

Press release

Freelancer.com announces winners of the NASA Shock Propagation Prediction Challenge

NASA Shock Propagation Prediction Challenge awarded a US\$50,000 prize pool to four winners from Europe and North America

SYDNEY, Australia - 19 July 2022 – [Freelancer.com](https://www.freelancer.com) (ASX: FLN, OTCQX: FLNCF), the world's largest freelancing and crowdsourcing marketplace by number of users and jobs posted, today announced the winners of the Aftershock: NASA Shock Propagation Prediction Challenge.

The global challenge, run on behalf of NASA and in collaboration with government-focused consultancy LMI, aimed to crowdsource novel shock propagation prediction models to improve NASA's ability to predict shock loads through spacecraft.

As engineers at NASA make revolutionary improvements to spaceflight, different components on a spacecraft and its payload are impacted by different frequencies of the shock spectrum during flight. For example, electronics are more susceptible to high frequencies and structural components may be more susceptible to lower frequencies.

Contestants from all around the world were given four months to complete their submission that provides a new model for shock propagation. The participants came from diverse professional backgrounds, including experts in machine learning, software engineering, data science, scientific research, and more.

The challenge received a total of 49 submissions offering NASA new and innovative solutions to support shock propagation prediction. Of those entries, four solutions came out on top and were awarded a share of US\$50,000.

"We're proud to award four high quality, game changing submissions that could go on to help NASA with shock propagation prediction," said Matt Barrie, Chief Executive at Freelancer.com. "The winners of this challenge are just another example of how our challenges attract world class experts across a variety of fields and industries. We're excited to see how NASA may implement these solutions to support future spaceflight."

Winners - Aftershock: NASA Shock Propagation Prediction Challenge



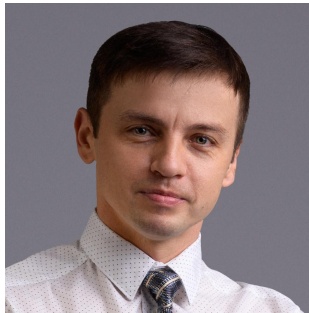
First Place & Innovative Award - winning \$25,000: [Dr. Axel Ország-Krisz](#) (Team Lead) from Budapest, Hungary, supported by his team member Dr. Richárd Ádám Vécsey.

Axel and Richárd won both first place in the challenge and the innovative solution prize for their submission which can be used in different real-life situations.



Their solution proposes a deep learning model that predicts SRS (g) values connected to different frequencies (Hz). The model consists of a combination of convolutional and linear layers, as using convolutional layers for prediction is an out of the box solution. This method helps the different parts of the model to learn different connections and contexts between the input data points. Since various materials and joint types affect the propagation of shock loads differently, the approach works with 28 input data points experienced during spaceflight.

Second Place - winning \$15,000: [Alexander Poplavsky](#) from Krakow, Poland.



The solution is based on several machine learning algorithms, trained and configured to predict acceleration spectrum in various locations within the spacecraft using available sensor data, sensor location and properties, aircraft material and related information.

The core algorithm – gradient boosting – has been chosen as it has shown the best results of prediction for small sparse datasets. The algorithm is reasonably fast to compute, so that both training and inference phases could be done at the same time, making this solution flexible and scalable for shock prediction and similar problems.

Third Place - winning \$7,500: [Samer Hanoudi, Ph.D](#) from Detroit, United States



The solution applies regression analysis using the programming language R to build polynomial models with a degree of 5. It measures the distance of each location/sensor from the impact location. The independent values were the distance, and the dependent values were the channel values. A model was computed for each timestamp. For each timestamp, the missing values were computed using the learned model.

Innovative Award - winning \$2,500: [Dean Koucoulas](#) from Etobicoke, Canada.



The solution was fundamentally based on 2 main stances: (1) that a pyroshock signal may be modeled as a summation of individual single harmonic oscillators and (2) that the shock spectrum at a main structural interface can be used to predict shock spectra at critical locations based on a function of modal properties of those locations multiplied by the main shock response.

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About Freelancer.com

Twelve-time Webby award-winning Freelancer.com is the world's largest freelancing and crowdsourcing marketplace by total number of users and projects posted. More than 60 million registered users have posted over 21 million projects and contests to date in over 2,000 areas as diverse as website development, logo design, marketing, copywriting, astrophysics, aerospace engineering and manufacturing. Freelancer owns Escrow.com, the leading provider of secure online payments and online transaction management for consumers and businesses on the Internet with over US\$5 billion in transactions secured. Freelancer also owns Freightlancer & Loadshift, enterprise freight marketplaces with over 550 million kilometers of freight posted since inception. Freelancer Limited is listed on the Australian Securities Exchange under the ticker ASX:FLN and is quoted on OTCQX Best Market under the ticker FLNCF.

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