

Pedal Powered Wireless Internet in the Laotian Jungle

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INTRODUCTION

A chance meeting with Jhai foundation founder, Lee Thorn, over breakfast during the 2003 “UN World Summit on the Information Society” in Geneva has led to the author becoming very interested in an exciting, innovative project currently being trailed in Laos. This project aims to bring wireless Internet connectivity to remote villages that lack access to electricity and other services generally regarded as prerequisites for entering the digital age. The project is based on cooperative development with local people to produce and develop a system based on a rugged, long lasting, and weather-proof Linux-based computer connected to the Internet via antenna, a repeater station and a link through an ISP located in the nearest large centre. This article will outline the technical features of the project, the advantages currently arising from the project, and an overview of the personnel currently involved and their roles in the project. This will be followed by a discussion of broader and diverse issues associated with bringing new technologies to people living in isolated and poverty affected areas like Laos. These include *ethical* issues around perceived cultural imperialism, prioritised allocation of resources, unequal access and effects of globalisation. Issues of a more *practical* nature also arise with respect to sustainability, advantages and disadvantages, and future directions.

BACKGROUND INFORMATION

Laos, a country in South-eastern Asia is northeast of Thailand and west of Vietnam and has a population of approximately 6 million people. Lao is the official language and other languages spoken include French, English and various ethnic languages. It is a country with a very poorly developed infrastructure. For example, it has no rail system and an elementary and poorly maintained road system. Telecommunication systems offer little external or internal access and electricity is restricted to a few areas with higher population densities. A large percentage of the population (80%) is engaged in subsistence farming. The project discussed in this article is taking place in the Hin Heup district of the Vientiane

province which is approximately 100 km from the capital Vientiane. The nearest markets are situated in Phong Hong which is approximately 30 km away. Facilities for transport are scarce and torrential rain in the wet season makes the roads almost impassable.

TECHNICAL FEATURES OF THE PROJECT

Lee Felsenstein, developer of the Osbourne computer and pioneer in the development of publicly available micro-computers, designed a compact, rugged computer with the power of a pre-Pentium machine specifically for the Jhai Foundation project. The machine has no moving parts, is small and compact, and has a waterproof case designed to counter the onslaught of the South-East Asian monsoon season. The main processor is a 486-type chip, which allows the use of a heat sink rather than a fan, thereby eliminating the common problem of fans seizing up in adverse conditions. More powerful processors, like recent Pentiums and AMD chips, require large fans. The Apple G5 requires multiple fans as well as a liquid cooling system. These are all potential problem sources in harsh conditions. Importantly, whereas a standard desktop computer requires 90 watts of power, the project machine draws only 12 watts. The machine uses a small energy saving LCD screen, and flash memory chips have replaced a conventional hard disk drive. Finally, the machine has been designed to withstand formidable conditions of different kinds for a minimum of 10 years with little or no maintenance. These conditions include torrential rain, choking dust, and intense heat and humidity at different times of the year. The machine will ultimately be capable of mass-production for less than \$400 U.S. dollars per unit.

On the basis of an initial investigation solar power was rejected as a means of powering the unit, due to the cost involved as well as the adverse cloudy and gloomy conditions during the wet season. Pedal power subsequently proved to be a very sustainable method of providing power, and at just one-third the cost of solar energy. A prototype pedal generator linked to a standard automotive battery produces five minutes of computer use from each minute of pedalling.

Wireless connectivity is provided by a standard 802.11b card linked to an antenna located on the thatched roof of the bamboo structure in the Phon Kham trial site. This is in turn linked—via a solar powered repeater station in the hills—to a local Internet Service Provider (ISP) in a larger centre. The system relies on standard and relatively inexpensive wireless hardware components.

Perhaps the most interesting component in the overall system is the locally adapted Linux operating system and software for word processing and simple spread sheet applications. Dravis (2003) describes the system as a local version of KDE, known as LaoNux on the Debian Linux distribution. Technical work on this component of the project was conducted by Anousak Souphavank—a former IBM programmer now working at the National University of Vientiane—with students and lecturers who provided voluntary assistance. This complex technical challenge involved creating a custom Unicode to support the Laotian font set. The result is a stable version of Linux using the local Laotian language.

Crucial software components include a Web browser for navigating the Internet, a local language version of an open-source word processor and spreadsheet package, and a Voice over IP (VoIP) system that makes local and international telephony possible through the standard phone system. These software applications meet the needs and uses of the system expressed by local people. Thorn (2002) identifies some of the planned uses. According to Thorn:

...right now, the villagers have no way of telling what the market is in the big towns they sell their stuff to, telling what the weather report is for their crops, things like that. This will absolutely change that. Plus, they will be able to talk to relatives in America some of them they haven't seen in decades. (n.p.)

These hopes for utilising the system have been realised in the trial village. Plans are currently underway to extend the program to four other Laotian villages and to sites in up to six other countries.

ISSUES

Some researchers in the field of ethics and ICT development caution against wholesale acceptance and adoption of modern technologies by tribal communities in developing countries. Efforts to diffuse modern technologies within such settings have, not infrequently, been denounced as exercises in cultural imperialism. Demmers & O'Neil (2001, 40) argue that:

...whether you agree that access to technology in developing nations is detrimental to the mainstream of their cultural heritage, the reality in the world today is that a predominantly Western approach to the use of technology is subverting these cultures at an accelerating rate. A new form of cultural imperialism is emerging as tribal communities become wired to the Internet, gain access to satellite television, and begin using global positioning systems to enhance agricultural productivity.

Demmers and O'Neil claim that training people in tribal cultures to add their own content to the Web would only reduce the impact of ICT, not overcome it.

Contrasting views maintain that access to new information communication technologies is a pre-condition for development in the modern world. According to a statement on the Web site of a second project, (LINCOS), that also provides a form of mobile ICT devices to people in isolated areas:

...a techno-centric view has proven not to meet the actual needs of the communities. In fact there is a need to enrich the vision with appropriate, creative and intelligent methodologies for the use of technologies to enhance sustainable developed rural communities. (n.p.)

Rather than dismissing outright the provision of ICT as cultural imperialism, the LINCOS view argues that simply providing technical solutions in a techno-centric way may be counterproductive. Instead, creative solutions must be pursued. The approach taken in the Jhai Foundation initiative reflects the pursuit of appropriate, creative and intelligent solutions advocated by the LINCOS team. This is evident in the close collaboration between Americans like Lee Thorn and local programmers like Anousak Souphavanh that has resulted in joint development reflecting the local language and locally expressed needs.

Many of the concerns expressed in oppositional views involve the exposure of local people to mass media via the Web. This, however, is unlikely to occur in the short term through the Jhai Foundation project. Few people in the villages speak English, and they will be using software and Internet sites written in the local language by local people. Some English speakers will, of course, be needed to interpret English language sites that provide useful information on weather and up-to-date agricultural practices. The fact that this initiative does not comprise a narrowly techno-centric approach is further evident in the link between the technology and efforts to improve agricultural practices ways that are environmentally friendly and economically advantageous. The Jhai project team helped villagers acquire organic farming techniques and helped them obtain organic certification and learn how to

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