Geolocated Allergen Sensing Platform (GASP)

Why asthma makes it hard to breathe

Inflamed bronchial tube of an asthmatic

Normal bronchial tube
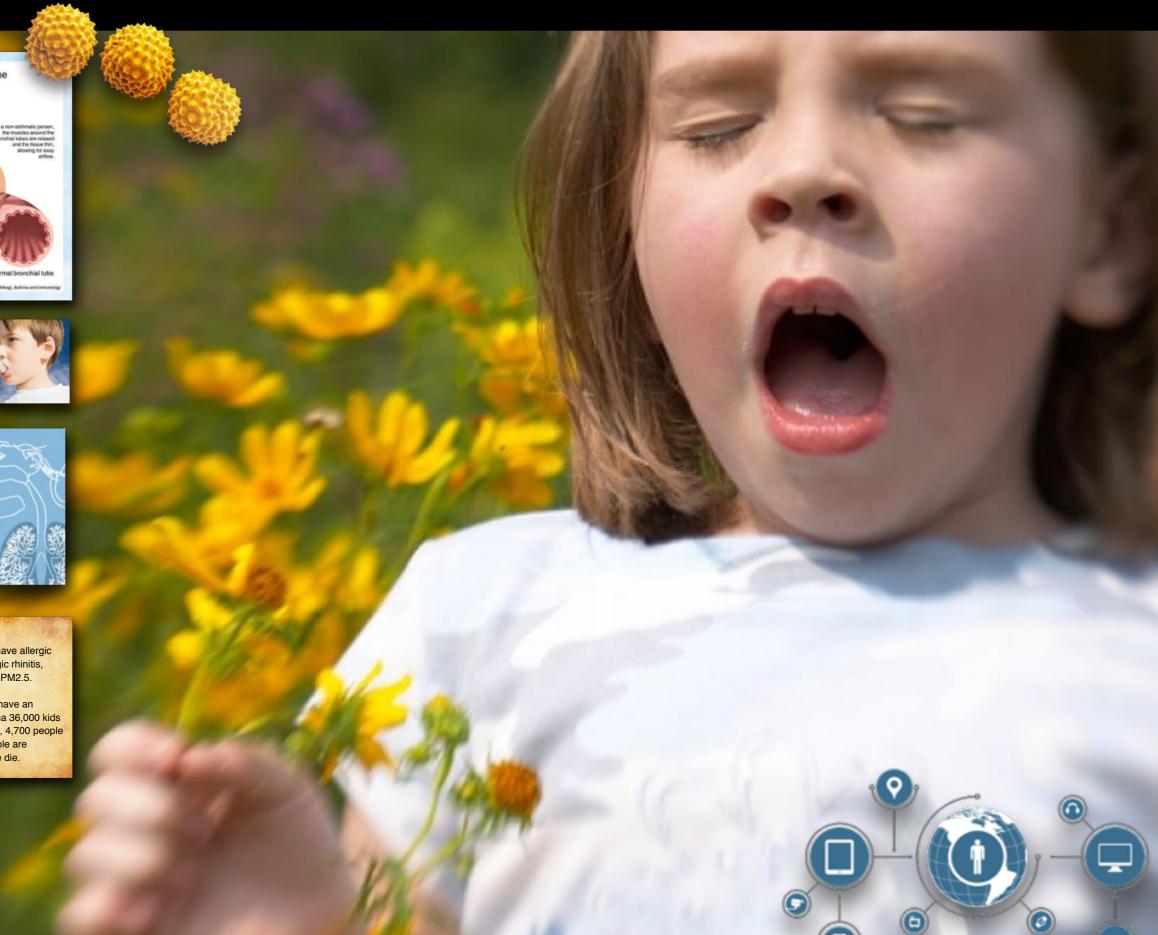
Source: American Academy of Allergy, Asthma and Immunology

ASTHMA
THE BATTLE TO BREATHE

Why we care so much?

Approximately 50 million Americans have allergic diseases, including asthma and allergic rhinitis, both of which can be exacerbated by PM2.5.

Every day in America 44,000 people have an asthma attack, and because of asthma 36,000 kids miss school, 27,000 adults miss work, 4,700 people visit the emergency room, 1,200 people are admitted to the hospital, and 9 people die.

Why we care so much?

Public health, environmental and social determinants of health (PHE)

7 million deaths annually linked to air pollution

In new estimates released, WHO reports that in 2012 around 7 million people died - one in eight of total global deaths – as a result of air pollution exposure. This finding more than doubles previous estimates and confirms that air pollution is now the world's largest single environmental health risk. Reducing air pollution could save millions of lives.

Read the news release on air pollution attributable deaths
Read the feature story on air pollution
- FAQs on air pollution and health pdf, 169kb
- Air pollution estimates pdf, 1.16Mb Summary of results and method descriptions

World Health Organization

3.7 million deaths	4.3 million deaths	1600 cities
attributable to ambient air pollution	attributable to household air pollution	worldwide are reporting air pollution levels
Mortality from ambient air pollution for 2012 - summary of results pdf, 293kb	Mortality from household air pollution 2012 - summary of results. pdf, 558kb	Air quality in cities database – summary of results pdf, 304kb

NIST National Institute of Standards and Technology U.S. Department of Commerce

NEXT GEN APPLICATIONS

Long-Term Average 1997-present

Mobile Sensors
Wearable Sensors

Automated traffic patterns, driverless cars routing

UTD

PM2.5 Air Quality Standards

Japan	USA	WHO/EU
Annual Avg.: 15µg/m³	Annual Avg.: 15µg/m³	Annual Avg.: 25µg/m³
24 hour Avg.: 35µg/m³	24 hour Avg.: 35µg/m³	24 hour Avg.: 20µg/m³

PDF of PM2.5 Abundance for November 19, 2014

PDF of PM2.5 Abundance for December 04, 2014

Day within EPA Air Quality Standards

Day with exceedance of EPA Air Quality Standards

Flight on Nov 18, 2014 clear skies

Flight on Dec 04, 2014 hazy/overcast

GEOLOCATED ALLERGEN SENSING PLATFORM (GASP)

PROTOTYPES ARE ALREADY IN PLACE

CHATTANOOGA GASP

Thanks to the NSF support we can now validate and deploy an array of Internet of Things remote airborne particle sensors within Chattanooga to be used to provide real-time streamed data on hourly particulate levels, Measuring a full size distribution from 0.7-40 microns

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Low pressure front moving in | Low pressure front moving out | High pressure front moving in | Stationary high pressure front

May 2014

No significant rain in 16 days | 0.56" of rain on May 8 | 0.91" of rain for May 12, 13, and early morning on May 14 combined | 0.27" of rain for May 25, 26, and 27 combined

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