

14-year-old scientist predicted a major earthquake near San Francisco

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Suganth Kannan presented his mathematical model at a recent science conference, predicting an imminent earthquake 50 miles from the actual site

By Alison Bert Posted on 26 August 2014

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Editor's Note: On September 4, *Spiegel Online* in Germany published an article on this topic: [Earthquake Prognosis of a 14 year old: The Fairy Tale of Napa Valley](#) ("Erdbebenprognose eines 14-Jährigen: Das Märchen vom Napa Valley")



Suganth Kannan presents at the 3rd International Conference on Earth Science & Climate Change in San Francisco, predicting that a major earthquake would be striking that region within six months.

On July 29, Suganth Kannan stood before scientists at the [3rd International Conference on Earth Science & Climate Change](#) in San Francisco and told them that a major earthquake "will be coming soon."

Using the mathematical model he devised, he predicted a magnitude 5.0 to 9.0 quake would occur within six months at a "prediction point" that turned out to be 50 miles from Sunday's 6.0 earthquake in Napa Valley, which injured more than 100 people and caused an estimated \$1 billion in damage.

It's been two years since Kannan introduced his "Innovative Mathematical Model for Earthquake Prediction." He was invited to the [Fifth Annual Conference on Engineering Failure Analysis \(ICEFA\)](#) in The Hague – unbeknownst to the organizers that he was just 12 years old. It was well-received by scientists, some who recommended improvements. Soon after, he was invited to submit his article to the affiliated journal, Elsevier's [Engineering Failure Analysis](#).

He wrote about the experience in the Elsevier Connect feature "[How I published in a scientific article at age 12.](#)"

Since then, Kannan has started his own company to provide mathematical prediction models for various businesses and even use them to improve collaboration in science classrooms.

He has also been "networking" with the scientists he met at the conference in The Hague, emailing them to ask about their work and update them on the progress of his research. His enthusiasm for science scored him an invitation to serve on the organizing committee of the recent conference in San Francisco, organized by the [OMICS Publishing Group](#).

"I accepted the challenge, since I have previous experience with organizing and moderating Symposium on Bed bug eradication for the Florida Entomological Society during my middle school year," Kannan said in an interview yesterday.

Geologist: "The results were remarkably accurate"

For his conference presentation, Suganth focused on California fault zone prediction, looking at the increased activity in the region through a mathematical prediction model he has improved upon with "multiple statistical functions."

He explained that it's based on Spatial Connection Theory, which states that all earthquakes in a fault zone are related to each other; the [Poisson](#) Distribution, which indicates the probability of a given number of events occurring in a fixed interval of time or space; and Exponential Distribution. Using data from the [National Earthquake Information Center \(NEIC\)](#), he constructed spatial connection models using KML programming language in Google Earth for six fault zones around the world: California, Central USA, Northeast USA, Hawaii, Turkey and Japan. (Read more about his methodology in his [conference paper](#) in the *Journal of Geology & Geosciences*.)



**Prediction point
38-55' N and 121-54' W**

**Actual Earthquake
38.22°N and 122.32°W**

**Distance between them is
~50 miles**

This image shows the forecast for seismic activity in Northern California according to Suganth Kannan's Innovative Mathematical Model for Earthquake Prediction. Suganth explains: "The blue line is the prediction line for future earthquakes based on past earthquake data for northern California from 2000 to 2013 with calculations based on time, order of earthquake, and angle of change. Per the prediction calculation, as time progresses the potential location for the quake moves further away from the last earthquake location in the model. For the time lag of 265 days between last earthquake in my model to my predicted location, it is about 50 miles from actual earthquake epicenter."

"Utilizing the results of this research, disaster management agencies around the world can allocate their resources in appropriate locations to assist people during evacuation and save lives," he told his audience. He said his prediction method in conjunction with other existing methods could be a valuable tool for better prediction of earthquakes in the future.

And he pointed out the likelihood of a major earthquake striking the Northern California region within six months.

Professor Douglas Leaffer

"The results of his research were remarkably accurate," said Professor [Douglas Leaffer](#), a geologist and civil engineer presenting at and co-chairing the conference.



The value of Suganth's model is that it may have the potential to forecast significant earthquake activity within a discreet geography, thus enabling disaster prevention officials and citizens to prepare for quakes of statistically important magnitudes.

Leaffer, a Professor in the [Department of Physics & Earth Sciences at Framingham State University](#) in Massachusetts, pointed out that this weekend's 6.0 earthquake in the South Napa region was the highest magnitude quake observed in Northern California since the devastating Loma Prieta 6.9 magnitude earthquake in 1989.

At the conference, he and Suganth spoke of collaborating in the future, and Leaffer made a suggestion on how to make the model even more significant. "I suggested that it would be interesting to see the results of his model recalibrated to 6.0-8.0 magnitude quakes, which are more challenging to forecast given their intensity and damage, and lower frequency of occurrence," he said.

Starting his own company

Suganth said he started his model at 5.0 because this is the threshold at which structural damage tends to occur. "I want to provide warning to people at that range to prevent damage to property and life and avoid insurance claims," he explained. "I would like to develop an index and trademark it, to provide a value for every zip code of the United States using my mathematical model. Major insurance companies could have paid access to use it to project their claim costs and provide that information to their shareholders and to the market."

The index would be constantly updated with latest seismic activities around the country.

"One day in the future," he said, "the price of the airline ticket or hotel room could depend on the index value!"

That's just part of the mission of his new company, MathforUS LLC.

I launched my company so that I can channel my interest and energy towards providing solutions to problems that are present in everyday life of the community. I am working on developing a couple of specific solutions.

One is a program to help develop a better classroom composition so both students and teachers are happy and can collaborate better to produce great results at school. Currently, without a proper mix of different performance levels ... I see teachers getting too tired in the first few hours of school, and they do not carry their full teaching potential until the last period of a typical school day. So the students in later half of day do not receive the benefit of great teaching. Due to this, at the end of the quarter, both students and teacher are not happy with the results. In the long run, this could be one of the reason for so much of attrition of teachers at schools. ...

I am also writing elementary-level math books to encourage youngsters around the world to get good in math and not be afraid. Without proper math skills I have seen many adults make wrong decisions when it comes to their earnings, mortgage, children college plans, stock investing and retirement savings.

Suganth Kannan presents a certificate to Ashley Soto of De Marillac Academy in San Francisco, winner of the middle school Poster Competition he organized in conjunction with the conference.

"When my company makes money, I will get to spend that for my charitable work starting with [HAPPI Farm](#)," he added, referring to Horse and Petting Pal Interaction Inc, where he volunteers near his hometown in Broward County, Florida. "I am a big fan of animals, and they (HAPPI Farm) take care of orphaned horses and other animals and provide therapeutic help to patients of ADHD and ALS.

"By helping these rescue animals and using them, we can rescue the weak citizens of our society to get better," he explained. "According to my understanding and math skills, for every dollar one donates to organizations like HAPPI Farm, you save six to eight dollars in the long run for society by producing more productive citizens."

Bringing young people to science and math

One of his main passions is to inspire young people to study science and math. At the recent conference, he introduced a poster contest for middle school students based on the conference theme: An Insight into the Recent Advancements in Geoscience and Climate Change Control. "I received hundreds of entries and elected a winner based on the content."

"This way, I have made thousands of kids in the Bay Area get interested in science and do some background learning, which I am sure will help them later on in choosing what they want to do," he said.

Beyond this conference, he is working on ways to form public-private partnerships that will "spread this message to youngsters around the globe so the next generation of youth will be strong in math and science to solve problems that are faced by inhabitants of the earth."

As for his own career, he has his sights set on attending a major research university to pursue his interest in mathematical modeling and "solve pressing problems." He's off to a good start, according to his senior colleagues.

"He shows great potential for further development of his research," Professor Leafer said. "And his scientific grasp of the intersection of math and engineering is already showing value."

Read Suganth Kannan's articles

- Kannan's conference paper, "[Improving Innovative Mathematical Model for Earthquake Prediction](#)," was published in the *Journal of Geology & Geosciences*
- His 2013 paper "[Innovative Mathematical Model for Earthquake Prediction](#)," was published in *Engineering Failure Analysis*.

Elsevier Connect Contributor



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