Spirit of Ramanujan Fellow of 2021

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The world is a wonderful place full of prodigious talents in different fields. Whether those talents translate into significant something basically depends on two factors - proper guidance and a financial cushion to devote entire time and energy into the respective fields. The field of mathematics is a vast and beautiful one. But at the same time, it's still quite niché. Hence, it comes with certain constraints. Around the world, there are a great many people who have done significant amount of work towards the scientific world without any proper education and guidance, apart from adequate funding. Presently also, there are lots of talents in the field of science in different corners of the world whose works have been constrained by lack of proper support, hence failing to realize their full potential. To discover those talents and provide guidance as well as support Prof. Ken Ono along with some other notable mathematicians founded "The Spirit of Ramanujan STEM Talent Initiative". The Spirit of Ramanujan STEM Talent Initiative supports emerging engineers, mathematicians and scientists who lack traditional institutional support through financial grants and mentorship opportunities. It has been named after the great Indian mathematician Srinivas Ramanujan, as he did tremendous amount of invaluable work in the field of mathematics despite a lack of traditional higher education and exposure to proper scientific methods. He, thus, embodies the very essence of the STEM initiative.

Despite the shortcomings in his surroundings and a life tragically cut short, Ramanujan, by dint of his sheer genius, revolutionized the field of mathematics. But at the same time, it is also worth mentioning that without the guidance and support of Prof. G H Hardy his works wouldn't have got mainstream recognition. Their relationship underlines the importance of having proper mentors and a support system in one's life. With the support and guidance of Prof Hardy, Ramanujan invented several theories, results, formulas (nearly 3900 results) in his short life. He also left three enigmatic notebooks that drive cutting-edge research to this day. His contributions towards several mathematical fields like mathematical analysis, number theory, infinite series and continued fraction etc. are unforgettable.

Coming back to the STEM initiative, the director of this program is renowned number theorist Prof. Ken Ono of the University of Virginia. Fields Medalist Prof. Manjul Bhargava of Princeton

University, Prof. Sujatha Ramdorai of the University of British Columbia and David Patrik of Art of Problem Solving are in the advisory board of Spirit of Ramanujan STEM Talent Initiative program.

Every year they select winners of this program and support their work in their respective field of interest. They have selected 46 winners from 12 different countries till 2020. Some of the winners of this program for the year 2021 are (untill 7th June 2021):

(i) **Ikuya Kaneko** (Japan): He is the first Spirit of Ramanujan (SOR) Fellowship winner for 2021. This 17 years old high school senior boy has already published several results in analytic number theory (primarily on L-functions). He will use his SOR Fellowship to support his joint research with Peter Humphries, University of Virginia.

(ii) **Ayan Nath** (India): He is the one of the winners of 2021 Spirit of Ramanujan Fellowship. He is presently pursuing his higher secondary education at Kaliabor College, Assam. He is experienced in Olympiad mathematics and an active member of the Art of Problem Solving community. His first research article will soon be published in the American Mathematical Monthly. He wants to use his Spirit of Ramanujan award to secure advanced mathematics books for his original research.

(iii) **Julia Moosikasuwan** (US): This 14 year old high school student from New York has been selected as one of the winners of 2021 Spirit of Ramanujan Fellowship. Julia has excelled in several national level mathematics competitions. She was also selected for the World Science Scholar (WSS) program in 2020. Beside mathematics she also enjoys playing the oboe. She will use her Spirit of Ramanujan fellowship to support her participation in Awesome Mathematics.

(iv) **Maggie Yao** (US): She is another winner of 2021 Spirit of Ramanujan Fellowship. She is 16 years old hailing from San Diego. A prodigious mathematical talent since her days at elementary school, she is currently studying multivariable calculus. She is passionate about activities that promote STEM participation among girls and children with autism. She also serves as the head production editor of the Young Scientist Journal. Besides mathematics she is also interested in music. She likes to play piano and composes her own music. Maggie tentatively plans to use her fellowship to further her mathematics education in this summer at Stanford University.

(v) **Shreyan Jha** (India): This Mumbai resident is among the winners of 2021 Spirit of Ramanujan Fellowship 2021. Despite being only 12 years old, he has already published his first research article in geometry and number theory. Also, he has recently won first place in the Bhaskaracharya Mathematics Talent Search (a national level Indian mathematics competition). He has been nurtured by the "Raising a Mathematician Foundation" in India, headed by Vinay Nair. In addition to his passion for pure mathematics, he is interested in the role that mathematics plays in percussion music. He is also hooked on the writings of Richard Feynman. Shreyan will use his SOR award to participate in Art of Problem Solving activities.

(vi) **Fernando Trejos Suárez** (Costa Rica): Another winner Fernando Trejos Suárez decided to pursue a career in mathematics from a very early age. His field of interest is number theory. He won a Bronze medal at the International Mathematical Olympiad and also scored highest

points from Central America. He has already co-authored two research paper of number theory. Fernando will use his SOR Fellowship to support his research on analytic number theory with Jesse Thorner of the University of Illinois.

(vii) **Mingyang Cen** (US): He is one of the youngest winners of 2021 Spirit of Ramanujan Fellowship. All of 8 years, Mingyang has been fascinated by pure mathematics since a very young age. After he exhausted his local school math curriculum, he has continued his mathematical exploration at the University of California, Berkeley. There he has earned A+ grade in his mathematics courses. He will use his SOR Fellowship to fulfill his curiosity about analysis, topology, geometry and algebra through programs such as Art of Problem Solving.

(viii) **Hannah Guan** (US): One of the winners of 2021 Spirit of Ramanujan Fellowship is Hannah Guan. She is a high school sophomore hails from San Antonio. She has performed excellently in virtually every mathematics competition she has entered. In 2020 she also won the Maryam Mirzakhani AMC Award, which is named after the first female recipient of the Fields Medal. A minor planet, 12885 was named "Hannah Guan" in recognition for her scientific achievements. Hannah has conducted original research in Mathematical Biology. In the future she is interested in doing her research in Astrophysics and Mathematics. She is also the founder of San Antonio Math Include (`https://mathinlude.com`), which provides a platform to students of different backgrounds. She wants to use her SOR Fellowship for further research in Mathematical Biology and also in exploring new things in Astrophysics and Mathematics.

(ix) **Sean Li** (US): This 17 year old high school student hailing from Danville has a long list of achievements in several national level mathematics competitions. He has been taking graduate level mathematics classes in UC Berkeley, earning A+ grades. His area of interest is number theory. He will use her SOR Fellowship to do research at the University of Virginia.

(x) **Shreya Hegde** (India): Shreya Hegde is a high school student from Bangalore. She has been actively involved in a remarkable array of activities in several fields of science including Astronomy and Physics. She is also a TEDx speaker. She will use her SOR Fellowship to support her research with astrophysicist Eric Myers on gravitational waves. They will be investigating LIGO (Laser Interferometer Gravitational Wave Observatory) data in the Pioneer Research Program.

(xi) **Kaylee Chen** (US): 15-year-old girl Kaylee Chen from Irmo, South Carolina, has gained experience through math competitions like American Mathematics Competitions series, as well as research camps such as PRIMES Circle and the Ross Mathematics Program. She is also an accomplished classical pianist and violinist. Additionally, she likes to play tennis in her free time. She will use her Spirit of Ramanujan Award to participate in the Ross Math Program again, as well as to conduct research in cancer biology.

(xii) **Andrei Mandelshtam** (US): High school boy Andrei Mandelshtam hails from Irvine, California. His achievements include a long list of standout performances in many national level mathematics competitions. He has been taking graduate level mathematics classes at UC Irvine, and he has conducted original research in combinatorics. He also likes singing and rock climbing. He wants to use his SOR Fellowship to support his research in algebraic geometry

and the theory of Tamagawa numbers for elliptic curves over number fields.

(xiii) **Nikhil Kulkarni** (India): Nikhil is a 15 year old high school student from Nashik, India. He has been conducting research in Computer Science and Mathematics, and he has excelled in the Indian Mathematics Olympiads and the Chennai Mathematics Institute STEM Competition. A passionate lover of mathematics, he has been actively involved in the Raising a Mathematician (RAM) Training Program headed by Vinay Nair and he works as a teaching assistant for the RAM Foundation. His other interests include astronomy, biotechnology, information technology and competitive debate. Nikhil will use his SOR Fellowship to support his research with Prof. Rajiv Gandhi at Rutgers University.

Materialistic things may not matter much to most of the people dedicated to understanding scientific phenomena and using that understanding for betterment of the human race. But at the same time, it can't be denied that donations, grants and financial help go a long way in enabling those minds to reach their greatest heights. It not only helps them pursue higher studies under people they admire and want to work with, but also allows them to remain unburdened of their day to day needs and devote their entire time and energy in the name of science. As most of the awardees have mentioned, they plan to use the fellowship to further their study in their respective fields in places which they wouldn't have been able to go to if the fellowship didn't exist. So, the basic idea behind the STEM fellowship is that it wants to act as a catalyst, a helping hand in this endless pursuit of knowledge.

Data sources:

- `https://spiritoframanujan.com/home`
- `https://www.facebook.com/SpiritOfRamanujan`