 4000000371	✓	Le Rheu	CASE-A226	4
2022-03-18 06:55:05	992 4000000372	✓	Le Rheu	CASE-A226	4
2022-03-18 06:57:50	992 4000000356	✓	Le Rheu	CASE-A226	4
2022-03-18 06:59:08	992 4000000388	✓	Le Rheu	CASE-A226	4
2022-03-18 07:00:12	992 4000000358	✓	Le Rheu	CASE-A226	1
-	992 4000000364	✗	-	-	-





3. Mobile app

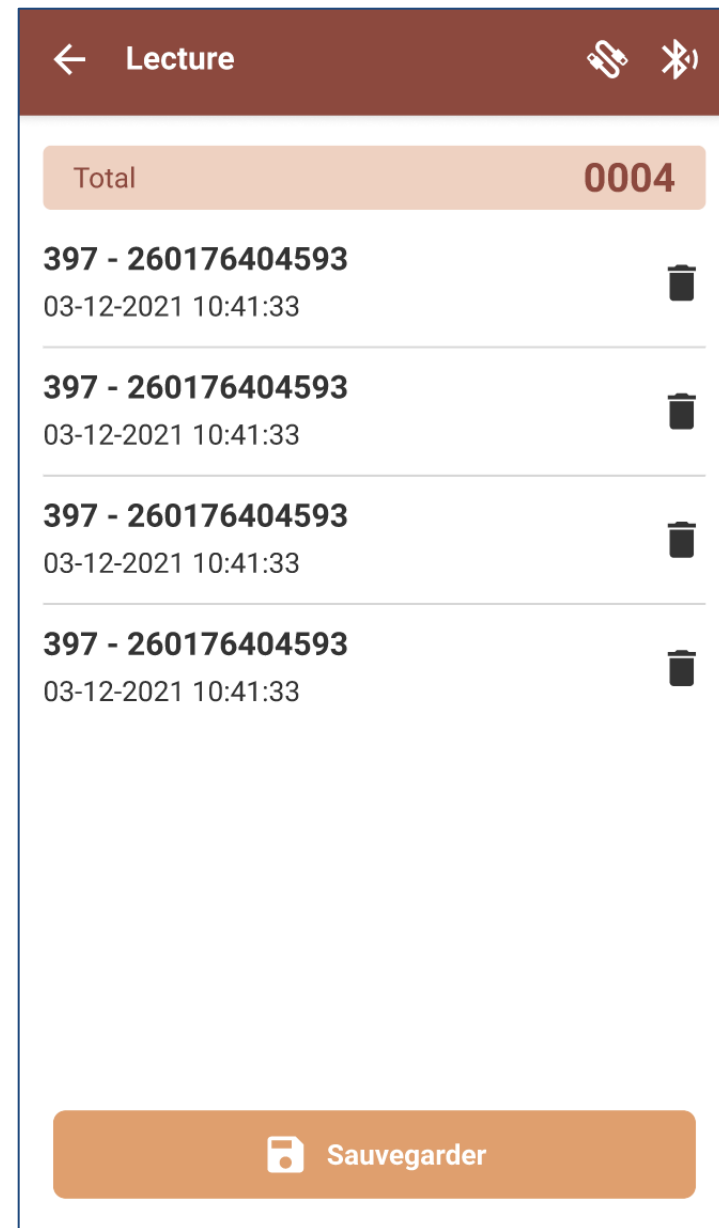
Main functionalities

Main functionalities

- Reader configuration
- Real time readings
- Real-time inventories
- Data sharing



3. Mobile app



3. Mobile app

← Listes		🔗 📶
Total	0036	
Liste 1 03-12-2021 10:41:33	40	
Ma liste 03-12-2021 10:41:33	12	
Comptage moutons 03-12-2021 10:41:33	77	
Liste de test 03-12-2021 10:41:33	45	
Liste 2 03-12-2021 10:41:33	4	
📄 Exporter		⚖ Inventaire
		🔗 Ouvrir

← Inventaire		🔗 📶
LISTE 1		
🔍 Attendus	11	
☑ Trouvés	0	
❓ Autres	0	
📄 Exporter		



3. Mobile app

Configuration

PU0012

ANTENNES

1

2

3

4

MODE

Continue

Pilot

Connected

READING

Power

30.0

dBm

Gen2 Session

1

Population estimate

2

Advanced mode

UHF

Bluetooth

TCP IP

Infos.

4. Next steps

- Integration of new readers (Impinj R700)
- Multiplexing
- Configuration per antenna

