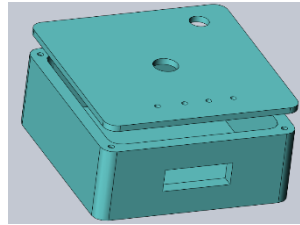
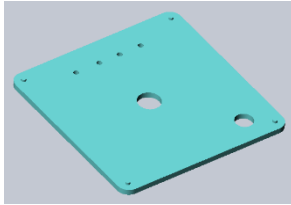
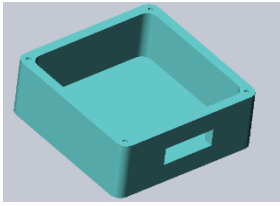


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SOLAR-POWERED AIR QUALITY TESTER PROJECT June 2022 – August 2022



Project Summary

Designed and prototyped a lightweight, portable air quality monitoring device powered by solar technology to provide accessible air pollution detection capabilities to underserved communities globally.

Project Background

Approximately 91% of the world's population lives in areas where air pollution exceeds safe limits outlined by the World Health Organization. However, high costs and lack of energy access restrict air quality testing solutions in many low- and middle-income regions. This project aimed to develop an affordable, mobile, and energy-efficient air quality tester to empower communities to measure local pollution levels.

Methodology

- Researched commercially available air quality monitoring technologies to identify ideal target specifications, components, and design considerations.
- Designed mechanical housing prototyped in SolidWorks CAD software, incorporating weatherproofing features and modular architecture for portability and easy maintenance.
- Performed finite element analysis simulations on design models to optimize structural integrity. Applied GD&T standards to facilitate manufacturing.
- Developed and programmed integrated sensor array and microcontroller circuit using Arduino to enable real-time detection of particulate matter, carbon monoxide, ozone and other pollutants.
- Validated and optimized system performance through smoke emission sensing tests up to 15 feet. Refined programming code to improve accuracy and reliability of readings.

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Outcomes

The completed prototype demonstrates the technical viability of a lightweight, compact, solar-powered air quality monitoring device. Sustainable operation was achieved using on-board solar cells and power management. The system reliably detected smoke emissions during field tests, showcasing its potential for community-level air pollution mapping.

This project provided valuable hands-on experience in electro-mechanical product development, project planning, and testing validation - skill sets directly applicable to an engineering role focused on designing solutions that improve lives.

