

On exploiting Gamification for the Crowdsensing of Air Pollution: a Case Study on a Bicycle-based System



Air Pollution

Is one of the greatest challenges of current times

Healthy risks

Considerable social impact

Data are needed to take action



Crowd-sensing

Allows to acquire data to face air pollution

1

Monitor personal exposure

2

Inform policymakers

3

Why crowd-sensing?

Local information

Empowers citizens

Related works



Wearable sensors

- /Typically not able to sense PM
- /Interferences from the user
- /Short distances covered by walking



Car-based systems

- /Cover wide areas
- /Produce pollution
- /Automobile exhaust could affect measurements



Bicycle-based solutions

- /Cover wide areas
- /No environmental impact
- /No interferences

Challenges

1

Privacy

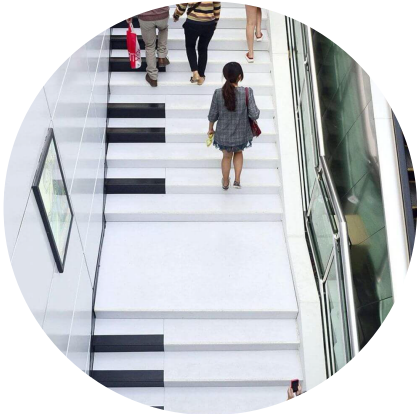
2

Scalability

3

User Engagement

Without **User Involvement** Crowdsensing will fail



Gamification



UCD

Main idea



Bicycle based crowdsensing system

Sensor



Smartphone (web app)



Server



Sensors requirements for participatory sensing

Accurate

Inexpensive

Compact

Usable

Prototype

Arduino Primo Core

Sharp GP2Y1010

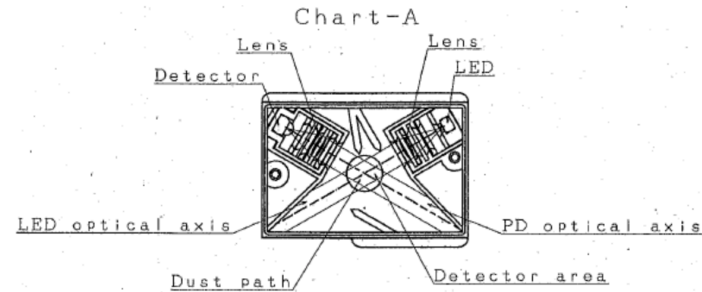
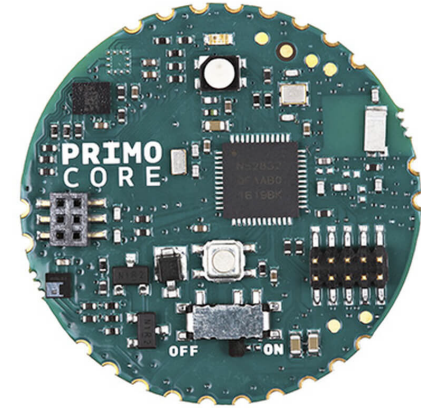


Chart-B
Without dust
and/or smoke

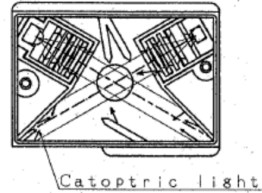
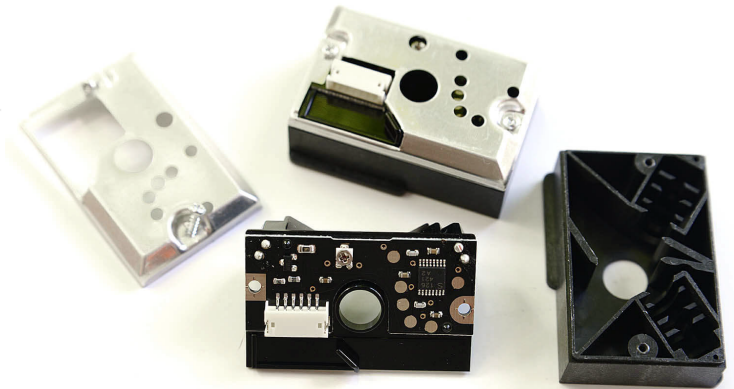
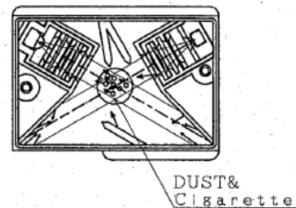


Chart-C
Witht dust
and/or smoke



Application design

1

Analisis

2

Experience prototyping

3

User testing

Voluntary participation

Fun

Value

Ideology

Personal needs



Enviromental sensing core task

Coverage

Touch POI

Rendezvous

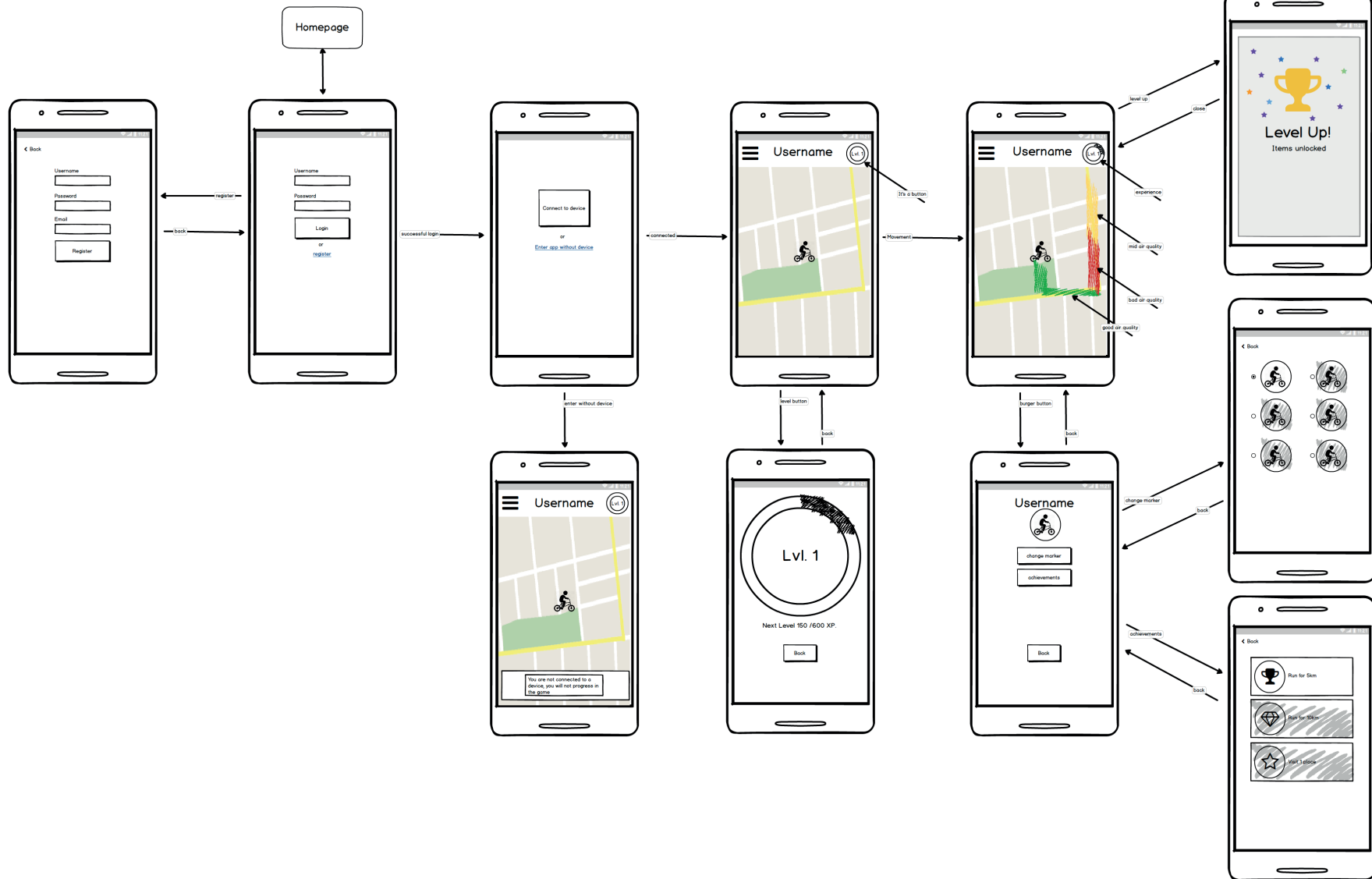
Correct sensing



Mockups



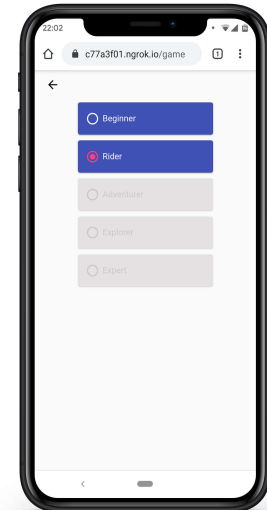
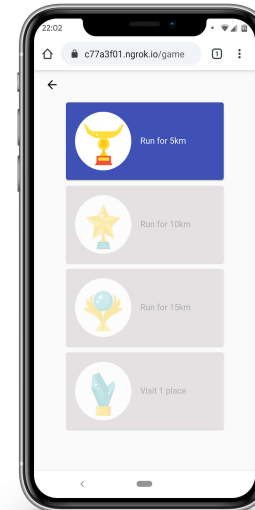
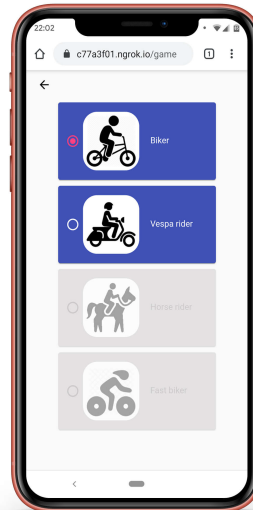
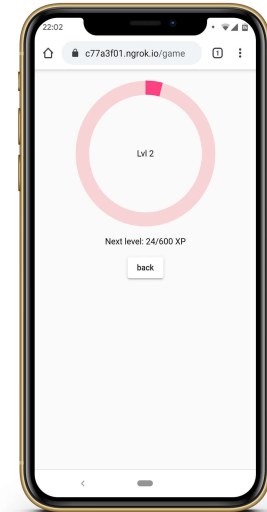
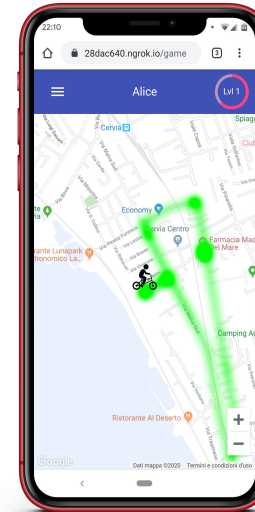
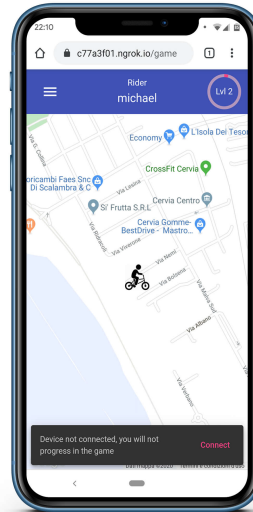
Mockups description



Experience prototyping



Prototype implementation



Testing

Think-Aloud protocol



Future works



App in its early stage



In depth evaluation

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