



# Applicazione basata su sensori per il monitoraggio dell'assunzione dei farmaci

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<http://sites.unica.it/domusafe/>



# Medicine intake monitoring: State of the art

## Pill reminder apps

- Obtrusive
- Context-unaware



## Ingestible sensors and smart packaging

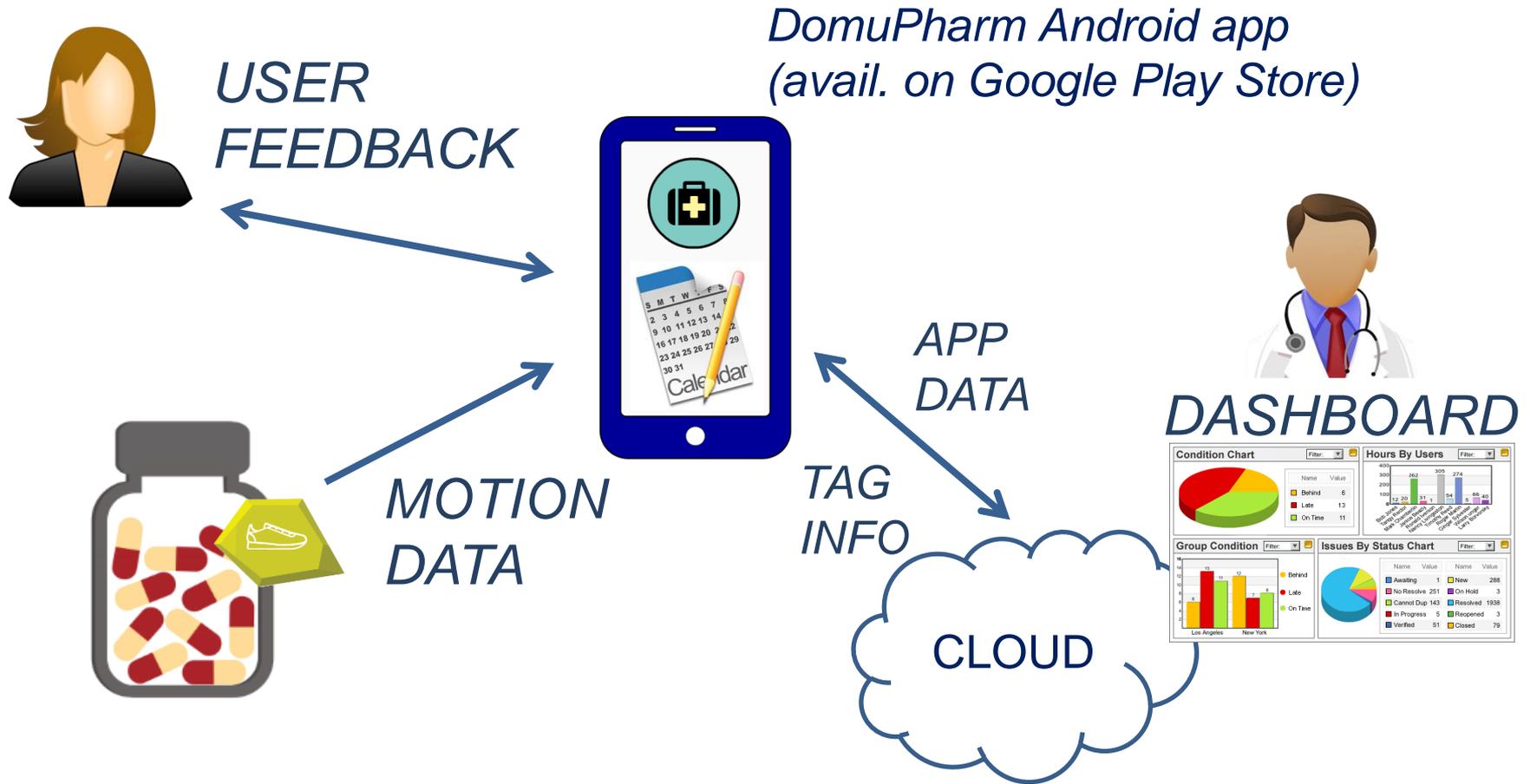
- Expensive and limited to clinical trials



# Objectives

- Cheap and usable today
- Unobtrusive and naturalistic interface
- Accurate
- Context-aware
  - Adapt recognition to patient's habits and routines

# System overview

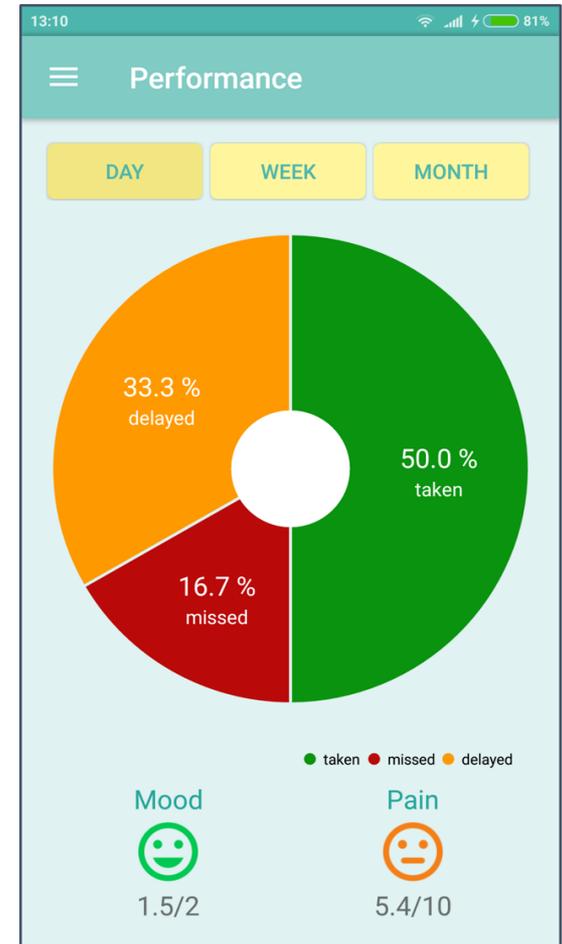
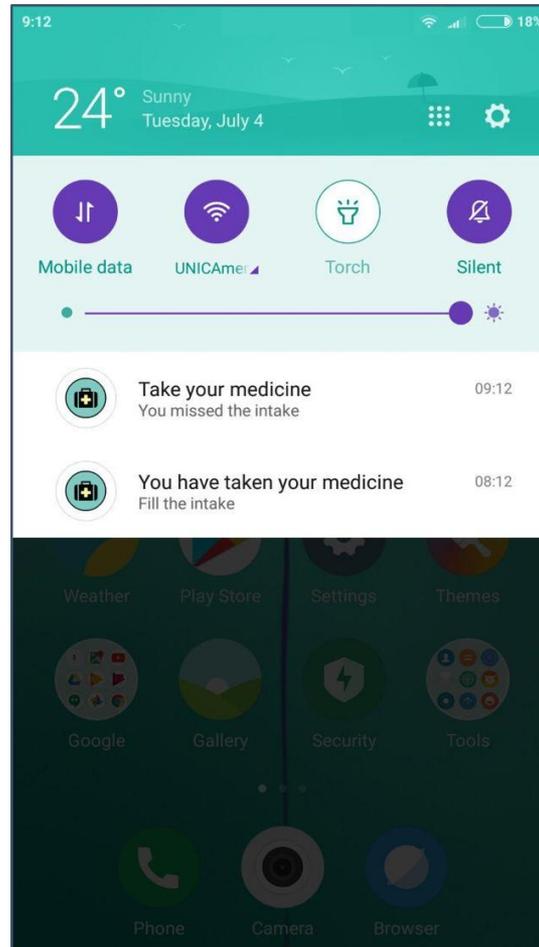
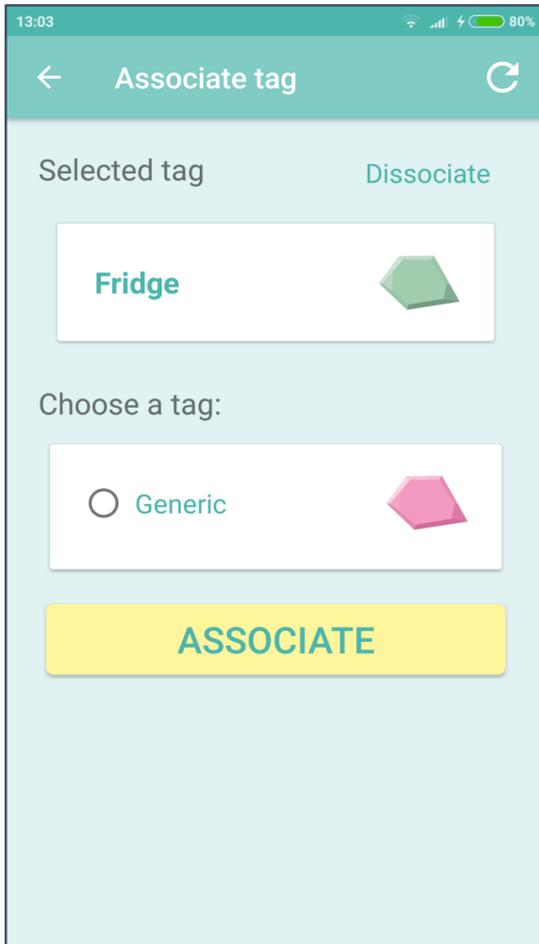


# Motion data from BLE Stickers

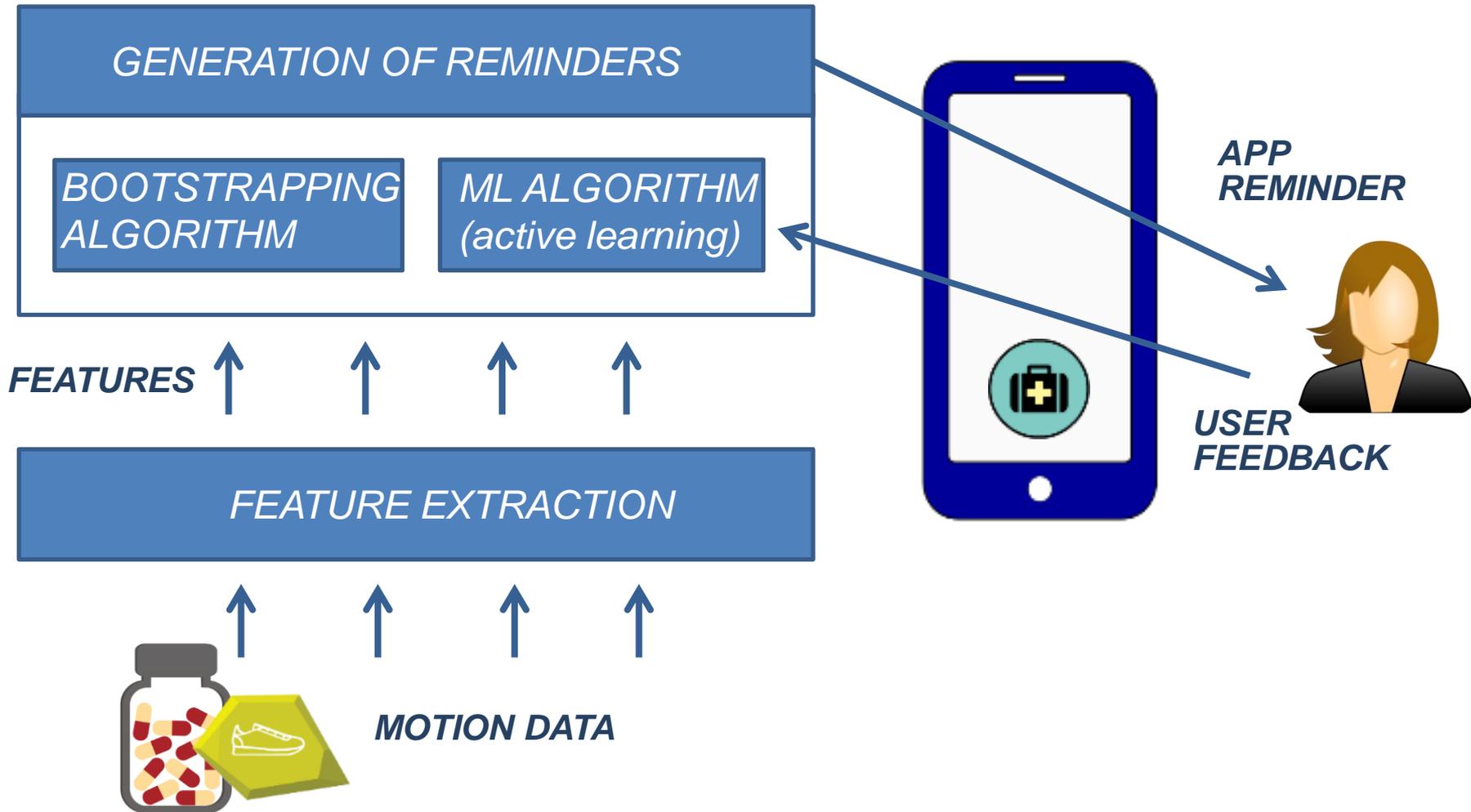
- Tiny sensors with embedded:
  - accelerometer
  - thermometer
  - BLE radio
- Range: from 7 to 50 meters



# Android app



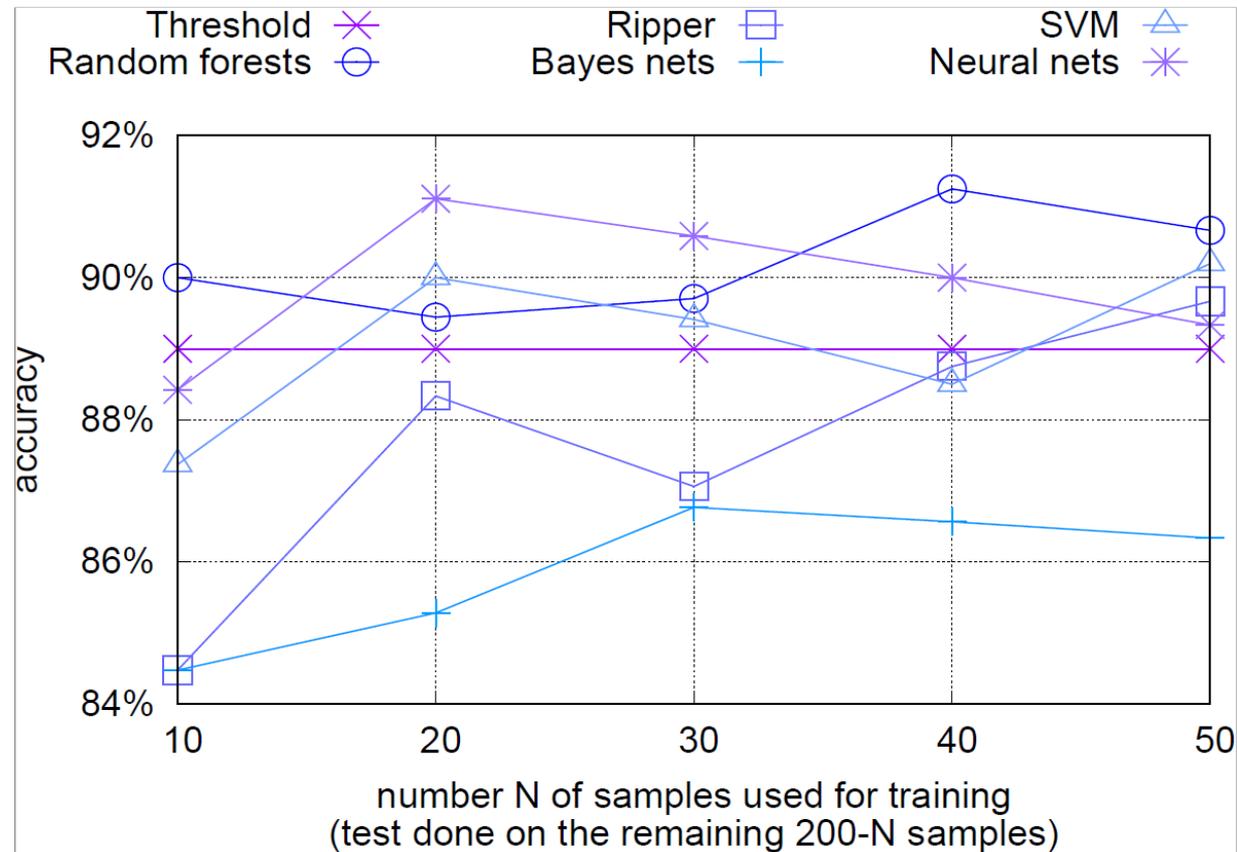
# Algorithms



# Experiments: ML algorithms

- Dataset: two therapies, 200 intake events

- Best results achieved by Random Forests



# Experiments: active learning

- Active learning improves accuracy:  
from 91.3% to 95.2%

	General model (accuracy)	Customized model (accuracy)
Therapy 1	88.24 %	93.65 %
Therapy 2	94.44 %	96.77 %
Average	91.34 %	95.21 %

# Future work

- Improvement of ML and active learning algorithms
- Notifications to caregivers
- Experiments with real patients

# Thanks

- DomuSafe project:
  - Unobtrusive Behavior Monitoring for Active and Healthy Aging
- <http://sites.unica.it/domusafe/>

