

OpenIoTwx:

IMPROVING THE ACCESSIBILITY OF OPEN SOURCE WEATHER SENSING AND DATA



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BACKGROUND

An end-to-end open source, affordable, and 3d-printable weather station

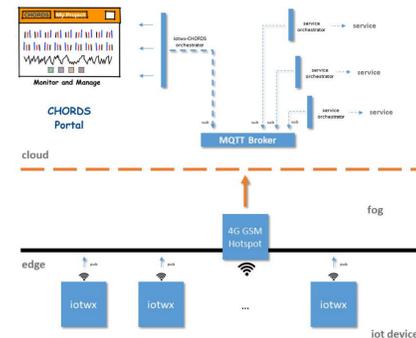
- ~\$430 per unit, including solar power, battery, and an onboard cellular wifi modem
- Designed for educational and data sparse environments.
- Built to be a tool for increasing data equity



SOFTWARE

Built on an easy-to-use software stack

- All code is written in Arduino
- Uses the lightweight messaging protocol, MQTT, for data transfer
- Sent to CHORDS, an NCAR data visualization and archiving client for user access

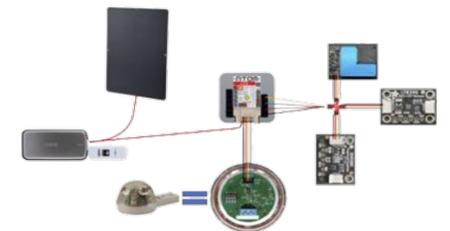


HARDWARE

All non-electronic components are 3D-printable or available at any hardware store

Configurable without soldering or breadboarding.

- BME680 - Temperature, humidity, pressure
- RG15 - precipitation accumulation and rate
- LTR390 - UV
- PMSA003I - Particulate density from pm2.5 - pm50



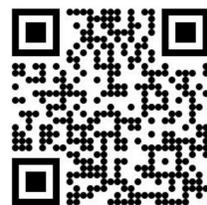
Basic openIoTwx electronic layout

ACCESSIBILITY

- Developed an in depth users guide built for people without technical skills
- Worked with people unfamiliar with the system to test readability
- Built on a static mkdocs website, making it easy to download and use in low/no bandwidth setting
- 3d designs are made to be simple to print, with more complicated designs
- We limited necessary parts - 30 for the entire system - including 3d prints to increase simplicity
- A developer and a User mode



Scan Me



DEPLOYMENT

- Easily deployable using 1in PVC piping - all hardware is 1in threaded
- Does not include anemometry, allowing for simpler siting requirements



Example Station Deployment

FUTURE WORK

- Arduino-CLI scripts for a simpler boot
- Over-the-air updates
- Building educational kits
- Deployment at scale

CONCLUSION

Ready to Scale

Over the term, we brought the project from employable only by technically savvy users with DIY experience to makeable by anyone willing to learn how to 3d print and download a package.

ACKNOWLEDGMENTS

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