www.fit4work-aal.eu

# Fit4WORK

SELF-MANAGEMENT OF PHYSICAL AND MENTAL FITNESS OF OLDER WORKERS

## Prevention of health-related absence of older workers

**Michał Kosiedowski, Project Coordinator**
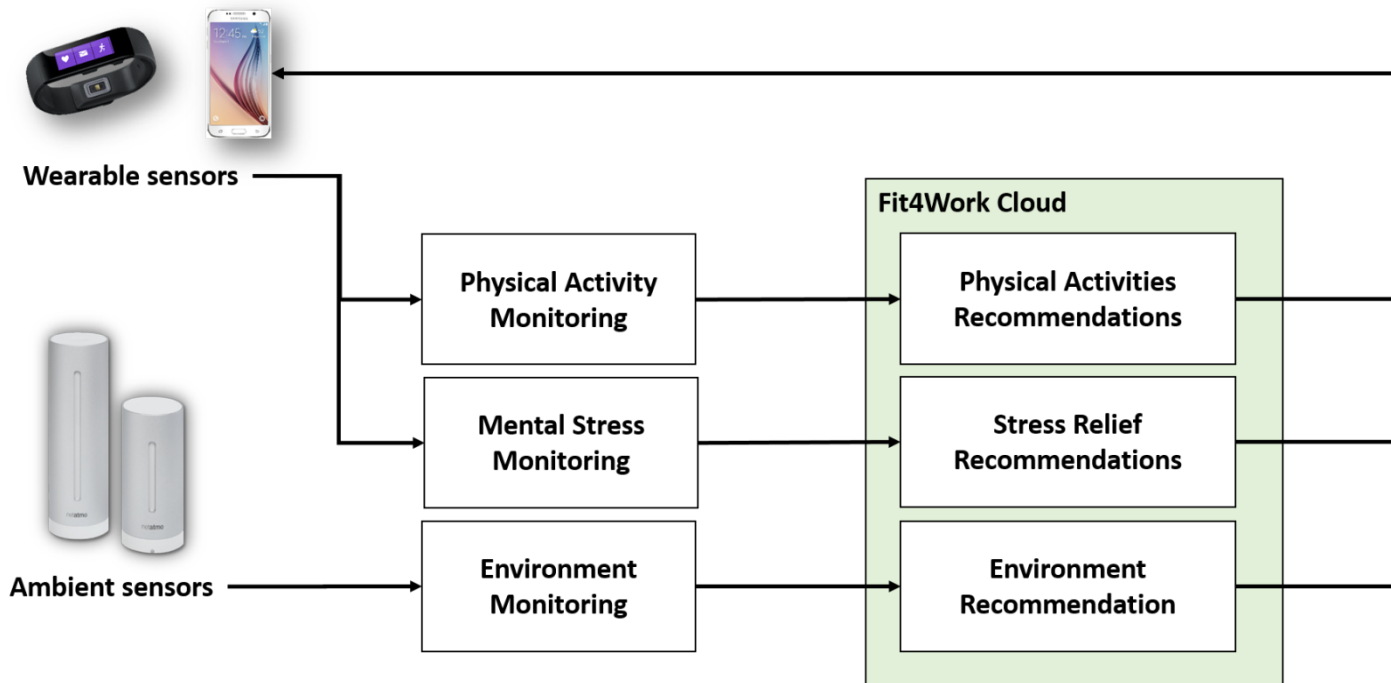**Poznań Supercomputing and Networking Center**

## Objective

**innovative easy-to-use and unobtrusive system that supports older workers in reducing and managing physical, mental and environmental stress resulting from their occupation**

# What should the solution do?

# Stress monitoring in Fit4Work

# Physical activity monitoring

- Results from earlier (and project) work by a team of researchers at Jožef Stefan Institute[*]

- Monitoring in order to help the use achieve a desired level of physical activity:
  - Daily goal
    - 200 active kcal[#]
    - one (or more) continuous moderate physical activity lasting at least 10 minutes[^]
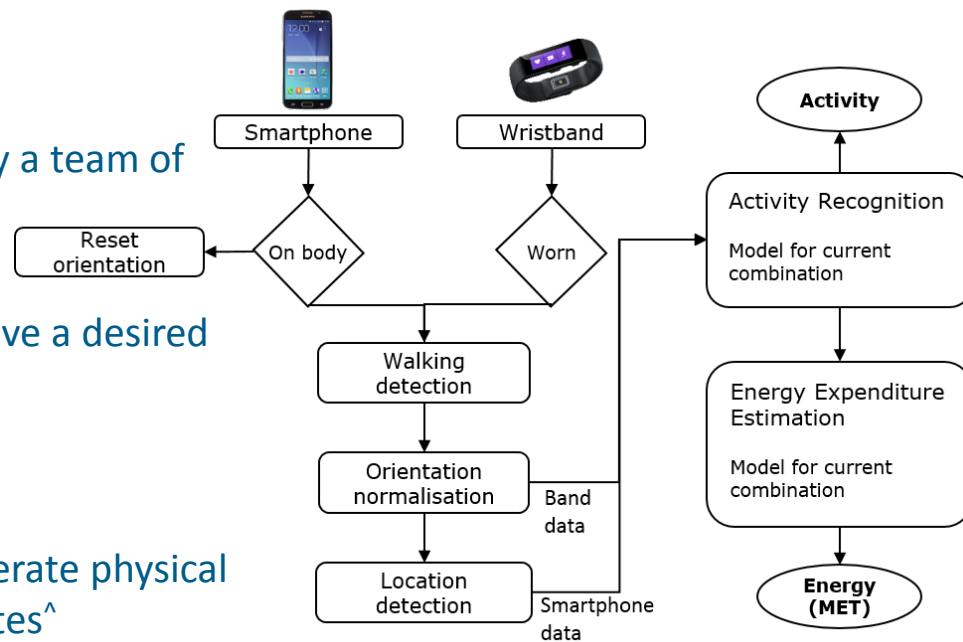


[*] Cvetković, B., Janko, V., & Luštrek, M. (2015). Activity Recognition and Human Energy Expenditure Estimation with a Smartphone. Proceedings of PerCom 2015
[#] Pate R.R., Pratt M., Blair S.N., Haskell W.L., Macera C.A., Bouchard C., Buchner D., Ettinger W., Heath G.W., King A.C. (1995). Physical activity and public health: a recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. Journal of the American Medical Association 273 (5): 402-407.
[^] World Health Organization (2010). Global Recommendations on Physical Activity for Health. WHO Library Cataloguing-in-Publication Data

# Postural stress monitoring

- Monitored through detecting type of physical activity
- Recognized activities:
  - Standing
  - Sitting
  - Walking
  - Running
  - Lying
  - Cycling
  - Mixed (standing activity like e.g. cooking)
  - Transition

- Goal: detect prolonged physically demanding positioning of the users (e.g. office – sitting for longer than an hour straight) and recommend to take a relevant break from this positioning (e.g. stand up and take a walk)

# Mental stress monitoring

- Machine-learning method applied on raw data collected from bio-sensors
  - blood volume pulse
  - heart rate
  - R-R intervals (heart rate variability)
  - galvanic skin response
  - skin temperature

  and acceleration sensor.
- Processed using signal processing techniques in order to provide numerical features relevant for stress
- Goal: detect the level of mental stress as a derivative of
  - physiological signals
  - context
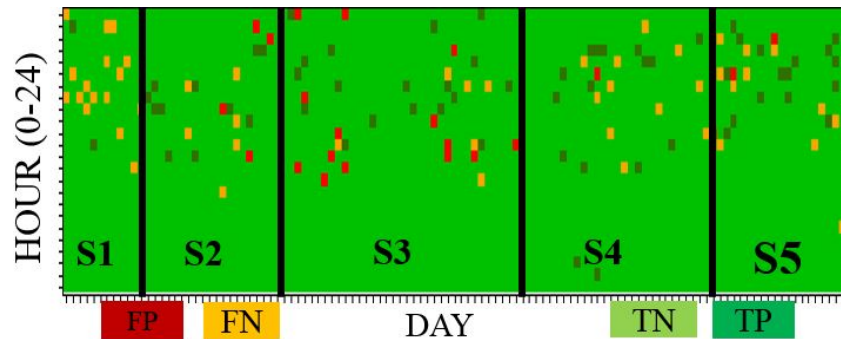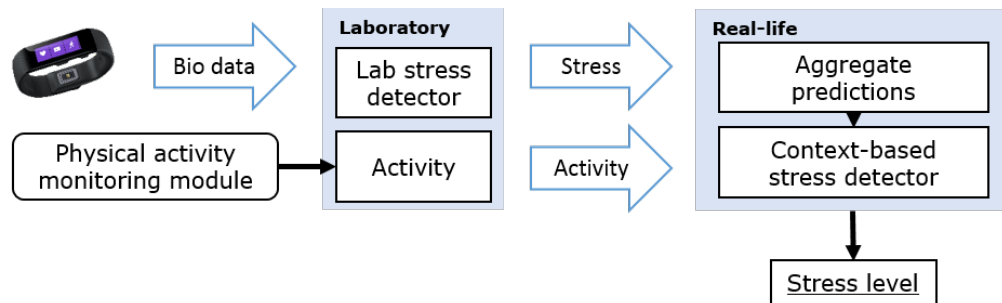


*Stress classifications: green correct, yellow&red false*

# Workplace conditions monitoring

- Good workplace conditions – ISO standards:
  - air temperature
  - concentration of carbon dioxide - $CO_2$ - in the air
  - relative humidity
  - noise
  - luminosity

- Goal: detect if any workplace environment condition is outside the norm and recommend action that could help to improve that

- The algorithm needs configuration based on available (in the given workplace) measures of changing the environment (e.g. availability of air conditioning)
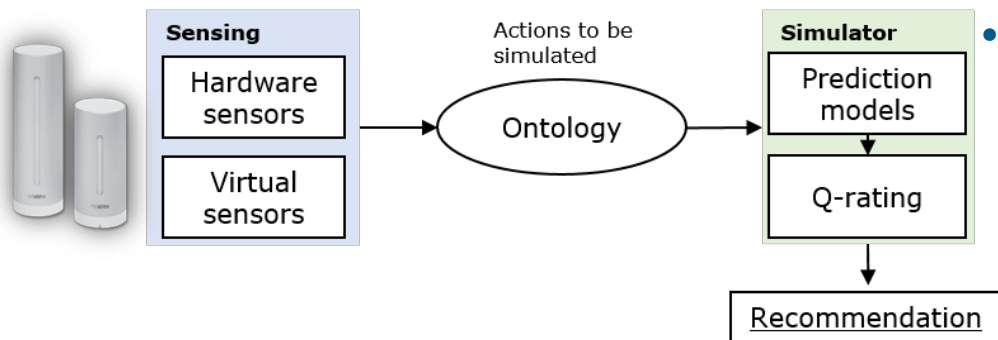
- The algorithm uses external temperature and external relative humidity measurements in working out recommendations that might relate to opening windows

# Functional exercise

- Goal: ensure functional independence (at work / occupation) through a programme of functional exercises with multiple (difficulty) levels

- Exercises do NOT pose risk for persons with (minor) health problems





*Long term goal: use 3D motion sensor built into the smartphone*

# User application





*Complimentary PC (web) interface*

**Project coordinator:**
**Poznan Supercomputing and Networking Center**

ul. Jana Pawła II 10, 61-139 Poznan, phone: (+48 61) 858-20-01, fax: (+48 61) 852-59-54
www.psnc.pl, e-mail: office@man.poznan.pl

# www.fit4work-aal.eu