Keeping it fresh – Monitoring of air quality in enclosed spaces

category: environment, health, air pollution

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Motivation

Improving air quality is very important. It can deliver substantial health benefits. Reducing air pollution levels means reducing premature deaths and diseases from stroke, heart disease, lung cancer, and both chronic and acute respiratory diseases, including asthma. In schools the air quality has an impact on your brain's performance. If the air is bad the concentration will start to lack and therefore the students can't take the best out of the class anymore. In supermarkets it would be interesting to find out what impact it might has on the food that is stored there or if it maybe stimulates your consumption. And also, in gyms or sport halls it is important to have fresh air because the performance in the sport depends on it. You can't reach the same level with bad air. Especially in minergy houses this has to be controlled often to be sure that the system of these houses works all right.
To dive deeper into the topic we need to find out what kind of element we can filter in the air and which ones harm you at a certain amount.

Approach: What system approach, technology, idea is being proposed? (Sabin)

The main idea here is to monitor the air quality of a room or a certain place. To do this, a monitoring system can be made either using Raspberry pi or Arduino . Then it can be attached to different sensors and a display that should show the index. Depending upon the index, the air quality can be determined how good or bad it is in a certain place

Things that might be needed to complete the project:

1. Raspbery pi or Arduino
2. Breadboard and wires
3. Air Quality Sensors
4. Display board (to show air quality)

Techniques

Technically, the system would consist of a network of low-level data collection devices distributed across the site. These devices can be fairly basic, only consisting of a cluster of air quality sensors, practically – a PM2.5 (air particulate pollution), CO2

(carbon dioxide), VOC (volatile organic compounds), ozone gas, possibly expanded to other more specialized sensors in spaces with special requirements (factories, fireplaces, etc.) and a microcontroller with access to WiFi. These metrics will be casted to centralized server over WiFi, and can later offer valuable insights into the air quality over time and over various locations through visualization and analysis. Further, the data can be used to control air quality machines, turning them off when not required, for energy savings.

Evaluation

To judge our approach and to ensure that our device is working properly, we will measure the values of multiple test rooms. We will conduct experiments to ensure that our initial values change if we change the environment, e.g. if the humidity in a room we monitor changes if we bring a pot of water to boil. Other experiments include monitoring if the temperature sinks if we open a window or if the detected level of CO_2 rises after spending some time in a room with the windows closed.
We will proceed to make a live demonstration of or device during our final presentation, monitoring the quality of the air in the class room.