AirMon: Measuring Your Air

Faculty Supervisor: Dr. Ming Li

TAs: Youngtak Cho, Keerthana Jaya Krishnamoorthy, Srinivasan Murali, Huadi Zhu

Students: Hussain Alkatheri, Zait Martinez, Chandler Wilson, Faaiz Shaphy

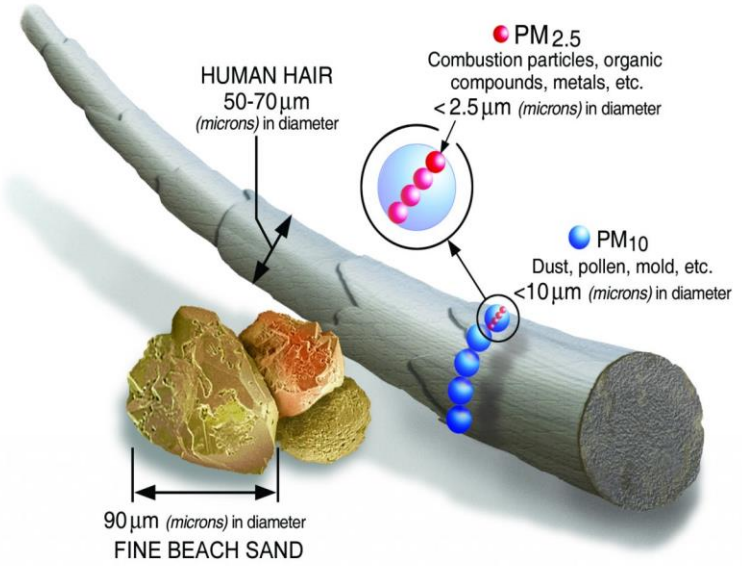
The issue

Certain particles are harmful to humans

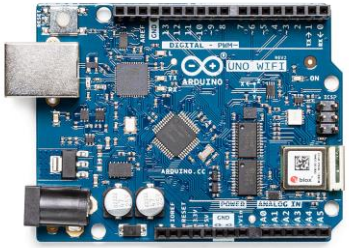
Air pollution is harmful to human health and the planet. When inhaled, particles can hurt the lungs and heart, causing diseases.

Types of particles:

- PM1 – particles <1 µm in size. Examples: dust, bacteria and viruses
- PM2.5 – particles <2.5 µm in size(fine particles). Examples: pollen
- PM10 – particles <10 µm in size(coarse particles). Examples: fine dust and organic particles



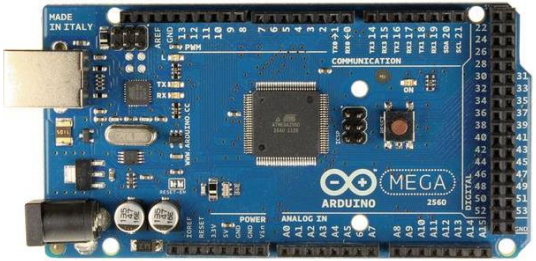
The parts



Arduino UNO WiFi Rev2

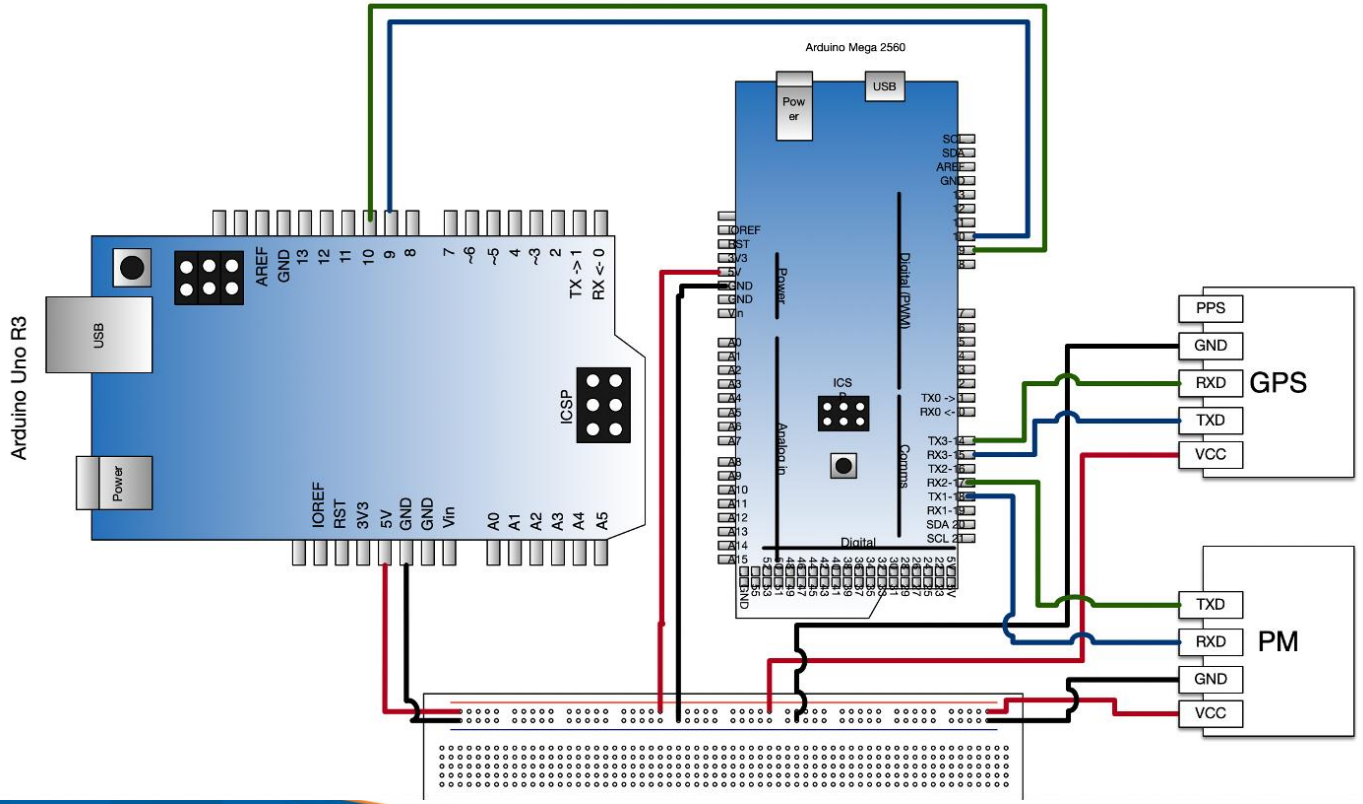
PMS 5003 Air Sensor

GT-U7 GPS Module



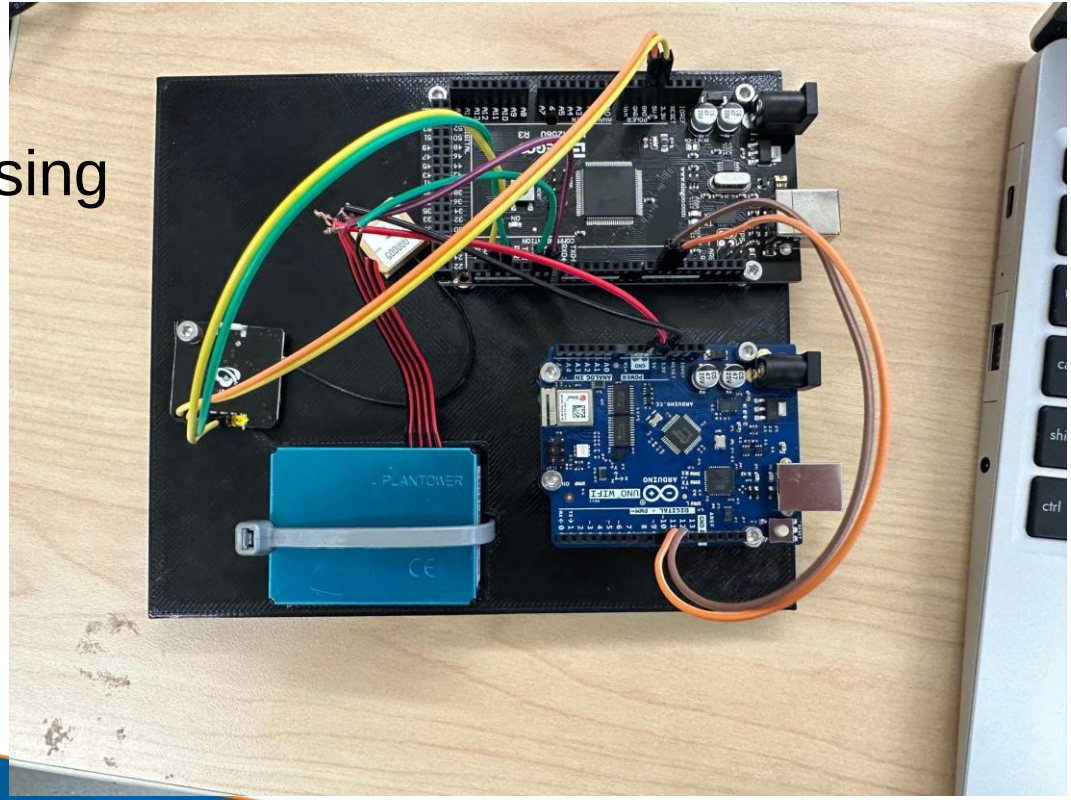
Arduino MEGA2560

How it all connects together



What it looks like

3D printed housing

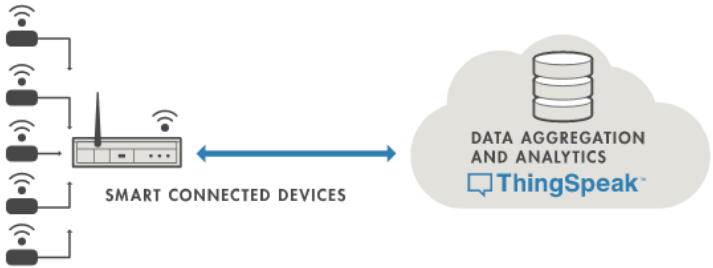


Software

Software is important in order to impower this design

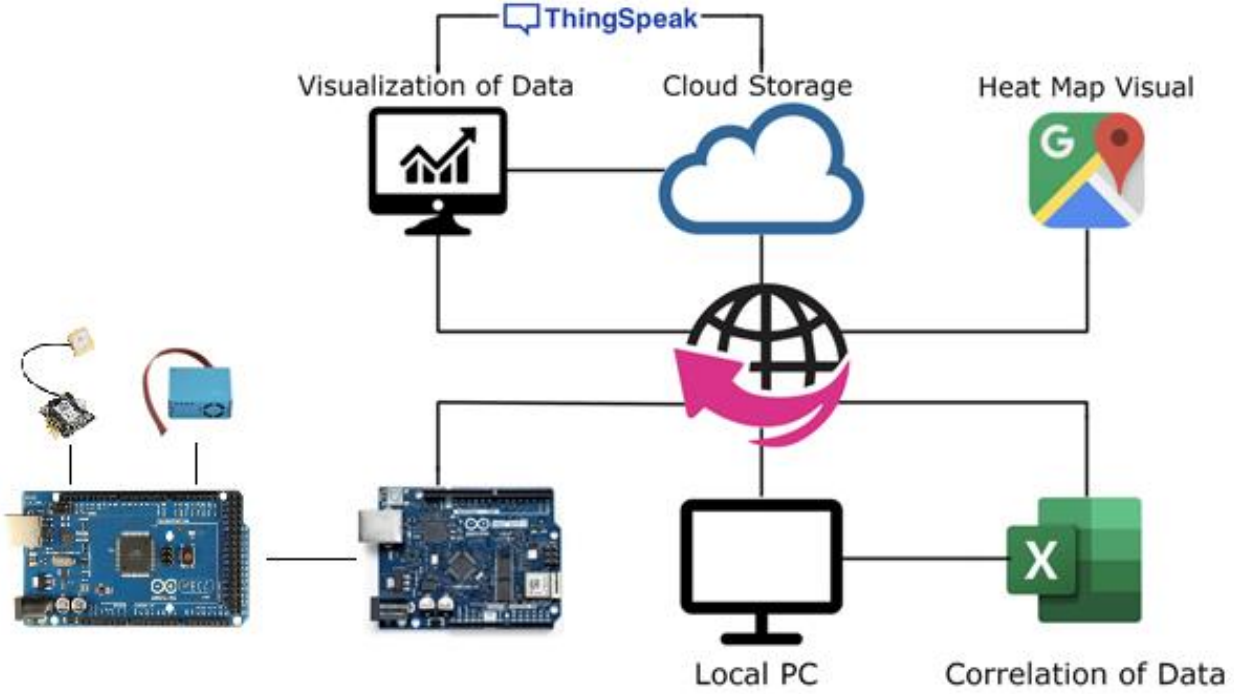
Arduino IDE: development environment

ThingSpeak: A Cloud service provided by MATLAB



Big picture

An overview of architecture

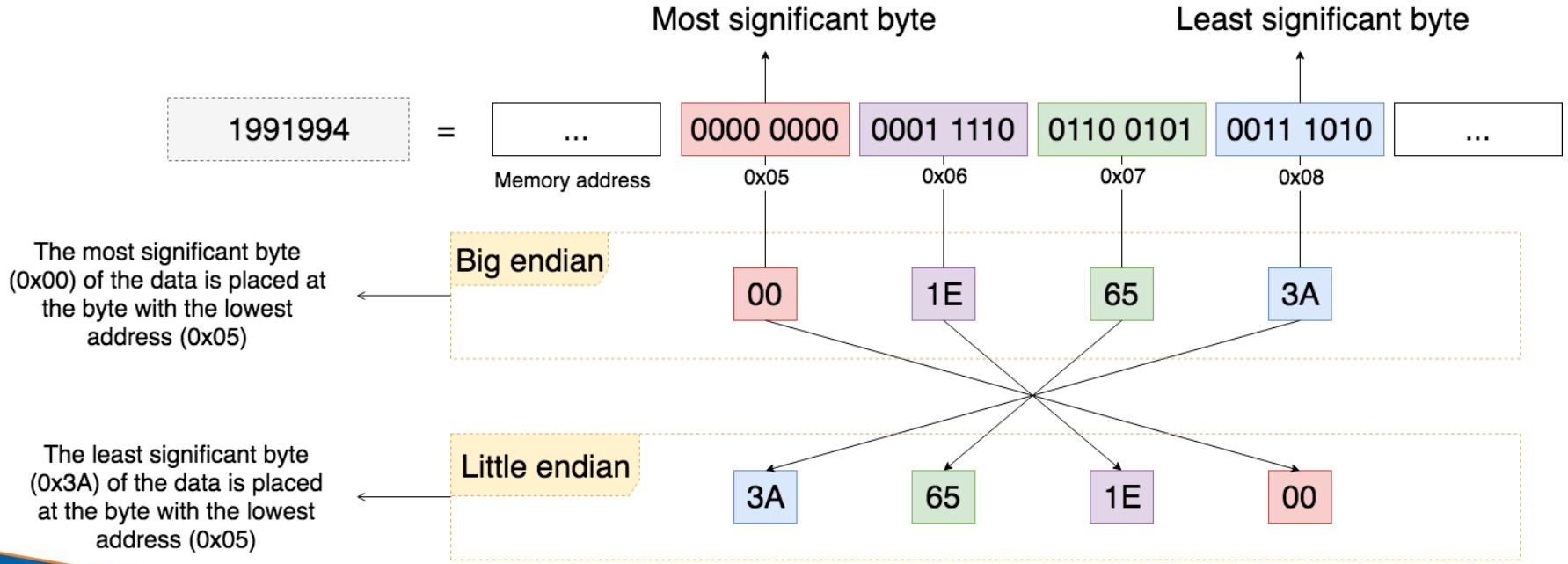


Challenges

Project specific considerations

Big endian to Little Endian

Conversion is a challenge without open-source

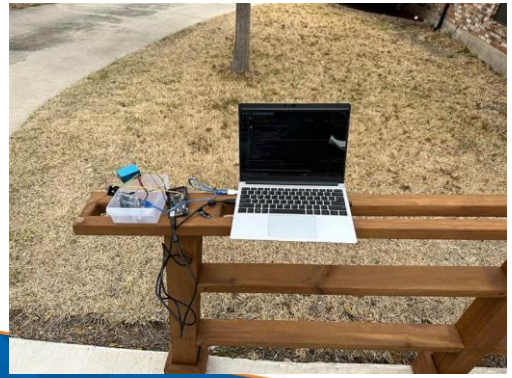


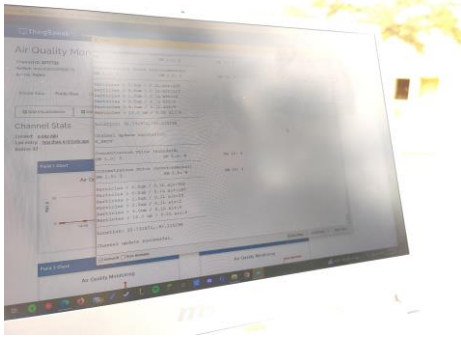
Communication is key

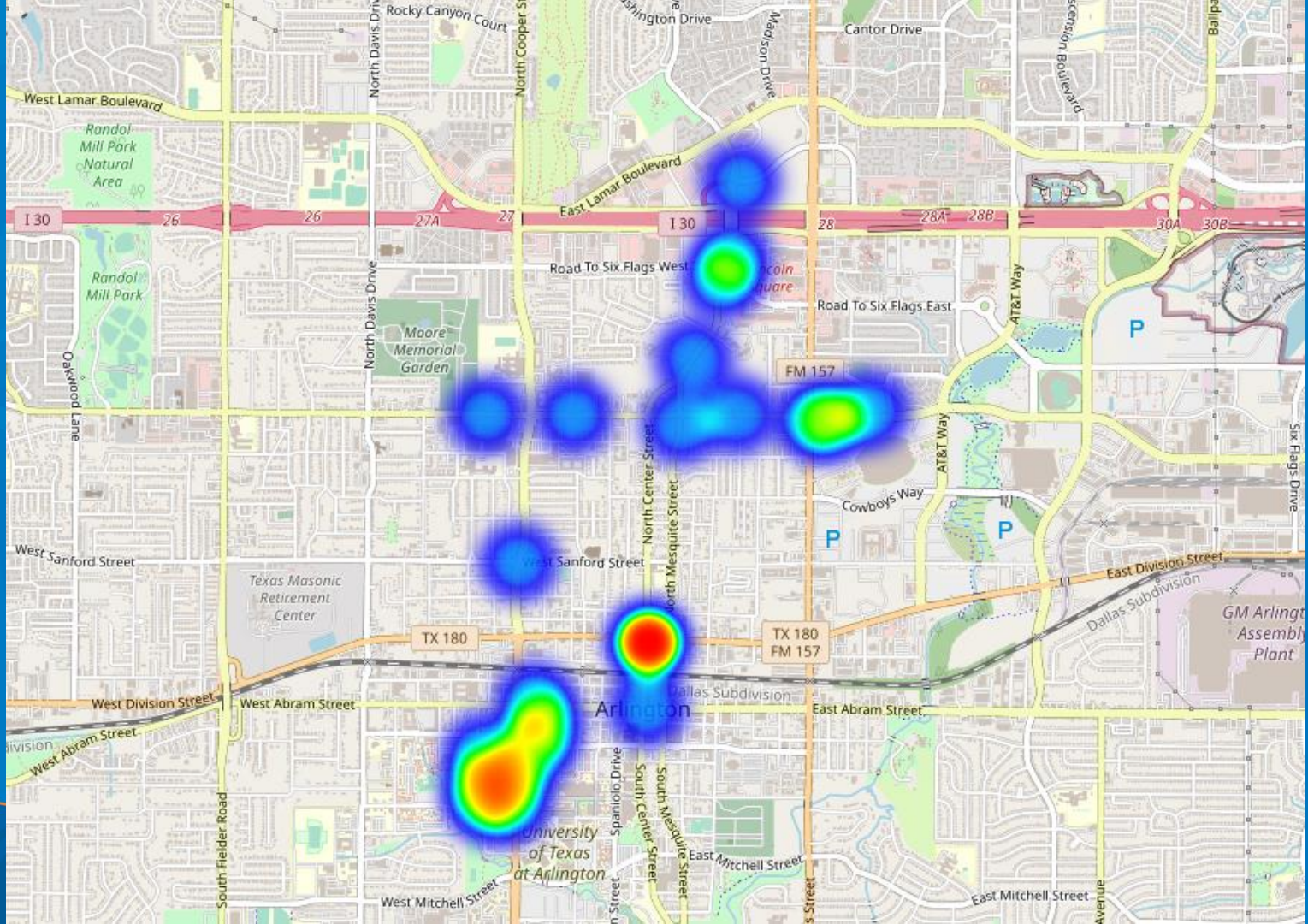
Hardware limits can complicate designs

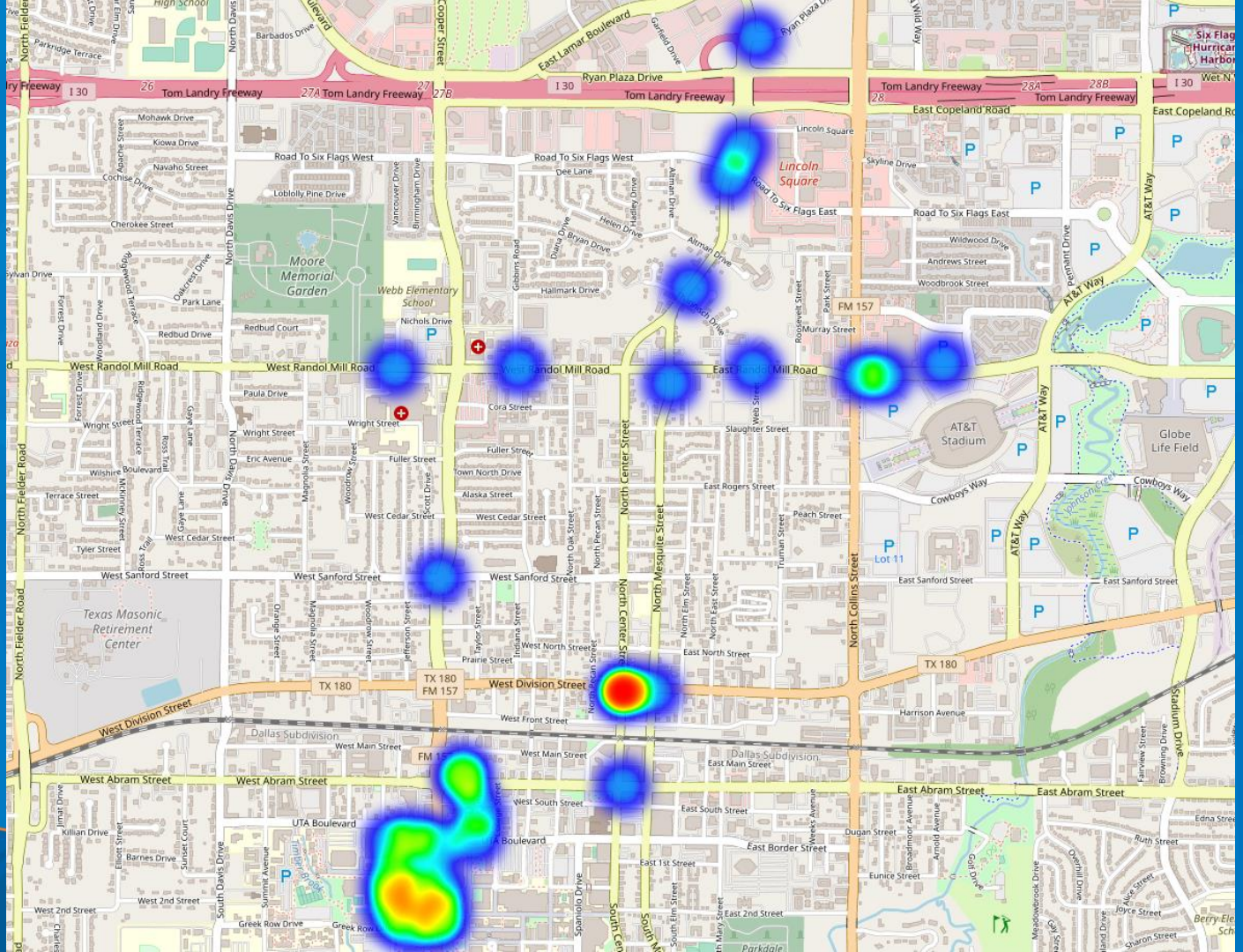
	Arduino MEGA	Arduino Uno WiFi Rev2
MCU	ATmega2560	ATmega4809
Architecture	AVR	AVR
Operating Voltage	5V	5V
Input Voltage	6V – 20V (limit)	6 - 20V
	7V – 12V (recommended)	7V – 12V (recommended)
Clock Speed	16 MHz	16 MHz
Flash Memory	256 KB (8 KB of this used by bootloader)	48 KB
SRAM	8 KB	6KB
EEPROM	4 KB	256 Bytes
Digital IO Pins	54 (of which 15 can produce PWM)	5
Analog Input Pins	16	6
UART (Hardware)	4	1
WIFI	NO	Yes

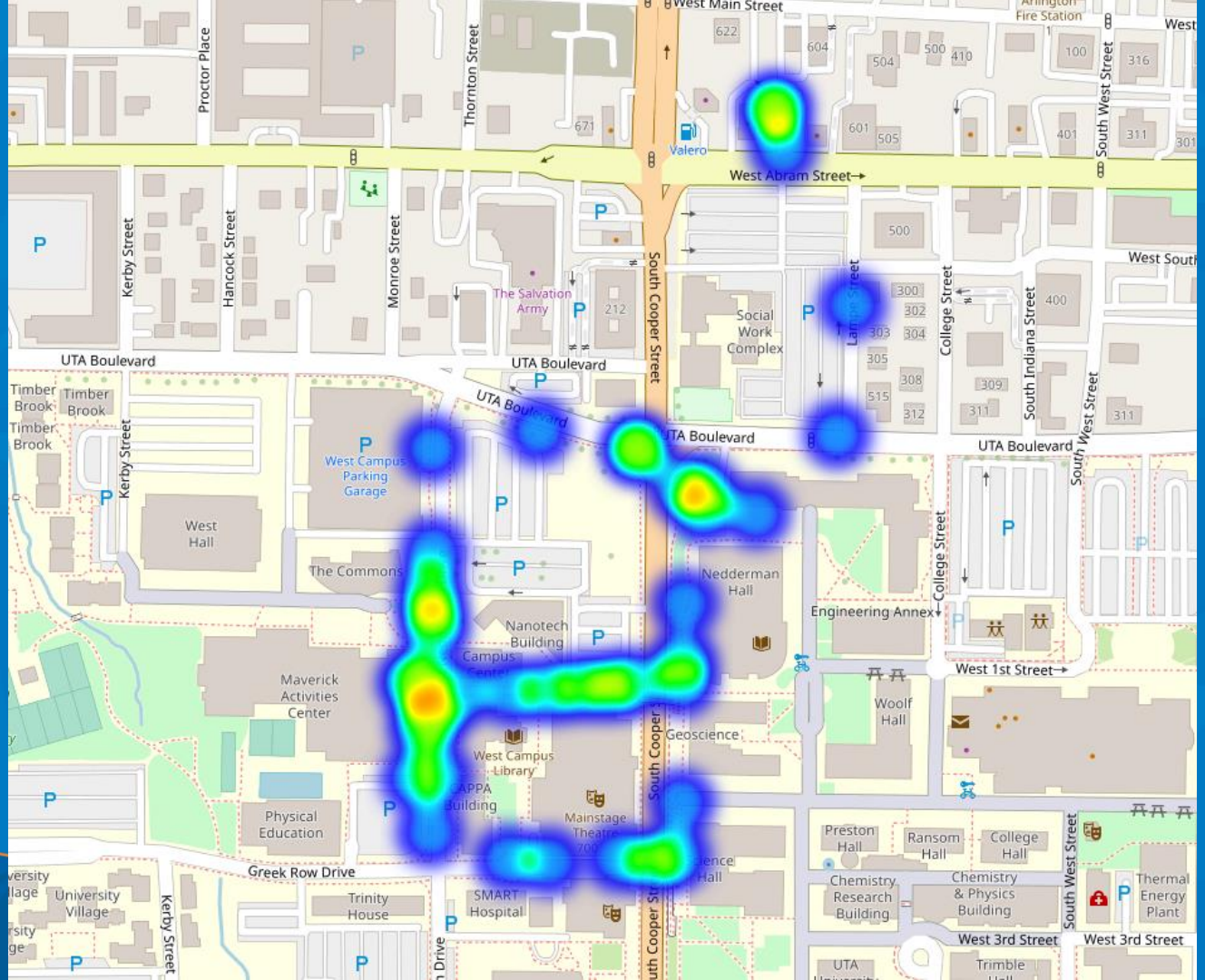
Data Collection






West Lamar Boulevard
Randol Mill Park Natural Area
I 30
East Lamar Boulevard
Road To Six Flags West
Road To Six Flags East
Randol Mill Park
Moore Memorial Garden
FM 157
Texas Masonic Retirement Center
West Sanford Street
TX 180
TX 180 FM 157
West Division Street
West Abram Street
East Abram Street
Arlington
University of Texas at Arlington
West Mitchell Street
East Mitchell Street
Cowboys Way
Six Flags Drive
Dallas Subdivision
East Division Street
North Davis Drive
North Center Street
North Mesquite Street
South Center Street
South Mesquite Street
South Fielder Road
Spaniolo Drive
Oakwood Lane
AT&T Way
Cantor Drive
Rocky Canyon Court
Madison Drive
P


Tom Landry Freeway
I 30
East Lamar Boulevard
Ryan Plaza Drive
East Copeland Road
Road To Six Flags West
Road To Six Flags East
Lincoln Square
Moore Memorial Garden
Webb Elementary School
West Randol Mill Road
East Randol Mill Road
FM 157
AT&T Stadium
Globe Life Field
Cowboys Way
AT&T Way
North Davis Drive
North Center Street
North Mesquite Street
North Collins Street
North Fielder Road
Texas Masonic Retirement Center
TX 180
TX 180 FM 157
West Division Street
Dallas Subdivision
West Abram Street
East Abram Street
UTA Boulevard
East Border Street
West Sanford Street
East Sanford Street
Lot 11


West Main Street
Proctor Place
Thornton Street
Valero
West Abram Street
Kerby Street
Hancock Street
Monroe Street
The Salvation Army
South Cooper Street
Social Work Complex
College Street
South Indiana Street
South West Street
UTA Boulevard
Timber Brook
West Campus Parking Garage
West Hall
The Commons
Nedderman Hall
Engineering Annex
West 1st Street
Nanotech Building
Campus Center
Maverick Activities Center
Woolf Hall
Geoscience
West Campus Library
Physical Education
Mainstage Theatre
Greek Row Drive
University Village
Trinity House
SMART Hospital
Preston Hall
Ransom Hall
College Hall
Chemistry Research Building
Chemistry & Physics Building
Thermal Energy Plant
West 3rd Street
Trimble

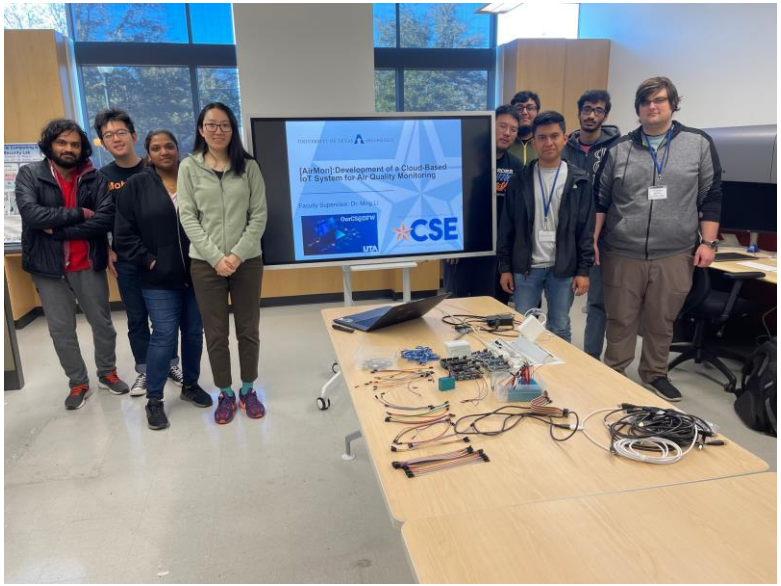
Why is this important?

Low Cost for information

Low-cost alternative

Helping enable air quality sensitive groups understand their environment

Thank you!


[AirMon] Development of a Cloud-Based IoT System for Air Quality Monitoring
CSE