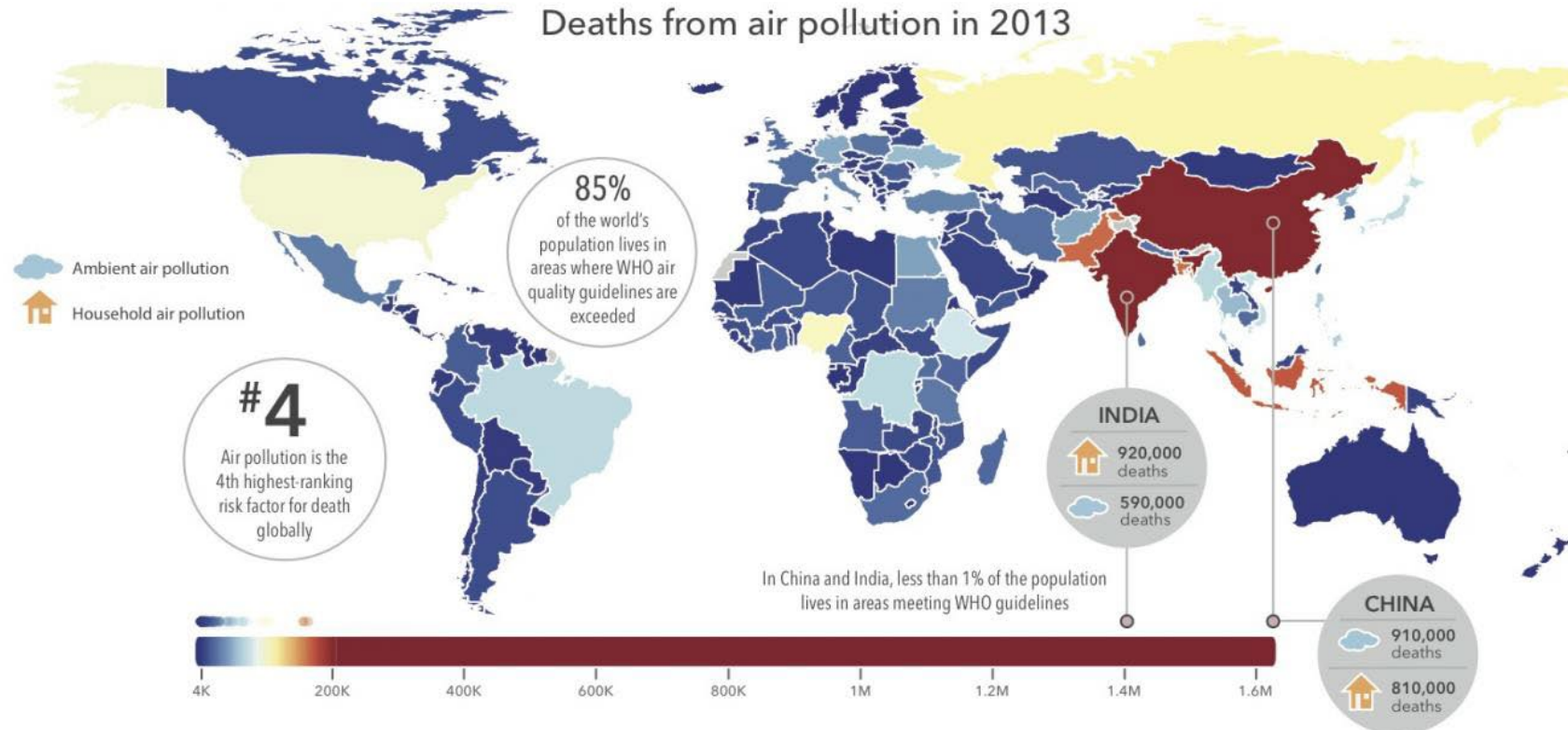


# Developing a prototype device to measure individual exposure to poor air quality

Dr. Tom Clemens

Dr. Scott Ogletree

# Global Burden of Air Pollution



## Air pollution was responsible for 5.5 million deaths in 2013

**Household air pollution**  
 Caused by burning solid fuels for heating and cooking, including:



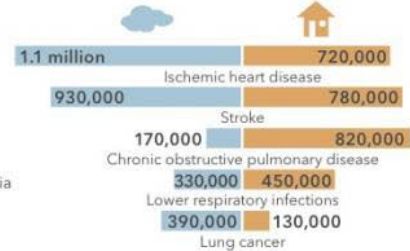
**Ambient air pollution**  
 Caused by emissions from things like:



2.9 million deaths from ambient air pollution in 2013



10% of all deaths were from air pollution in 2013



Source:

1. Forouzanfar MH, et al. Global, regional, and national comparative risk assessment of 79 behavioral, environmental and occupational, and metabolic risks or clusters of risks in 188 countries, 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. *The Lancet*. 2015 Dec 5;386(10010):2287-323.

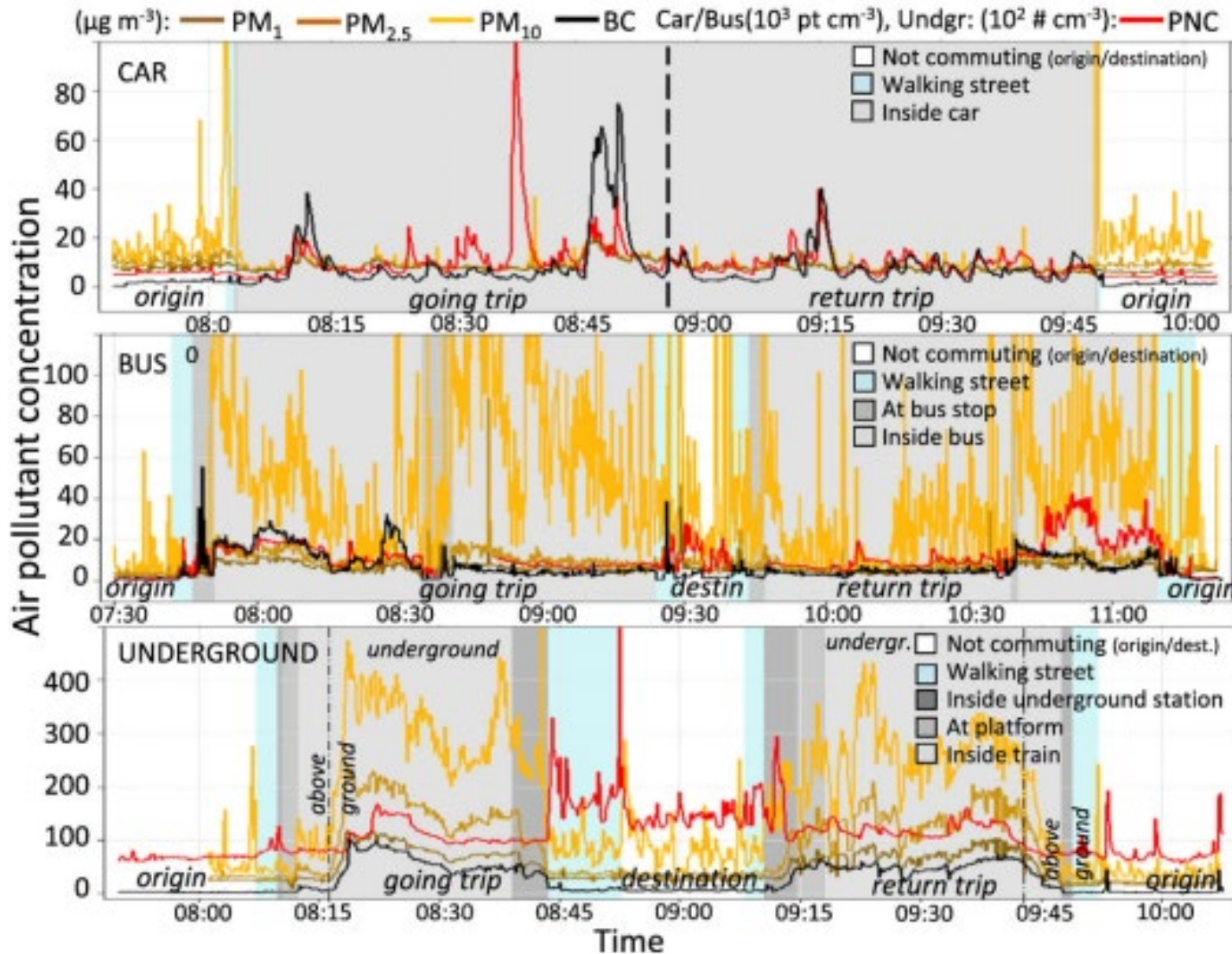
2. Brauer M, et al. Ambient air pollution exposure estimation for the Global Burden of Disease 2013. *Environmental Science & Technology*. 2016 Jan 5;50(1):79-88.



W UNIVERSITY of WASHINGTON

# Personal exposure complexity

I. Rivas et al. / Environment International 101 (2017) 143–157



## Exposure to air pollutants during commuting in London

Rivas I, Kumar P, Hagen-Zanker A. Exposure to air pollutants during commuting in London: Are there inequalities among different socio-economic groups? *Environ Int.* 2017 Apr;101:143-157. doi: 10.1016/j.envint.2017.01.019. Epub 2017 Feb 8. PMID: 28188054.

# Personal exposure monitors – key considerations

- Ease of use
- Lightweight
- Weatherproof
- Reliable and accurate
- Cheap (if buying in bulk for a large project with lots of participants)





# Aim

- Develop a device that;

1. *measures exposure to particulate pollution and GPS location*
2. *Shows live updates of current air quality (web dashboard and on-device)*
3. *Easy to make (e.g. off-the-shelf components and accessible manufacturing techniques such as 3d-printing)*
4. *Battery powered and weatherproof*
5. *Flexible form factor and enclosure design*
6. *Doesn't require a smartphone connection*
7. *Is relatively cheap*
8. *Open source!*

