




# ML4IoT Implementation of different projects

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# Introduction

Use Deep Learning to:

- Recognize sounds 
- Classify images 

Connect Devices as:

- Cloud Servers 
- Sensors  
- Smartphones 



THE SENSORS ALLOW TO COOK  
MORE EFFICIENTLY



WE CAN KEEP TRACK OF OUR  
NUTRITIONAL HABITS AND  
TAILOR THEM IN CASE OF  
NEEDS



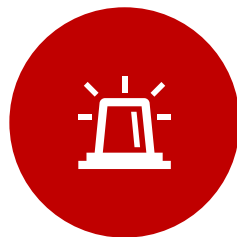
WE CAN BE HELPED BY THE  
SENSORS TO COOK BETTER



WE CAN KEEP TRACK OF OUR  
WORKING ACTIVITY



WE UNDERSTAND WHEN WE  
NEED A BREAK TO PLAY  
SOMETHING FUN



THE SENSORS WILL KEEP OUR  
HOME SAFE WHEN WE ARE  
OUT

# Nutritional help

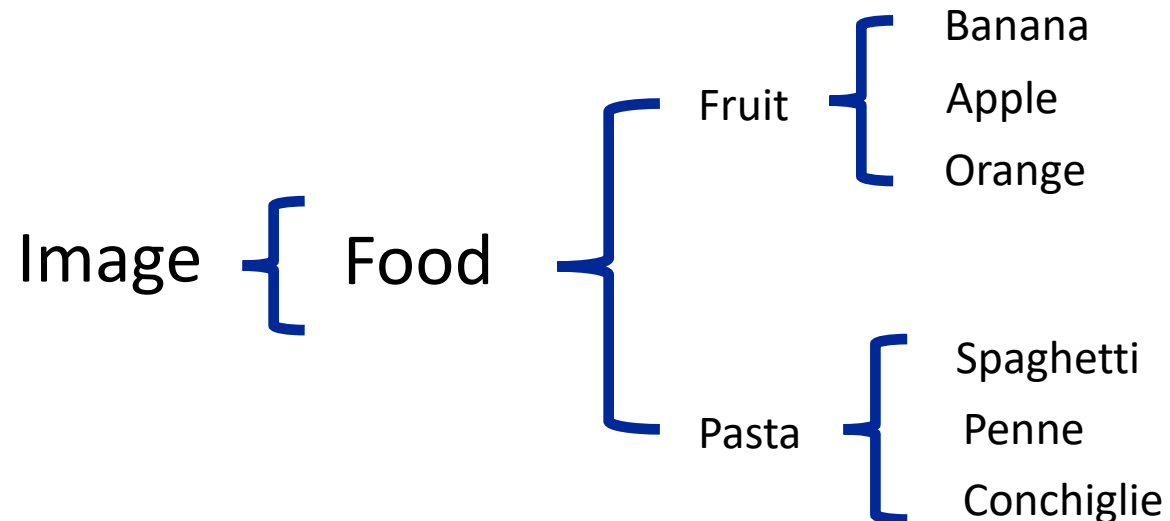
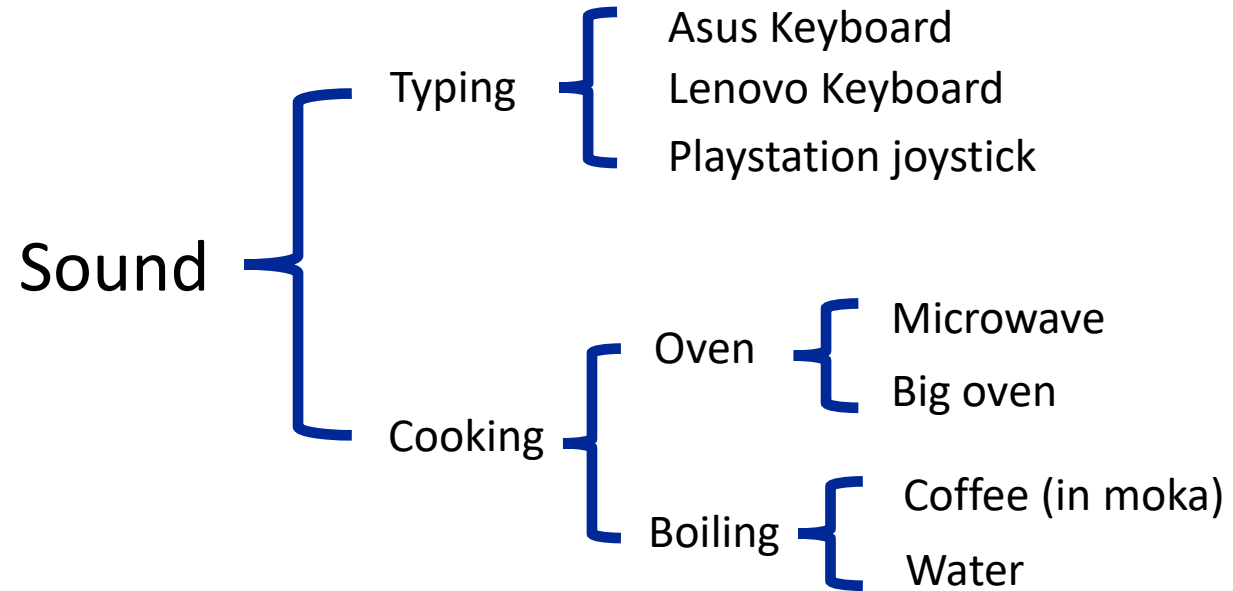
# Activity tracking

# Alarm systems

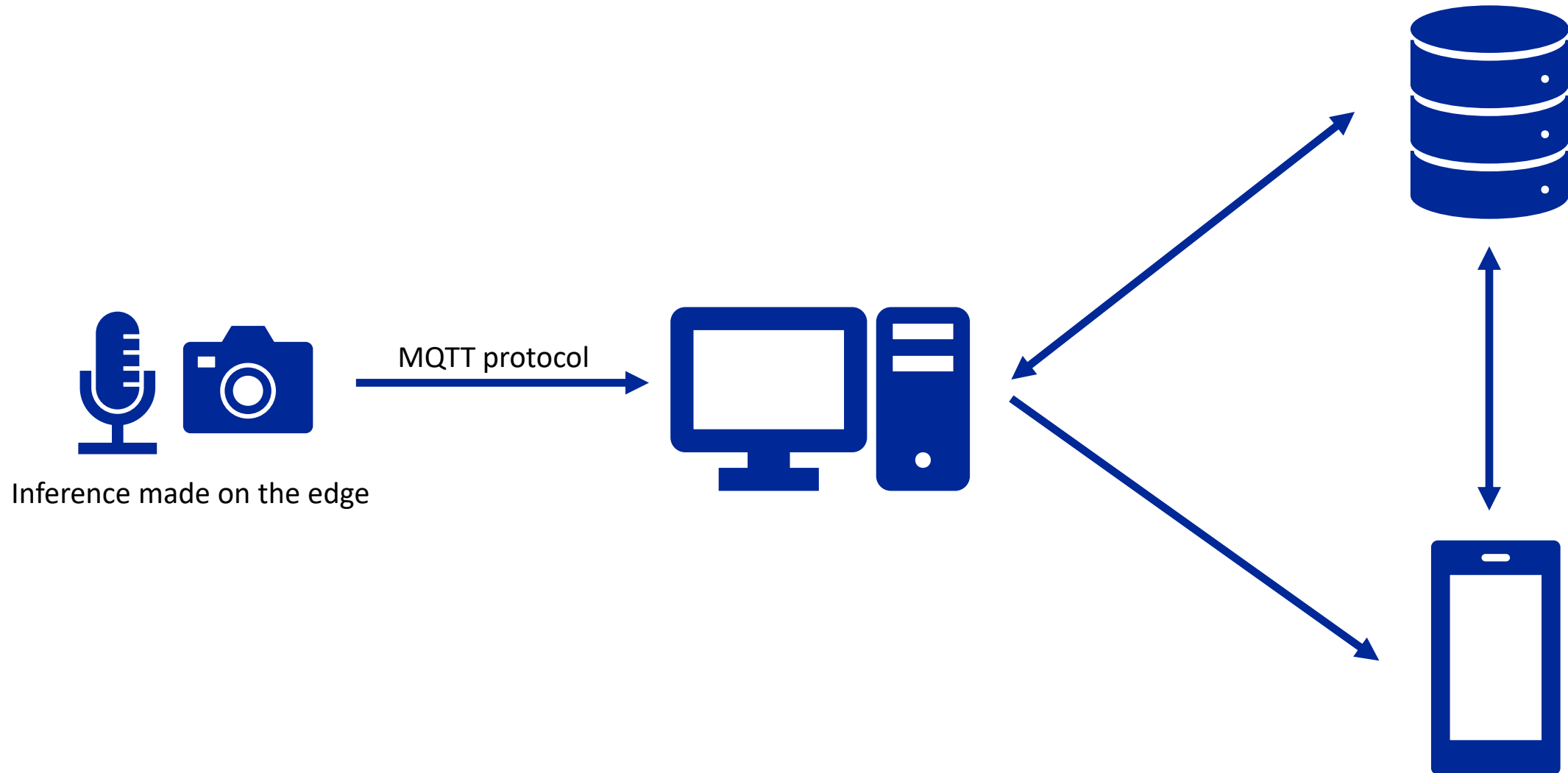
# Sound Recognition

Train and tailor DL architecture.  
Then push them on the edge  
applying state of the art techniques  
as post training quantization and  
structured/sparse pruning

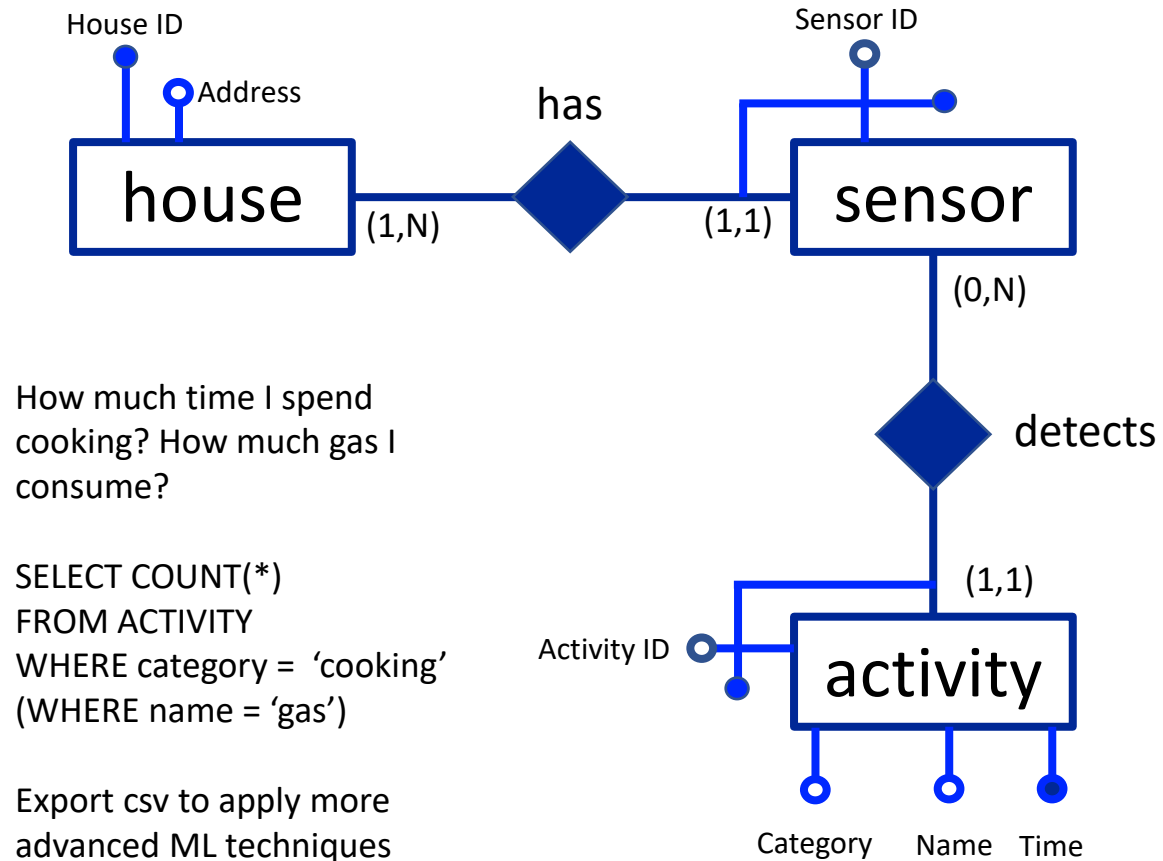
# Image Classification



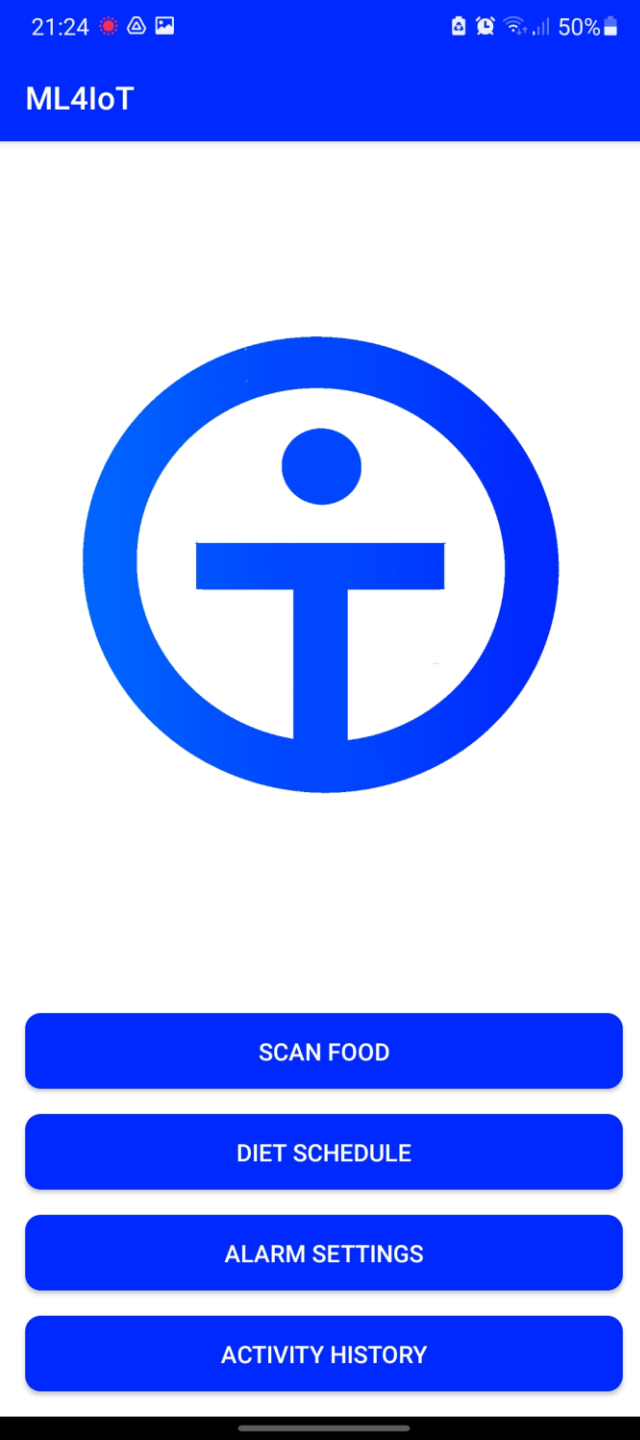
# System interaction between sensors, servers and smartphone



# To store data and perform analysis a DBMS is created



aid	name	category	time	sid	hid
2111	microwave_oven	cooking	1640877987	1	1
2112	microwave_oven	cooking	1640877990	1	1
2113	microwave_oven	cooking	1640877992	1	1
2114	microwave_oven	cooking	1640877996	1	1
2115	silence_kitchen	NULL	1640877998	1	1
2116	silence_kitchen	NULL	1640878001	1	1
2117	silence_kitchen	NULL	1640878004	1	1
2118	silence_kitchen	NULL	1640878006	1	1



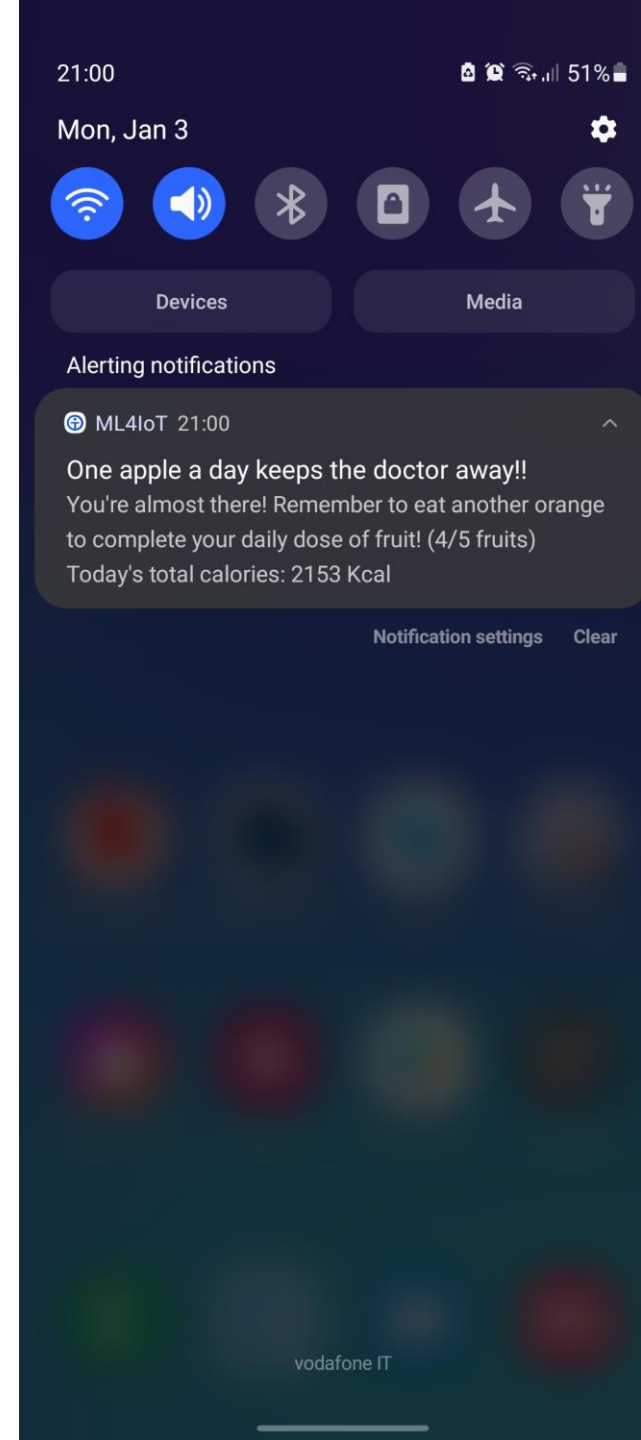
User experience is the core of our business

## Mobile Application

The app makes the system user friendly.  
The customers can easily keep track of  
their activity

## Notification System

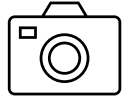
The notification alerting feature makes  
the application quickly interact with  
the user in case of need



# Example of enhanced cooking



The microphone monitors the state of the water and as soon as the water is boiling a notification is sent to the user.



The camera sees the type of pasta and consequently how much time it should cook. After the correct cooking time is ended, a notification is sent to the user.

Penne 9 min.



Conchiglie 8 min.



silence



gas



boiling water



boiling water



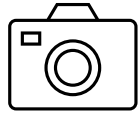
**READY  
TO EAT!**

\* = a notification is sent to the user

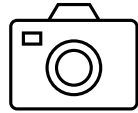




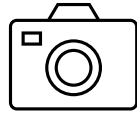
# Example of food schedule and alerting



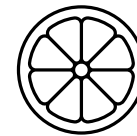
Apple, 08:30



Banana, 10:30



Apple, 13:30

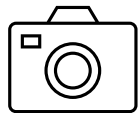


Orange, 17:30

H 21:00 and 4/5 fruits.

Notification:

You are almost there! Eat just another orange to reach the optimal daily dose of fruit.



Apple, 09:05



Banana, 09:10



Apple, 09:15



Apple, 09:20

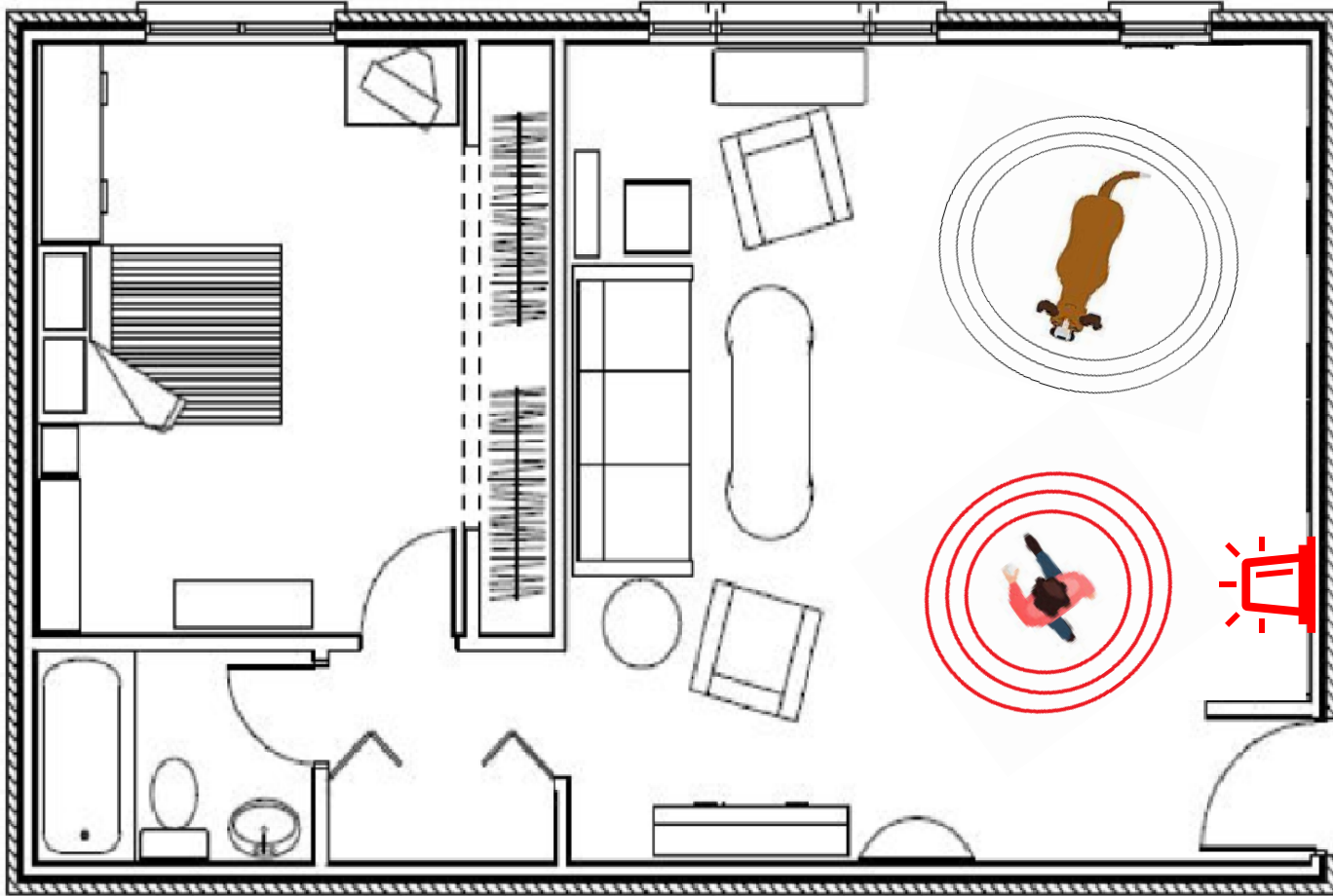
H 09:15:01.

Notification Warning.

Do not eat other fruits, your level of glucose could exceed the safe threshold.

Or: need another dose of insulin.

# Example of future application on Safety and Alarms



During a working day, you can turn on the alarm and the microphone will detect the sounds of the dogs as normal.

Instead, the walking noise of a thief/intruder and sounds like closing and opening doors will be identified as anomalies and the system will immediately send a notification to the user or directly to the competent authority.



Thank you for your  
attention