

Profiles



Last year's winner of the Institution's Young Structural Engineering Professional Award, **Kayin Dawoodi**, has been promoted to senior engineer by his employer Arup and is a founding trustee of the UK branch of charity Bridges to Prosperity. Interview by Jackie Whitelaw.

The 2014 recipient of the Institution's Young Structural Engineering Professional Award (YSEPA), Kayin Dawoodi, is a charming, charismatic, almost self-effacing man, but underneath a friendly exterior is a backbone of steel and the determination of character to go with it.

In the course of his career so far, he has had a special degree title created for him by his university, upped sticks to work successfully in Spain though he spoke no Spanish and, most importantly for him at the moment, is driving the development in the UK of a relatively unknown US charity that not only constructs – but also teaches people how to design and build – bridges to allow them to cross impassable rivers to access education, healthcare and markets.

From two engineers at the start in the UK branch of the charity, there are now 100 volunteers and one consultant – with his employer Arup contributing intellectually and financially to Bridges to Prosperity (B2P).

Dawoodi's video presentation when entering the YSEPA focused on the building of the charity's first suspension bridge trialling a simple, reusable design software programme he had written – BridgeTOOL. He and fellow volunteers had been to Muregeya in Rwanda to demonstrate that the 'how to' design guide worked in practice and to learn how it could be improved. In the course of 10 days they, alongside several Rwandan engineering students and local support, erected a bridge with a 50m main span over a 20m wide, 6m deep river which, during the rainy season, would only be crossable by swimming, with over a dozen deaths previously reported.

His clever, story-board style written presentation told the same tale and caught the attention of the award judges.

"Winning the award," he says, "has given me a great platform to help promote the charity. We estimate that around the world there are 100 000 bridges of this scale needed to provide passage and support

development. To date, the charity has completed almost 200 bridges but the aim is to build 100 every year, around 10% of which need to be suspension bridges due to site topography. The bridge at Muregeya is being used by 10 000 people; there is so much more around the world to do."

The work showcased in his award video helped towards achieving his Institution charterhip and winning the award undoubtedly helped nudge Arup into giving him his promotion. It is a platform for young professionals to demonstrate their skills and show their future promise. For Dawoodi, entering the award was an obvious step, one he would encourage everyone to consider, especially if you have a story to tell. For the record, he also entered the Muregeya project into the Structural Awards 2014 and it won the sustainability category and was commended in the pedestrian bridge category.

However, structural engineering was not his first choice of profession. He started a degree in architecture at the University of Bath.

"I'd been interested in buildings and cities and how they developed from a very young age," he says. "My mother is half French and half Italian, my father an Indian born in Tanzania; we lived in Haringey in north London but to encourage my French I went to the French Lycée in South Kensington." Anyone who knows the capital will also know that the two boroughs are about as far apart in the wealth stakes as it is possible to get.

"It never felt like a posh school when I was there," he says, "though it must have already been as most of my friends had beautiful mansions on the King's Road or The Boltons. I think that's when I must have first learned about social disparity."

But seeing all those beautiful houses kickstarted an interest in buildings that stayed with him. "I always loved maths, physics and art – I still paint – so I went to Bath where the architecture course had a mix of engineering and architecture in the early years.

"I am passionate about doing a good job



Figure 1
Kayin won YSEPA 2014 for his work on a suspension bridge in Muregeya, Rwanda

so I threw myself into the joint projects and found myself leading the teams and working out not only the architectural aspects but also the engineering stuff. I loved learning about bending moments and shear forces; it's a really tactile knowledge. What I struggled with was that architecture is very 'fashionable' and I didn't much like to follow trends."

Two key events convinced him that he needed to change course. One was the design of a covered market for which he took inspiration from a timber structure at the Hanover Expo in 2000 which used simple curvature to generate a seemingly complex roof. "I found myself thinking as an engineer. How does it work, how does it get built along with the need for it to be functional, beautiful and attract people?"

The second was an architectural-led project to design a studio. Again Dawoodi opted for an umbrella-form roof, creating an open house where the only structure was a central column. "But I needed to know how big it would be. I asked my mentor, 'How can I size the column?' and he said, 'Don't worry, that's the engineer's problem.'

"But no, it was my problem, and that's when I realised maybe I should be an engineer and

help architects to think differently.”

Kayin decided, if he was changing course, to move back to London. “Bath had been a bit of a culture shock; there were 60 different nationalities at the Lycée. I missed that mix.”

He chose University College London (UCL) to study civil engineering, because study included an in-depth integrated design course in the final year. They also were persuaded to adapt the degree title to suit the man.

“When I applied, I asked if they would create a structural engineering degree, which they did. And by my third year that was formally approved and one other student joined me for the two years, with a focus on structural aspects.

“When I left, UCL seemingly didn’t continue to offer this degree and this created a few problems when I graduated in terms of having to upgrade my membership from that of a student, as my degree title didn’t exist! It took some time to sort out the validation.” (Dawoodi qualified as a full member of the Institution in 2014.)

He remembers with gratitude John Eyre, who taught design at UCL until he retired last year. “He is a very flexible engineer who encourages holistic thought and creativity. He recognises that design is not just about structural calculations but part of a bigger multidisciplinary process.”

Eyre was also instrumental in getting Dawoodi his first job.

“I went to an Institution meeting where Eyre hosted a talk with Alan Baxter [of Alan Baxter Associates] and he presented a couple of projects I’d worked on. Later I got chatting with Alan, who encouraged me to apply; I did and I joined the business.”

But then, as it often does, love intervened. Dawoodi had met his wife-to-be Anna just before he joined Baxter. Like him, she is a mix of many nationalities – Swedish, Spanish and Japanese – and she was living in Madrid. He spent 12 months with Baxter but was flying back and forth to Spain every weekend. After a year he proposed to Anna and upped sticks for a new life in the Spanish capital.

“I’d kept Baxter informed so they weren’t surprised. And then I had to find a job in Spain although I didn’t at the time speak Spanish. Actually, I did GCSE Spanish and I remember telling my friends then that I’d never need it. How ironic, right?”

Dawoodi had successfully applied to Arup in Madrid and was swiftly back at work. He developed a skill in 3D parametric design (since employed for BridgeTOOL) and put it to good use on a 300m curved roof design for a new marina seafront at Vilamoura in Portugal – which unfortunately did not get built – and Metropol Parasol in Seville, considered the largest timber structure in the world. Dawoodi’s ability to juggle pragmatic

solutions with hi-tech challenges is evident.

Vilamoura was a casualty of the economic crisis which hit Spain and Portugal badly in 2008. Arup Madrid remained largely unaffected because of international work until early in 2011, but Dawoodi then had to watch the impact of a 30% staff cut. He was also by then the father of the first of his daughters, Nhur, and the family sought greater security.

“I secured an assignment in London working in the team for the National Museum of Qatar. When my second daughter, Leia, was born in Spain in late 2012, the family all moved to join me in London.”

Kayin had discovered B2P while in Spain.



Figure 2
The 50m main span Muregeya Bridge was built with the help of Rwandan engineering students and local support



Figure 3
The proposed Vilamoura Marina seafront canopies unfortunately did not get built

His ex-Arup colleague Manuel Contreras had joined just after being involved in the construction of the charity’s first suspension bridge. “He was looking for people with parametric design experience to work on a simple spreadsheet for suspension bridges. I got involved and what was two weeks’ work in my spare time has become a lifetime role.”

He worked on the initial project with another colleague, Phil Borowiec. “I have focused on the technical aspects and building the 60-plus-page spreadsheet, and Phil has looked after the manual to effectively communicate the ideas to as wide an audience as possible.” Both men were reunited in London in 2012 and the idea of a UK branch of the charity was formed. “My only request when I moved back to the UK was that I would be able to carry on my work with B2P,” Dawoodi says. He got that and more. His boss, Paula Walsh, and Phil’s boss, Barbara Lane, have been behind them all the way and Arup agreed to fund the prototype Muregeya Bridge in Rwanda. Having created

a strategic partnership between Arup and B2P, with Executive Sponsor, Arup deputy chairman Tristram Carfrae, the project is becoming ingrained within Arup.

Dawoodi is now working with the B2P Technical Advisory Board, leading the technical development of the suspension bridge standards available to local bridge builders.

He’s also deeply involved in setting up the B2P-UK Charitable Trust and is busy raising awareness with companies and universities to build support. Flint & Neill is now backing construction of its own bridge and Hilti has two projects with the charity.

B2P projects, Dawoodi believes, are an important way to raise awareness of the value of engineering, particularly to young people planning their future careers. “People don’t know what engineers do and it is not going to be through hi-spec residential projects that we attract new recruits or demonstrate our talents. Seeing what engineering does to help people is what will draw in young talent.”

The work with the charity has cemented Dawoodi’s views about disparity and what

he is and is not prepared to work on. “It is very hard for me to work on projects that benefit solely the individuals who create the disparity.”

Apart from the National Museum of Qatar, Dawoodi is working on the redevelopment of the ex-Commonwealth Institute in London, which is being converted into a new home for the Design Museum. And his ambition for the day job in the future, not surprisingly, is to continue working on exciting and challenging projects, where engineering is vital, visible and key to its success, such as bridges, but also interesting buildings!

“I went to a footbridge conference recently and there was a discussion about whether we are being pushed to over-design some of our bridges. I think there are lessons to learn from B2P and our 50m span for £15 000 using lo-tech designs and repurposed materials.”

Find out more about B2P at bridgestoprosperity.org or by emailing kayin@bridgestoprosperity.org