

How to predict climate change from the comfort of your home

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The causes of climate change can be demonstrated using a cheap home or school computer, thanks to a Python program developed by a team at the University of Bath.

The program, the only one of its kind, will be demonstrated for the first time on Saturday at the British Science Festival—a free, week-long event that celebrates the people and ideas at the heart of science. The event is aimed at both school children and the [general public](#), and this year's festival is being held in Chelmsford, Essex.

The Climate Predictor was designed to be run on a Raspberry Pi—a small computer that can be purchased (along with a keyboard and mouse) for around £50, and the code can be [downloaded for free](#) on any home or school computer. While it's a lot less sophisticated than the [climate models](#) used by the Intergovernmental Panel on Climate Change (IPCC) to predict [climate](#) change, and which require a supercomputer to run, the Python program (a high-level, general-purpose programming language) can still give useful predictions and can trigger insight into the climate crises.

Chris Budd OBE, Maths professor at the University of Bath and co-creator of the Python-based Climate Simulator, said the challenge was to develop a program that would allow [young people](#) to explore in a simple way what happens to the climate when, for example, Carbon Dioxide is released into the atmosphere through human activity. Users of the program can alter the amount of Carbon Dioxide released over a given period of time and then see what happens to atmospheric temperatures as a result.

Professor Budd says he hopes the program will be downloaded onto classroom computers across the land, and that it will help students understand more about why our climate is changing.

"Understanding why changes in Carbon Dioxide will lead to climate change will hopefully help lots of people see the reasons why we should change our behavior to reduce our Carbon footprint," he said. "These computer codes make clear the relationship between rising Carbon

Dioxide levels and then rising temperature, and show how we can predict what the change in temperature will be if Carbon Dioxide levels do continue to rise."

At the festival, Professor Budd and his team will also demonstrate two other programs that can be downloaded. One is a [mathematical model](#) that simulates possible tipping points in the climate—that is, points when small changes can lead to accelerated and irreversible impacts.

The other focuses on the causes of the ice ages that have occurred over the past million years, and will demonstrate how the changes in the climate during these events can be predicted mathematically. The causes of climate change in times past, and ice ages in particular, are areas of interest for Professor Budd and his team.

"By understanding what caused our climate to change in the past, we are much better placed to see how it will change in the future," said Professor Budd.

Also presenting the programs at the science festival are Yang Zhou and Tosin Babasola, Maths Ph.D. students at Bath. Both helped develop the Climate Predictor.

"Knowing and understanding [climate change](#) is important to me and to my generation," said Ms Zhou. "It's exciting to show people how maths can be used to solve important real-life problems. Sometimes, even simple maths—like this Python program—can explain a highly complicated situation."

Mr Babasola, whose research focuses on the effects of climate variation on agricultural yield in his home country of Nigeria, added: "This program is an example of how a mathematical model can help us understand the effects of Carbon Dioxide on the world. I love how

mathematics can increase our understanding of real-life events and solve the problems that arise from our daily activities."

Provided by University of Bath

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