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COST Action TD1105

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New Trends and Challenges for Air Quality Control

University of Latvia - Faculty of Geography and Earth Sciences

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OPTICAL AIR QUALITY SENSORS: BENZENE, DUST, CO_2

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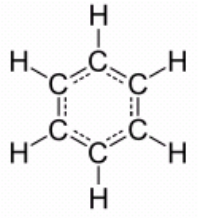
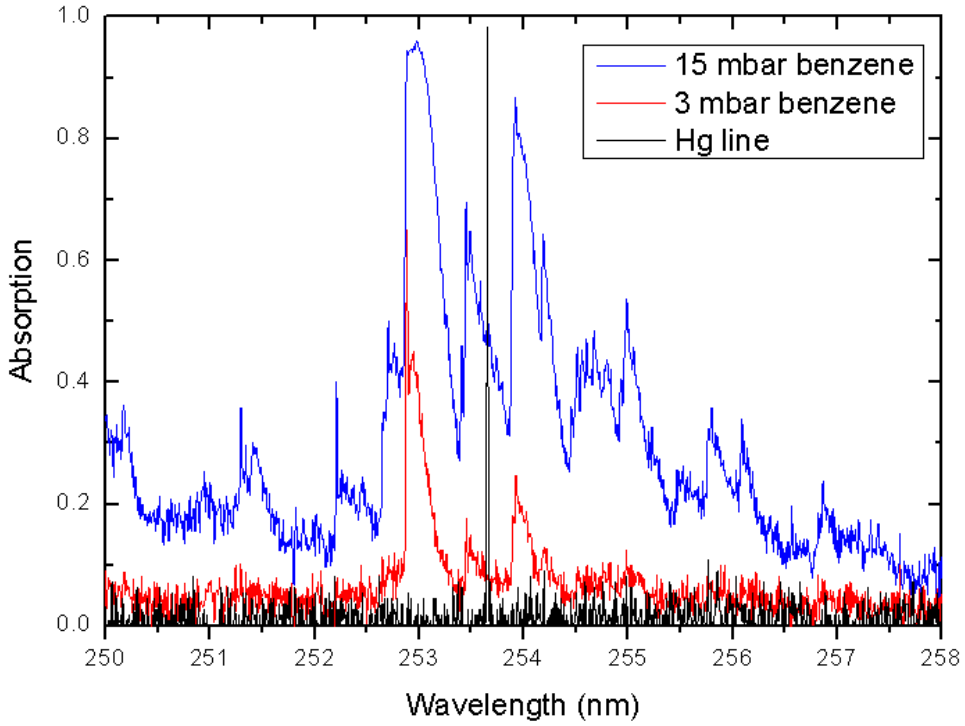
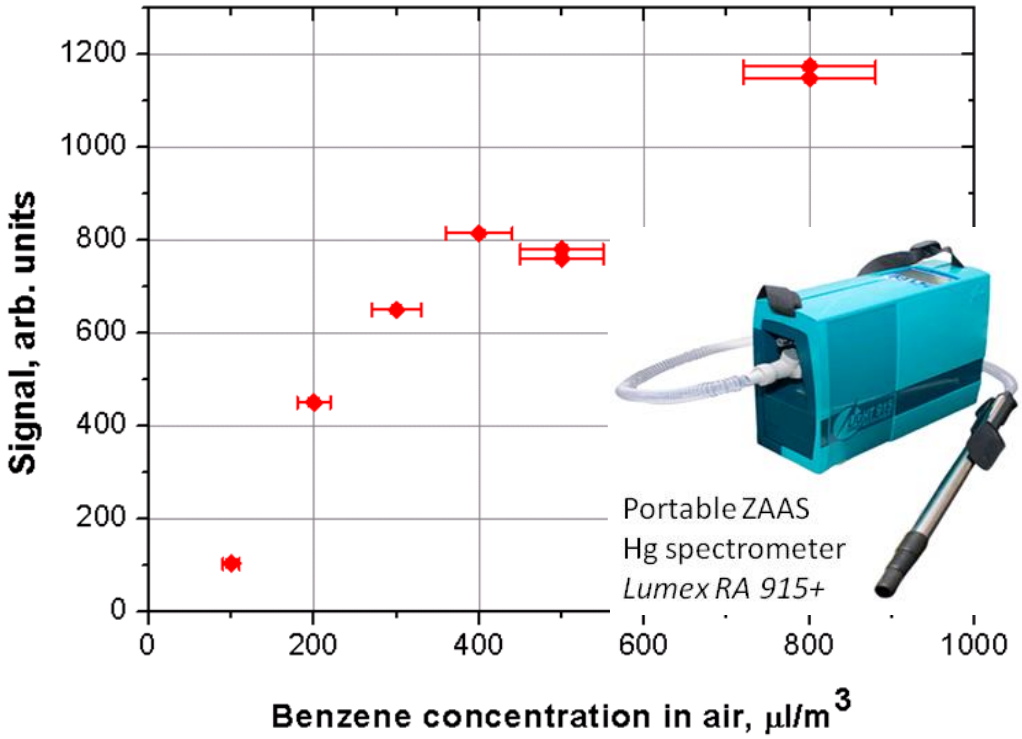
Benzene detection using Hg ZAAS spectrometer

- C_6H_6 occurence: coal tar, cigarette smoke, gasoline, solvent, rubber
- C_6H_6 safety limit 1ppm ~3µl/m^3, ocasionally exceeded in Riga Sea Port area
- C_6H_6 vapour molecules have UV absorption near Hg 254 nm emmision line.
- Zeeman UV AA spectrometer *Lumex AR 915+* **sensitivity** is **1 ng/m^3** for **Hg**. Extremely good!
- We demonstrate that Hg ZAAS can be used to measure **benzene in air** at concentrations exceeding **~10 µl/m^3**.



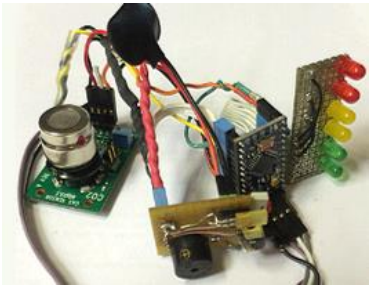
Alnis *et al*, Proc. of SPIE Vol. 9421 94210E-1, 2014

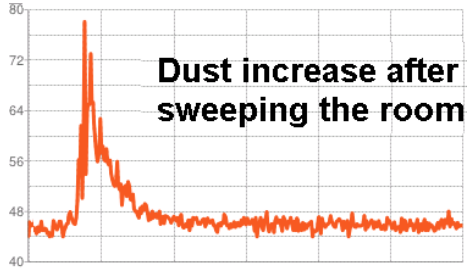




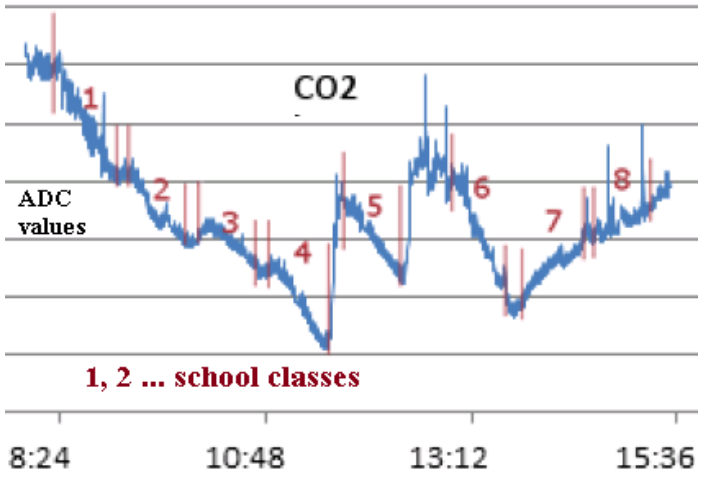
Multi-sensor box for school air monitoring

- **High-school student research project**
- **Documented at *Farnell/Element14* blog**



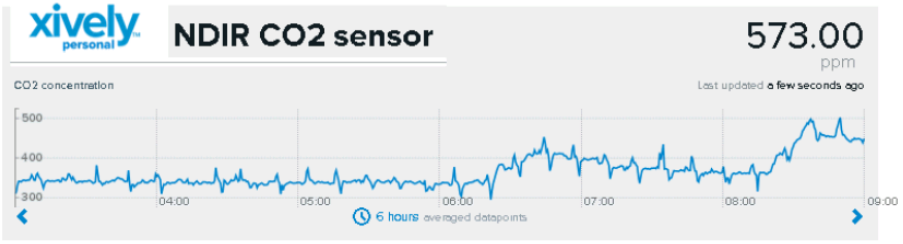


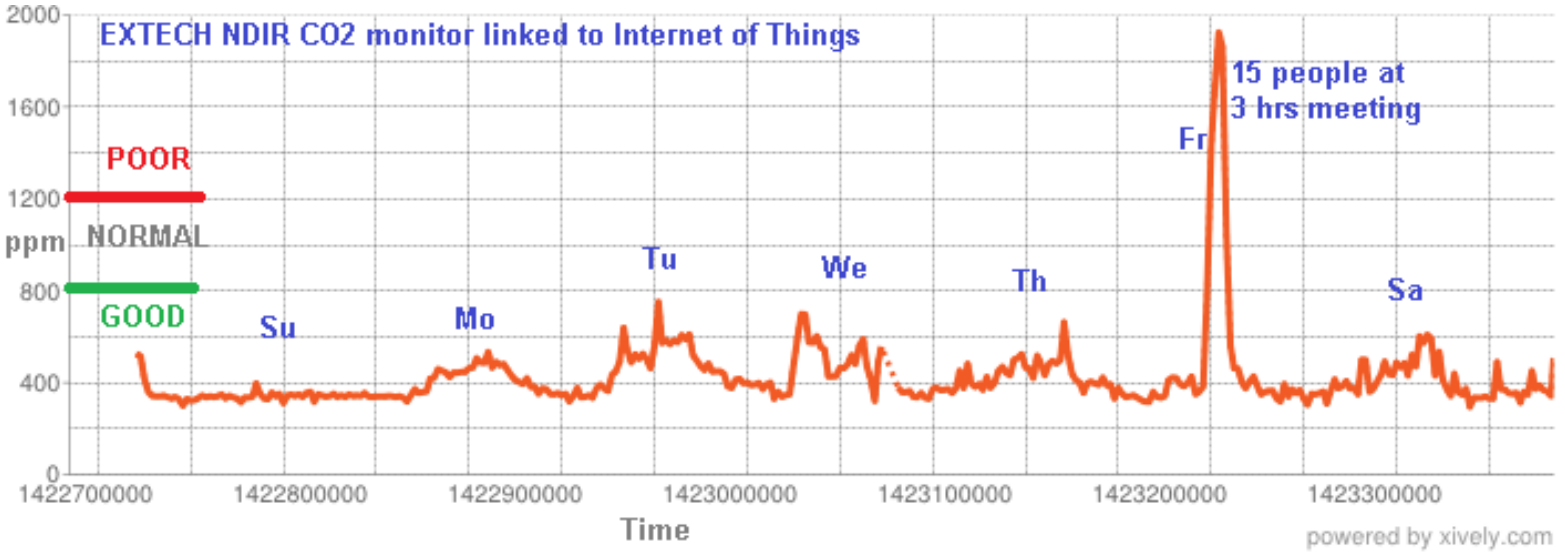
- temperature
- humidity
- pressure
- sound
- light
- dust (*Sharp* GP2Y1010AU0F), not very sensitive
- CO_2 (MG811), suffers from thermal drifts



CO_2 NDIR monitor connected to IoT

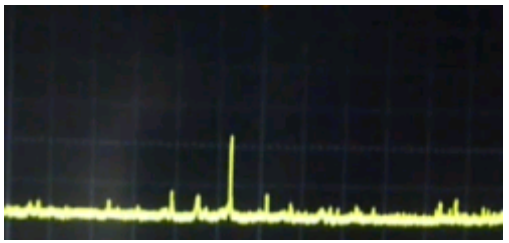
- School air monitoring, ventilation optimization
- *Extech* CO_2 monitor uses *SenseAir NDIR* sensor
- We added *Arduino* and Wi-Fi (*ESP8266*)
- IoT database *Xively.com*

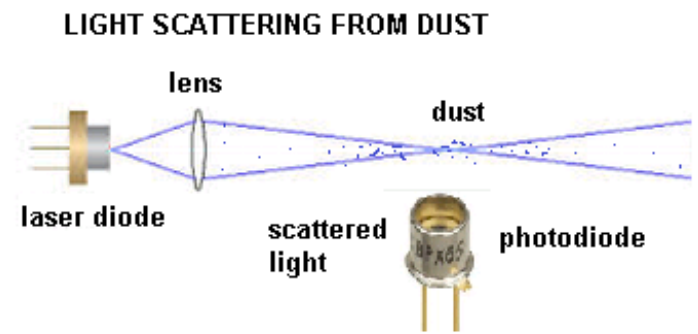


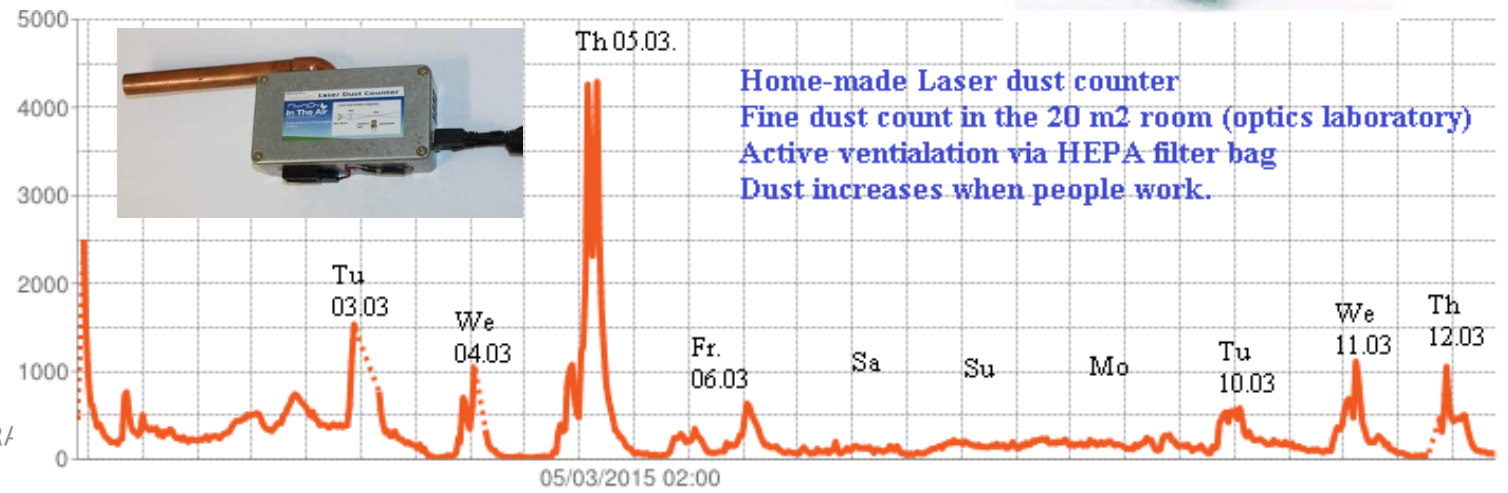


Home-made laser-based dust sensor

- Fine dust originates from diesel engines, heating chimneys, car tires, pollen, construction works, smoking, etc.
- Dust - major problem in laser labs. Air filtering necessary. Quantification needed.
- Commercial optical low-cost module *Sharp GP2Y1010AU0F* was not sensitive enough.
- We detect light scattering using 1 W blue 455 nm diode laser. Dust particles 20…50 in cm^3.
- Vacuum cleaner filter marked *Anti-Alergy* HEPA stops 99.95% of particles.







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