Bangla Pi

Computing for everyone

PROJECT

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PRESENTED BY

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Class of 2015

BACKGROUND

Now that we are well into the 21st century and have been trying to create a knowledge-based digital society in Bangladesh, access to computers for everyone is a necessity. At Harvard, while playing with raspberry pi, a popular development board, we came up with the idea of using the low power microprocessors to create a computer that is cheap and sustainable for a poor country like Bangladesh.

After much research, we created a prototype that costs about USD 80 (6200 BDT) to make. This has basic power system, casing, 10.1 inch LCD panel, and peripherals such as a mouse and a keyboard.

This system, named Bangla Pi can run all the basic computing softwares such as word processor, document reader, programming languages, educational tools, and audio/video players. We can also add peripherals such as printer, modems etc. via the USB ports.

During winter 2015, funded by the Harvard South Asian Institute, we have run several pilot projects to field test 15 prototypes to see how good they are in teaching young school students.
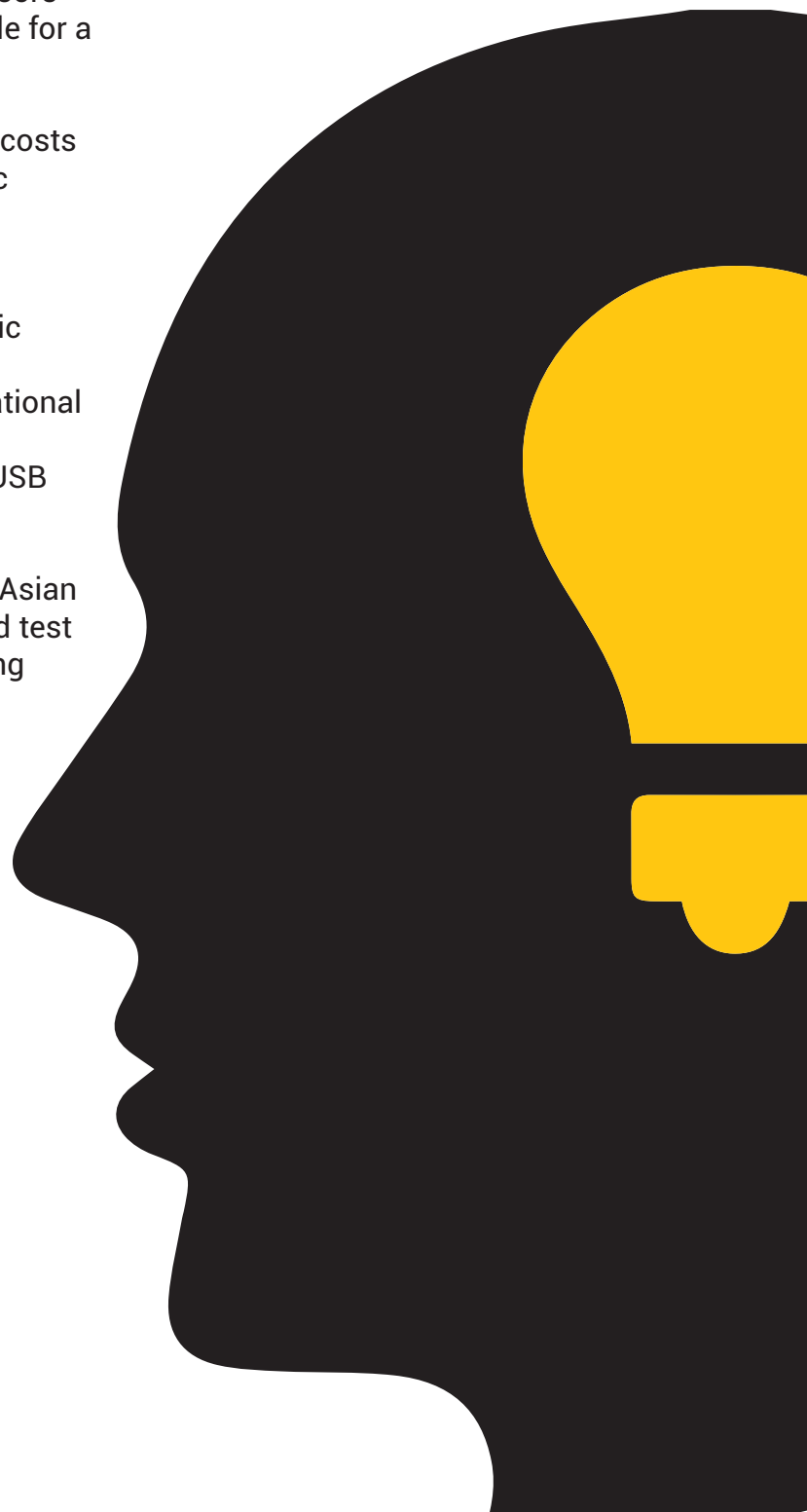
WHAT IS BANGLA PI?

Bangla Pi is a fully functional, inexpensive computer aimed at the computer users who do not need much computer power. As a result, this is an ideal device for teaching computing and for running basic computing tasks for the consumers, especially the young kids.

ARCHITECTURE

Since the beginning of the popular desktop computers we have been mostly using processors with x86 architecture. And company such as Intel is almost running a monopoly in the processor market. As a result the computer processors have been quite expensive.

However, in the recent years with cellphones being very popular the low cost ARM architecture got popular. While historically the power of the ARM chips could not compete with that of the chips with x86 architecture, in the recent years the ARM processors are quite cheap, robust and are more than enough for meeting our basic computing needs. So we chose ARM platform to design this computer system.

We developed an operating system for Bangla pi that is based off of open source Debian OS. As a result this can function as a fully functioning laptop/desktop computer and can run most of the popular softwares.

WHAT CAN IT DO?

⇘ Runs an open-source OS (modified Debian, very similar to Ubuntu).
⇘ Word Processing (included Libre Office, an opensource alternative to Microsoft office).
⇘ Play audio/video (included omxplayer).
⇘ Can connect to internet and do web surfing.
⇘ Programming (included python, C, C++, Scratch, Mathematica, and more).

HOW IS IT DIFFERENT FROM OTHERS?

It is natural to ask why we need this system given the number of systems available in the market. Apart from the extremely inexpensive price point, there are many other reasons. In this section, we will trying to point them and compare Bangla Pi with other systems. Runs an open-source OS (modified Debian, very similar to Ubuntu).

LAPTOP/DESKTOP PCs

- Functionally, very similar, but Bangla Pi is much more inexpensive.
- As we are using a low powered processor, the system can run very well with under 5 Watts. This is at least 10 times less power consumption than a laptop and about 60-100 times less than that of a desktop computer.
- As a result, we can use solar power or batteries to run many systems.
- Has USB ports, Ethernet and other ports similar to those.

DOEL/CHEAP CHINESE LAPTOPS

- ↘ While other cheap Chinese laptops would be similar, but Bangla Pi is much more modular and easily reparable.
- ↘ The cheapest Doel model (Doel Primary) only ran android, which is the OS of the tablets and lack many features of a typical desktop system.
- ↘ Doel and other similar system would cost more than 10,000 taka.

TABLETS

- ↘ Tablets run Android that cannot run many traditional softwares such as word processors, programming languages and so on.
- ↘ Cannot connect modems, keyboards, printers etc. to a tablet easily due to the lack of ports.

Basically, Bangla Pi is a system similar to a laptop/desktop system while costing a fraction of those.

FEEDBACK
FROM PILOT PROJECTS AND WORKSHOPS

Before looking for options to mass produce the device, we ran feasibility tests, market research, and pilot projects. We have already run two pilot projects—one in Dhaka Dhanmondi Govt. Boys' school and another in a small village named Kanihati in Moulavibazar.

In both of these places we used our 15 prototypes to teach young school going kids about computers and programming. We also wanted to know how they react to a novel device such as Bangla Pi.

3 DAY PROGRAMMING WORKSHOP AT DHAKA

At Dhaka we had 15 students from class 8, class 9, and O level. As most of them have been using computers for many years (average 5 years) and own a computer at home, they could tell us what they think is missing from our system and we used Bangla Pi's to teach them basic programming with Scratch, a graphical programming language by MIT media lab and Python, a popular programming language.

FEEDBACKS FROM THE WORKSHOP AT DHAKA

- On day one, we let the students use the computers and do whatever they wanted. They did not need any help to get used to the graphical interface even though they are long time Windows user.
- They found all the basic softwares like office, internet browsers, and media players very easily from the start menu and used them without any issues.
- A few complained the screen is a bit small. We will address the issues in the next iteration with a slightly bigger screen.
- A few others complained the lack of games in the system.
- They loved Scratch, the graphical programming language.
- They made some good animations and games within the first two hours of learning the language.
- Due to syntax and other issues, they found python a bit difficult at first, but on day 3 they were writing small programs by themselves.
- While teaching programming is by no means easy, as we taught them the basic ideas with scratch which is much more intuitive, it was much easier to teach them programming after that.

2 DAY PROGRAMMING WORKSHOP AT KANIAHATI

At Kanihati, we were very pleasantly surprised by the computer literacy level of the students. All of them knew the basics of computers thanks to the new curriculum that incorporated computers and IT in the textbooks.

FEEDBACKS FROM THE WORKSHOP AT KANIAHATI

- The also had no issues learning the new operating system. In fact, the almost did not find any difference apart from the "refresh button"!
- In the first hour of day one, they started using basic software such as office, pinta (painting). They wrote small paragraphs and even wrote texts in Bangla using Bangla keyboard.
- Some of the advanced students even wrote C++ programs and successfully compiled. They in formed us that they saw this program in their IT textbook. We were very impressed.
- Then we started scratch after 2 hours. Again the students loved it and it required little to no hand holding to get them used to it.They loved Scratch, the graphical programming language.
- On day two, the students made some impressive games and animations with Scratch.
- Some students wondered about the price point of the device, they said about 7-8 thousand taka would be a very affordable and fair price.

Overall, we got very positive feedback from the students. While most of them learned computers in Microsoft windows operating system it took them no time to get used to Linux because the interfaces are very similar. Both of them have start menus and desktops. Also file opening and saving are the same. In fact, most of the students loved the Bangla Pi OS for its simplicity.