STEM@CGI
SCIENCE - TECHNOLOGY - ENGINEERING - MATHEMATICS

LEARNING LINKS FOUNDATION

NITI Aayog | ATAL INNOVATION MISSION

STEM from Home

Weather or Not?

Do you know that as per the World Meteorological Organisation, extreme weather events - including powerful heat waves and devastating floods are now the new normal? The State of the Climate Report 2021 states that human influence has warmed the climate at a rate that is unprecedented in at least the last 2000 years!

In light of these rapidly changing times, collecting, recording and predicting information about the weather is important because it helps people know what they might expect and it helps to see how weather patterns work. Farmers, pilots, travellers, in fact all of us depend on the knowledge of weather conditions as we plan our daily activities. Knowing when to expect different types of weather helps to keep people safe from increasing natural disasters!

Main Activity: Fetching the Weather

Introduction

A **weather station** is a facility, either on land or sea, with instruments and equipment for measuring atmospheric conditions to provide information for weather forecasts and to study the weather and climate. The measurements taken include temperature, atmospheric pressure, humidity, wind speed, wind direction, and precipitation amount. Manual observations are taken at least once daily, while automated measurements are taken at least once an hour.

In this project you will use Python to code a program to fetch weather data from a weather station of your choice.

What You Will Need

By creating a script to fetch data from a weather database, you will learn:

- How to access a RESTful API in Python

- How to convert JSON data into dictionaries

- How to print data

- How to calculate distances between two points on the Earth's surface

What You Will Need

Hardware

- A computer (PC/Mac/Linux/Raspberry Pi)

- An internet connection

Software

- Python 3

- '[requests](#)' Python module

Getting Started

Click on this link to access [Fetching The Weather](#) and begin your project.

Bonus Activities

Activity 1: Weather Forecasting

Introduction

When meteorologists try to figure out what the weather is going to be like, it is called forecasting the weather. When forecasting the weather, the meteorologists look at the information that they gathered from the weather tools and their observations. They also look at satellite and radar information to see what the computers think the weather may be.

Atmospheric pressure is an indicator of weather. When a low-pressure system moves into an area, it usually leads to cloudy skies, wind, and precipitation. High-pressure systems usually lead to fair, sunny, calm weather.

In this activity we will build a barometer to help us observe air pressure conditions and predict if the weather will be clear or whether the conditions favour rain.

What You Will Learn

How to make a simple barometer and observe air pressure conditions.

What You Will Learn

- A Glass Jar

- A balloon (large enough to fit the mouth of the jar)

- Cello Tape

- Rubber Bands

- Drinking Straw

- Scissors

- A Plain Card Sheet

- Pencil

Getting Started

Access the [DIY Barometer](#) activity guidelines here.

Challenge Activity: Tracking the Wind

An anemometer is an instrument that is used to measure wind speed. Some anemometer devices can also measure the wind direction.

A cup anemometer has cups connected to horizontal arms that spin on a vertical pole. An effective design responds more quickly to gusts of wind and had less errors in the reading. A well-designed anemometer responds quickly to changes in wind speed. It is also able to detect a wide range of wind speeds.

The Challenge: Using the list of resources given below, you need to design an anemometer that accurately measures wind speed.

Your task also includes measuring how many spins the device makes per minute (mark one of the cups and observe how many times it completes a spin) In order to test, the anemometer should be placed outside on a windy day or can be tested using a fan

List of Resources

- 5 small disposable cups
- Thick cardboard
- 2 long straws
- 2 Pencils
- Pin
- Nail
- Hole punch
- Glue
- Pencil
- Plastic Bottle (soft drink bottle will do)

Click on this link to find a step by step guide to building your anemometer

Track windspeed at different times of the day and note the accompanying weather conditions. Use the barometer you have created in the Bonus Activity along with this anemometer to track, observe and compare wind speed and air pressure.

Share your design, findings and tracking results by uploading a presentation. Your final submission can be presented digitally using Docs or Presentation software.