

LIFE WITH PI

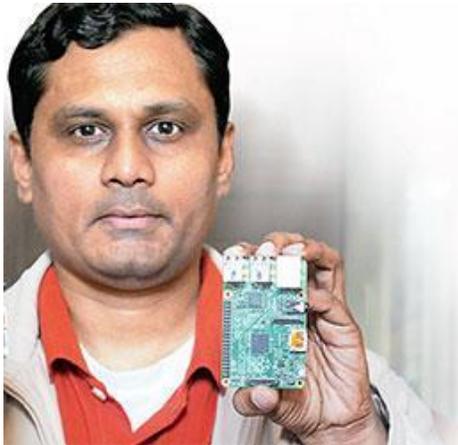
By Ashwin Khan, Ahmedabad Mirror | Sep 2, 2015, 02:00 AM IST

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A 16-year-old in a remote village in Maharashtra wants to gather scientific data on local biodiversity. Others are learning to predict the weather. Unbelievable as it sounds, children in remote tribal schools in Maharashtra are experiencing a digital wonderland, otherwise quite out of their reach, with the help of Raspberry Pi. And they owe it to Dr Girish Arabale, who introduced the versatile, portable and immensely powerful credit card-sized Pi to them in a bid to improve their lives.

"After completing my PhD in Carbon Nanostructures from National Chemical Laboratory (NCL) in 2009, I left for Sungkyunkwan University in South Korea for further studies. I was first introduced to a Raspberry Pi at the university, where I started using the computer for scientific research," says 35-year-old Arabale, who's currently

incubating a venture to build a gadget that can analyse soil conditions at NCL Venture Center. He was struck by the idea of doing something useful with the minicomputer after returning to Pune last year from South Korea. Arabale started the project in June this year, and has so far conducted two separate workshops at Anudanit Primary and Secondary Ashram School in Shendi, Adarsh Ashram School Bhandardara Camp in Akole and Government Ashram School in Muthkhel, located within a distance of 20km from each other in Ahmednagar.

The three-day workshops were organised free of charge in mid-June — both teachers and students understood computer basics, but were unfamiliar with the concept of programming. The workshops familiarised students and teachers with a Raspberry Pi, its operating system and use of basic applications like spreadsheet. The children, aged between 12-16 were bowled over by how the diminutive Pi attached to a central processing unit and graphics processor, costing Rs 3,000, was just as capable as a desktop. They are now learning to code and use the stripped-down minicomputer to undertake hitherto impossible science projects. From learning to attach sensors to a Raspberry Pi to predict the weather to observing how chlorophyll absorbs light during photosynthesis by attaching an infrared camera to a Pi, these kids are entering a whole new world of knowledge.

"My goal is to introduce the tinkering culture to these kids and wean them off from the habit of learning by rote," Arabale shares. To his surprise, the children were exceptionally receptive to his idea. "We lead difficult lives here. There is no electricity most of the time and we know nothing about technology. But learning to use a Raspberry Pi to solve math problems and predict the weather was an empowering experience," smiles 16-year-old Sharad Tatala, a class 10 student of Anudanit Primary and Secondary Ashram School. Tatala is looking forward to work on a project that will involve attaching a camera to a Pi and make time-lapse videos of how plants grow in his region.



"My village is a biodiversity hotspot. We have so many plants growing here — I could use a Pi to gather scientific data and find out how many insects and birds feed on the plants annually," says Tatale. Like Tatale, most of his friends who participated in the workshop, barely knew anything about computers for the lack of an experienced computer instructor at their institute. Going by its size, the students first thought it was a toy, but they quickly grasped how its interface worked. And although they were just introduced to the basics, the kids make it a point to practise the lessons learned at the workshop almost every day, like using a spreadsheet, writing a few lines of code in Python, a computer language that runs a Pi and familiarising themselves with Linux, an operating system that's compatible with a Raspberry Pi.

Earlier this year, a similar initiative was launched in Kerala to teach computer programming to school children by giving them Raspberry Pi computer kits. Compared to that state-funded programme, Arabale is a one-man army. "I was surprised when Girish volunteered to teach us how to use a Raspberry Pi. As such, nobody is interested in teaching us anything about technology," rues Sudhir Shedge, a teacher at Anudanit Primary and Secondary Ashram School. The internet is flooded with inspiring stories of how ordinary people are creating extraordinary things using the minicomputer.

For instance, a group called FishPi is getting ready to put the Raspberry Pi to sea by fitting the computer to a drone boat. The boat's navigational system will be controlled by the computer — measuring 20 inches from stern to stern, the vessel is set to cross the Atlantic and collect scientific data in the process. Will Arabale's project yield such fruitful results? "I am just about getting started. Right now, none of the schools have access to a Raspberry Pi although the institutes do have a computer lab that's gathering dust," he says. The many advantages of a Raspberry Pi is that you can experiment with its insides. "You can't dare do that with an Apple laptop for fear of spoiling it," reasons Arabale.

Also, learning Python is comparatively easy than mastering to code using the computer language C. So to make sure the kids don't forget what they have learnt, Linux has been installed on some desktops at the institutes. Few teachers have been introduced to Python and the teachers in turn impart the lessons they were taught to the students. "I have just introduced the teachers to programming basics. This is a longterm project — I plan to visit the schools in September to teach them programming lessons. With time, I will increase the frequency of my visits to fast-track the children's learning curve," adds Arabale.

Much to Arabale's joy, both students and teachers are eagerly waiting for the next workshop. "We are thankful to Girish for opening our eyes to the wonderful device. Our schools and villages are located so far away from modernity that we urgently need the aid of technology to make our way ahead," says Pandit Tanaji Kadam, who teaches at Adarsh Ashram School. And Tatale is keen on undertaking an experiment Arabale talked about in his first meeting. "Girish told us we could attach sensors to a Raspberry Pi to predict weather. That sort of information would be useful for my village," he says excitedly.

Another student, 14-year-old Laxman Gawale, who studies in the same school in class nine, adds: "Although we are surrounded by beautiful hills we face hardships every day. I hope I can invent something with the help of the Pi to lead a comfortable life." Apart from being competitively priced, the minicomputer — traced back to 2006 when Eben Upton, Rob Mullins, Jack Lang and Alan Mycroft, working at the University of Cambridge's Computer Laboratory in the UK, conceptualised a tiny and affordable computer for kids — is a veritable catalyst of creativity.

"You can't tinker with expensive computers, but since a Pi costs so little, you can try a wide variety of science experiments with it," explains 16-year-old Rushikesh Patil, an electronics hobbyist, who's studying at a coaching centre in Mumbai to prepare for the IIT Joint Entrance Examination (JEE). In January this year, Patil had come to Pune all the way from Satara just to attend a workshop on Raspberry Pi conducted by Arabale. "A Raspberry Pi is also easily programmable," adds Patil.

Given the Pi's powers, Arabale has grand plans for the future. He wants every student to have a Raspberry Pi that they can attach to a camera and observe how plants grow in the region. The data collected from the experiment will be directly made available to a professor of botany in Pune. "I hope my endeavour will inspire some kid in this backward area to become the next Bill Gates or Steve Jobs," he signs off.

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