Communication of Weather Monitoring System

Justin Adams, Basit Baloch, Anna Beech, Hasan Merzai
Department of Electrical & Computer Engineering, University at Albany

Problem Statement

The New York State Department of Environmental Conservation needs a better understanding of the impact of climate change on microclimates within New York State so that they can mitigate adverse effects and take appropriate preventative measures.

System Requirements

- **Range:** The communication system should have a range of about 0.5 miles to transfer data between outdoor and indoor units and potential connectivity with the NYDEC server or signal
- **Power Consumption:** The communication system (outdoor unit) should maintain low power consumption under 10W to ensure continuous operation, aligning with the system's commitment to sustainable operation and prolonged utilization. The indoor unit is connected to wall power, so power is not a constraint.
- **Wireless communication:** Utilize RF communication for wireless connectivity between outdoor and indoor units and the NYDEC server, ensuring seamless data transfer.
- **Time:** The system must collect and send live data every minute to replicate and ensure relatively real time data and low power consumption.
- **Licensing:** The system should operate without any licensing requirements, simplifying deployment logistics, adhering to regulatory standards, and enhancing user-friendliness. This ensures hassle-free usage for users with no need for additional licenses.

System Design

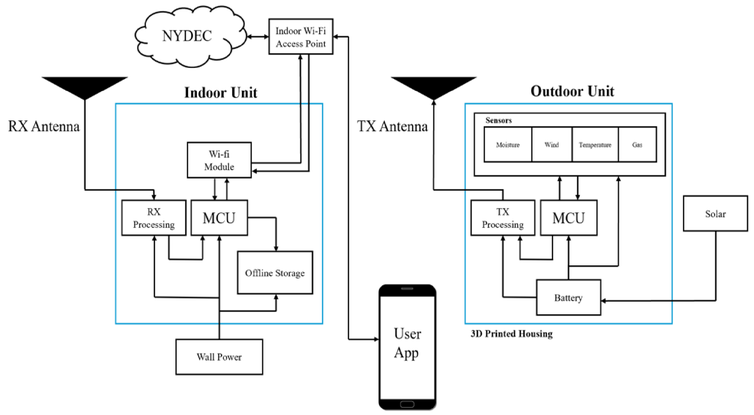
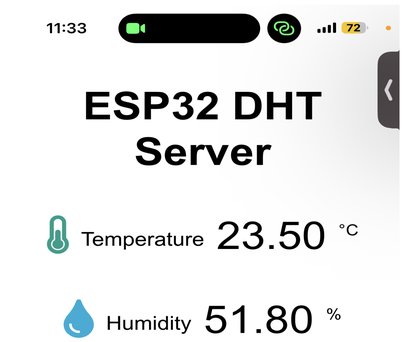


Figure1. *Physical Design of Overall System*



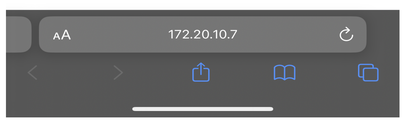


Figure2. *Wifi App Sensor Reading Interface*

System Design

Key System Features

To satisfy system requirements, we incorporated the following design specifications:

- **Long Range**: Data sent over .5 miles
- **Low Power consumption:** About 50 milliwatts of power
- **Live data:** Data collected every minute
- **Wireless Communication:** Communication between two RF antennas
- **No LICENSING:** No specific licensing needed

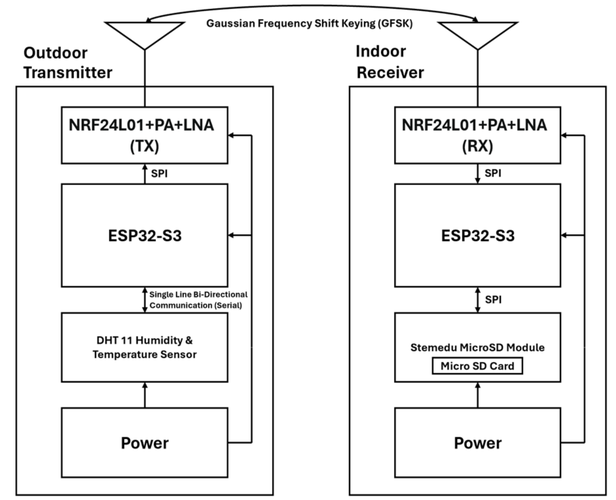


Figure3. *Physical Design for Communication Subsystem*

Bill of Materials

Part	Purpose	Cost
NRF24L01+PA+LNA	RF Wireless Transceiver module	$9.59
ESP 32- S3	Controls sensors and modules	$9.70
Micro SD Card Module	Offline storage device	$5.99
Humid/Temp Sensor	Collects temperature and humidity data	$0
	TOTAL	$25.28