

Zero Emission Network

A CO2 Kiosk Display

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Acknowledgements

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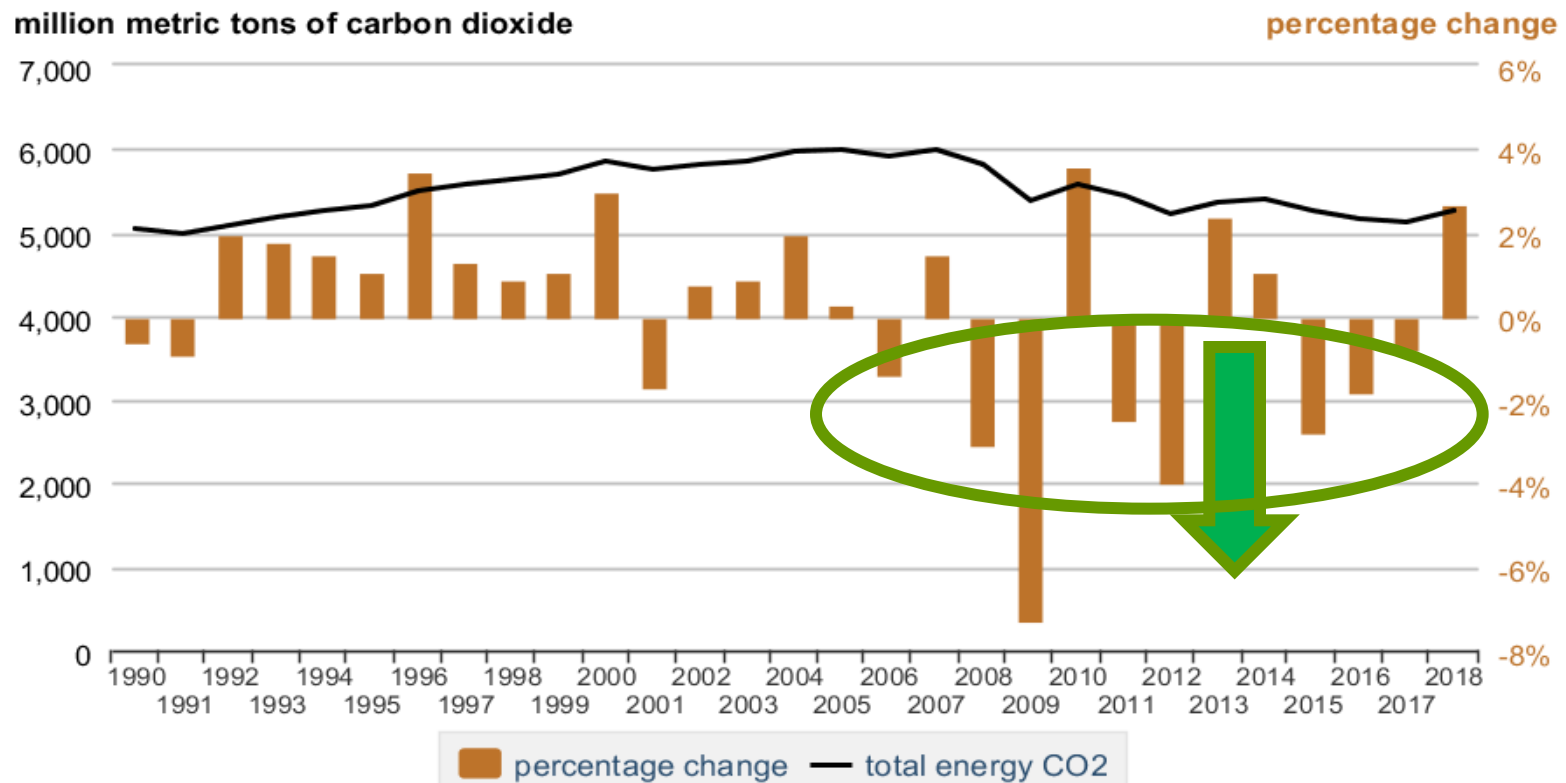
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In 2018, U.S. Emissions



Figure 1. Energy-related carbon dioxide emissions, 1990–2018



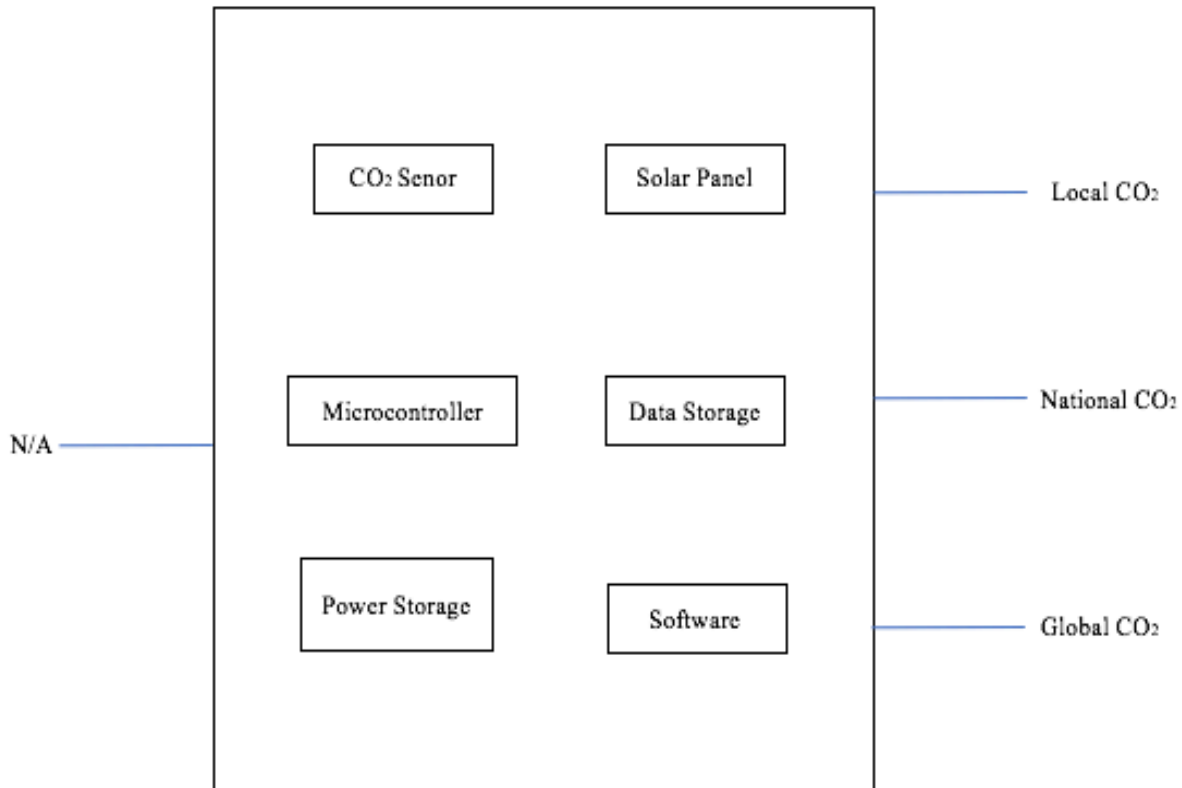
Source: U.S. Energy Information Administration, *Monthly Energy Review*, October 2019, Table 11.1, Carbon Dioxide

CO2 Kiosk Specification

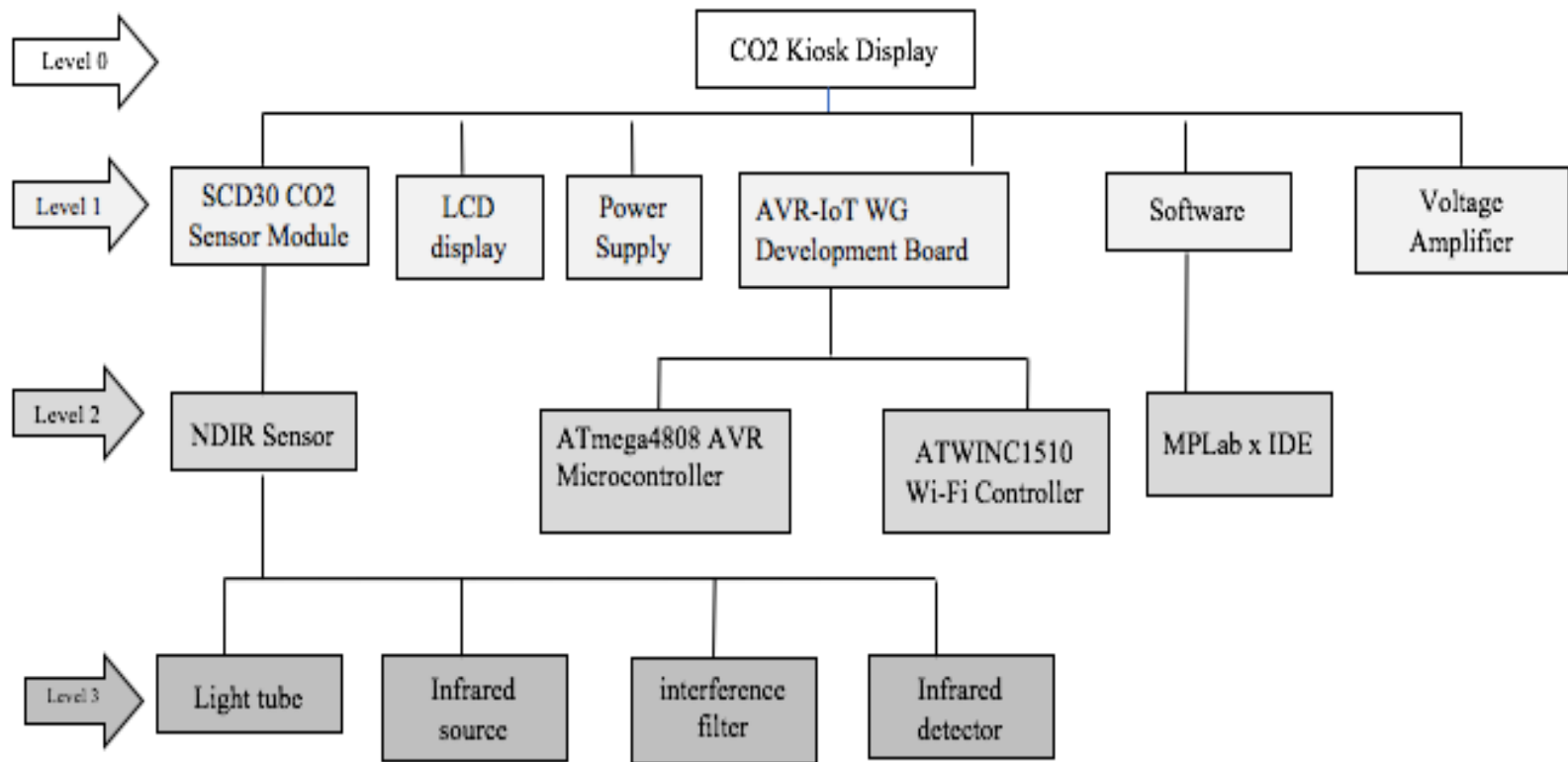


- **Design and build a Carbon Dioxide Kiosk that displays the local, national, and global levels of carbon dioxide in the atmosphere.**
- **The requirements of the system are:**
- **solar powered,**
- **updating data once every 24 hours,**
- **measure and display carbon dioxide content of the local atmosphere in part per million,**
- **be visible from 100 yards, and**
- **acquire and display the national and global CO2 data from reliable sources, and particularly from the U.S. Energy Information Agency websites (U.S. EIA):**
[https://www.eia.gov/environment/emissions/carbon/.](https://www.eia.gov/environment/emissions/carbon/)

System's Behavior



Functional Design



The main components of the system



- **The CO2 sensor module** which uses a light tube consisting of an infrared source and an infrared sensor used for detection of the CO2 content in the air at the locale. A low pass filter is used to reduce the interference noise. The signal from the sensor is further amplified and is received by the microcontroller for processing and storage.
- **The microcontroller module** which receives, processes, and displays the data.
- **The display module** that is powered from a DC source and is controlled by the microcontroller. This module consists of three display panels for local, national, and global CO2 data.
- **The power module** which consists of a solar panel, a rechargeable battery, and voltage regulator at various DC levels for the microcontroller module and the display module.
- **The wi-fi module** which is used to access websites for data on national and global CO2 data.
- **The software module** which consists of required programs to run the microcontroller and the wi-fi modules.



Closing



- It's time to **remove** carbon!
- It's time to go to **people!**
- It's time to **plant** trees!

Afterword: 100 Years From Now ... What Would They Say About **US**?



- ...That we **burnt** anything that we could burn...
- ...Or that we genuinely cared about **the environment**...

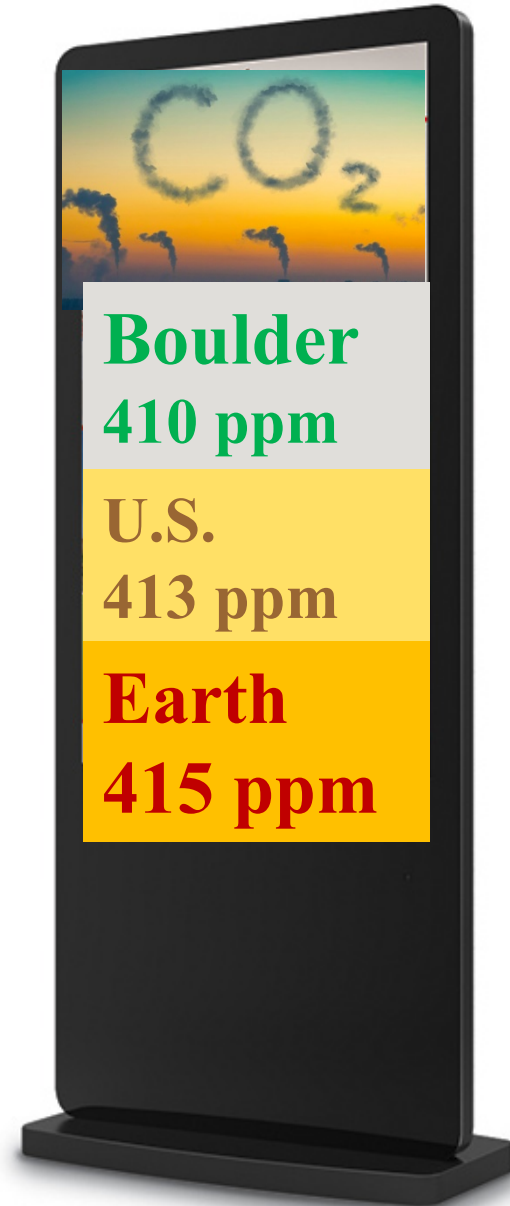
Additional Information



- Do you have a mock up **images** of what that would look like?
- **Cost?**
- **Timeline** when it would be developed?
- **Where** you would install it ?
- What would be the most **challenging** in making such a device and such?

Kiosk LX Model \$7,000

<https://www.allendisplay.com/TouchSign-Media->



Kiosk SE Model \$3,000

Boulder
410 ppm



<https://www.cdw.com/product/Philips-Signage-Solution>

U.S.
413 ppm



Earth
415 ppm



Electronics Dollar Budget

Power Source



Part	Dealer	Quantity	Price
Voltage Regulator	Digi-Key	1	\$0.87
DC/DC Converter	TRC Electronics	1	\$20.40
PV Panels	Toboa	1	\$42.35
Battery	Battery Sharks	1	\$18.50
Total			\$82.12

Electronics Dollar Budget

Microcontroller and Display

Part	Qty.	Price(USD)
SCD30 Sensor	1	\$57.50
ACR-IoT board	1	\$29.00
DC-DC converter	1	\$10.00
LCD display	1	\$84.95
	Total:	\$181.45

Timeline?



- **By December 2020, Grace and Giselle will finish a working prototype of the electronics system.**
- **We will install it on University of the Pacific campus.**
- **It will be STUDENT VERSION of the device.**
- **Manufacturing for Boulder and Beyond?**

Interested in Some Interesting Facts?



- **U.S. has 20,000 cities!**
- **8,000 of U.S. Cities are with 100 miles of ocean!**
- **120 million Americans live within 100 miles of ocean!**
- **There are 100 million homes in the U.S. !**
- **40 million of these homes are within 100 miles of the ocean!**
- **Average price of homes in the U.S. is \$250,000**
- **Severe costal flooding will cost \$10 trillion.**
- **Installing a \$5,000 Kiosk in 20,000 cities will cost \$100 million!**
- **Ratio: \$100 M/\$10 T is 1/100,000 !**
- **Return on Investment: 100,000 times !**

A Student of Mine Wrote:

	Do Something	Don't Do Anything
Global Warming Not Happening	Loss: - \$1 B	Loss: 0
Global Warming Happening	Prevent Coastal Flooding,	Loss: - \$10 T Displace 120 million

The Massive Coastal Flooding Caused by Global Warming

