Dualler – Bridging the Digital Divide through Technology & Volunteerism

A Call for Volunteers & Industrial Support

A Project of Dual Development & Skill-base ICT Initiative

Aurhor - Ng Chee-We (MIT)

"We need to think of ways to bring wireless-fidelity applications to the developing world so as to make use of unlicensed radio spectrum to deliver cheap and fast Internet access."—Kofi Annan, November 5th, 2002

"ICT can make an important development impact because it can overcome barriers of social, economic, and geographical isolation, increase access to information and education, and enable poor people to take part in more of the decisions that affect their lives" – United Nations Development Program Report, 2001

Purpose of this Document

The objective of this document is to seek volunteers and financial/material support for the above program, aimed at prototyping and building the *Dualler*, a low cost info-communication-terminal vehicle for villages in developing countries.

The *Dualler* is one of the projects under the Dual DS Initiative. The DUAL Development & Skill-base ("Dual DS") Initiative disseminates to its members information in the public domain on skills-based volunteer opportunities in Singapore and the region. Its goal is to foster active citizenry to contribute towards development and regional peace for the benefit of society.

We now call for volunteers (specialists, students, etc.) trained in info-communication, who are interested in helping bring info-communication technologies to poor under-developed areas of the world, such as East Timor. We also call for industrial support in providing assistance in terms of financial and material support in prototyping and building the *Dualler* and supporting infrastructure, which will be given free to villages in poor under-developed countries.

The Dual Development & Skill-base ICT Vision

Those of us who are reading this either in print or in "soft-copy" ought to count ourselves lucky to be living in a world enabled by Information & Communication Technologies (ICT), such as word processing, digital storage and the Internet. Imagine it was barely 20 years ago that a document like this has to be drafted in paper and then carefully type written. There was simply no way that one could have performed "key-word searches" on a document like this. And the only way a document could reach its audience is in multiple print copies, transmitted in person, through post or by facsimile.

Today this document probably reached you through email. Not only can you edit it, send it to someone else, store it, and perform a search on its content later.

Info-communication technology has transformed the way we live lives, learn, conduct research and do business. Yet as this paper is being drafted, according to the UNDP Human Development Report 2001, as much as 85% of the world's population has never heard the dial tone and the average telephone density in the developing countries is 6.9 per hundred inhabitants.

The fortunate thing is, with today's radio frequency technology it will be easier to reach out to people than it was a hundred years ago with copper cables. The advent of low cost wireless fidelity (Wi-Fi), microwave, satellite and other digital technologies such as voice-over-IP promises to leapfrog poor nations into the high-tech age. However, a huge obstacle remains in terms of the available funds and the poor infrastructure existing in these countries.

The Dual DS Vision is to help bring info-communication technologies to the world's population living poor developing countries, enabling them to tap on the immense knowledge-base and the efficiencies brought about by these technologies

The *Dualler*

The Dualler will be a mobile info-communication unit mounted on a human or machine powered tricycle. [See Figure 1] Inspired by the Infothela of MIT Media Lab Asia, the Dualler will not only bring info-communication technology such as telephone, facsimile and the Internet to villages in poor under-developed countries, but also help local micro-enterprises. Villagers can generate revenues by making Dualler a mobile store for goods such as spices, medicine, soft drinks as well as for carrying government forms and information.

The Dualler will be designed using low-cost commercially-off-the-shelf info-comm equipment. The Dualler will be designed to meet a demanding set of specifications that include environment robustness as well as constraints such as low operational cost.

One such technology is Wi-Fi (Wireless Fidelity). The Dualler will make use of stationary directional and omni-directional range extenders to extend the range of Wi-Fi access points to achieve Wi-Fi coverage in remote villagers. These range extenders will be built with solar panels and back-up batteries so that they do not electric power from the power grid. The use of Wi-Fi technology overcomes the traditional barrier of laying copper wires.

Another suitable technology is voice-over-IP. Riding on the IP network established Wi-Fi, voice-over-IP will bring telephony to remote villages where no telephony infrastructure exist.

The DUAL DS Initiative aims to prototype and assemble a few samples of the Dualler for use in developing countries in the region. With the help of trained info-comm specialist volunteers, DUAL DS intends to design a robust mobile unit with its associated infrastructure. DUAL DS intends to seek the industry support in the prototyping as well as for the material needed to put together the Dualler. These Duallers will be deployed in

developing countries such as East Timor and Indonesia. They will be operated by local villagers, and maintained by local skilled workers who will be trained by local polytechnics and universities.

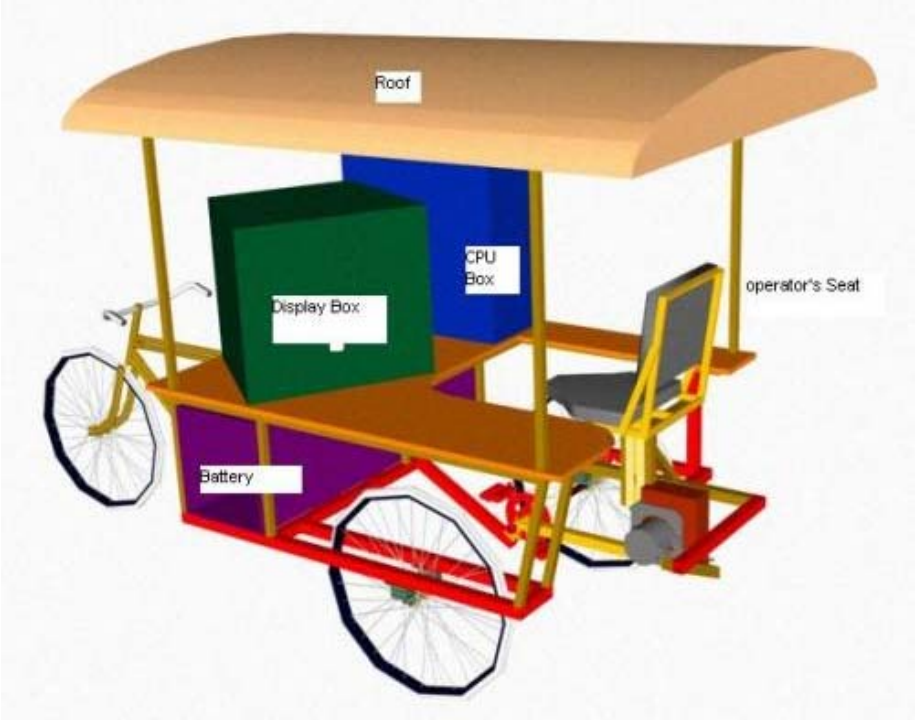

Figure 1 The Dualler, inspired by the Infothela [Picture taken from Media Lab Asia website]

Roadmap of the Dualler

The DUAL DS calls for volunteers to help make this dream happen. Dual DS seeks volunteers who are trained in the following fields:

(1) Mechanical engineers/mechanics with experience or have an interest in building robust human powered vehicles using low cost materials;
(2) Mechanical and electrical engineers with experience or have an interest in designing low generator and power systems for powering the Dualler;
(3) Information-Communication specialists with experience or have an interest in designing a low cost-of-maintenance and low cost-of-deployment ICT network;
(4) Volunteers with the experience or have an interest in seeking sponsorship or aid from industry, government and non-government agencies such as UNDP, UN ICT Task Force and OECD;
(5) Industry sponsors to support the project in terms of financial and materials.

As prototyping and building the Dualler will require effort and time over a period of time, DUAL in particular seeks:
(1) Polytechnics and Institutes of Technical Education with the interest of sponsoring student projects that work on specific technical problems relating to the design of the Dualler;

(2) Lecturers and teachers with the interest of supervising such projects;
(3) Industry sponsors with the interest of supporting and sponsoring such projects.

DUAL DS aims to build a couple of working prototypes, and document its design, as well as maintenance so that local skilled-workers can build new units and service them.

DUAL DS believes this project can be accomplished in 12 months in three phases:

Phase I: Team Forming (3 months)
a. Forming of teams
b. Identification of key technical and non-technical problems
c. Estimation of required financial and material support
d. Establishment of team objectives
e. Seeking industrial support

Phase II: Prototyping & Solving of Technical Problems (6 months)
Each team works on specific technical and non-technical problem

Phase III: Final Engineering, Deployment and Documentation (3 months)
a. Technical team works together to put together the Dualler prototype, together with its associated infrastructure equipment
b. Other teams work on deployment issues and liaison with local agencies and industry support
c. Documentation of design, assembly, operational usage and maintenance.

Industrial Support Required

Dual DS seeks the following support from the industry:

1. Equipment and components for prototyping the Dualler and its accessories such as access points and range extenders
2. Equipment and components for putting together samples of the Dualler and its accessories for actual deployment in a developing country
3. Financial and material support for polytechnics and institutes of technical education for their involvement in the project.

Opportunities for Participants

Dual DS believes the Dualler initiative will provide rich learning experience for all its participants.

For technical professionals – practitioners and students alike – it will provide an opportunity to further one's technical skill by experiencing an actual deployment of ICT infrastructure – from design, prototyping and deployment. Students will find the experience especially meaningful as it solves a "real-world" problem for the needy.

For non-technical professionals, the initiative offers opportunities for one to further one's experiences through liaison with industry, agencies and local representatives, to seek support and help in this project.

Challenges for Participants

The success of the Dualler Initiative requires solving many challenges, which include the following:

1. Design of an ICT network that has a low deployment and low operational cost. Use of green and low operational cost technologies such as solar and human power. Use of low cost off-the-shelf components such as Wi-Fi and television receivers, as well as readily available components such as pipes and metal cans for the design of directional antennas.
2. Design of building blocks for the ICT network so that it is robust to environment. In particular the access points, range extenders, and end-terminals must be resilient to wet weather, wind, sand and dust. The Dualler must be rugged against mechanical stress due to bumpy roads.
3. Liaison with industry, development organizations and local agencies to rally support, and establish local network of volunteers for the deployment and operation of Duallers.

Resources

There are many worldwide agencies working on what is known as the "Digital Divide" problem. These include:

1. United Nations Information and Communication Technologies Task Force
2. The Wireless Internet Institute
3. Organization for Economic Co-operation and Development

Some conferences have been organized recently to discuss these issues. These include:

1. Conference on The Wireless Internet Opportunity for Developing Nations, June 26 2003.
2. Business Council for the United Nations: Global Digital Divide Conference 2001

Conclusion

"ICT can make an important development impact because it can overcome barriers of social, economic, and geographical isolation, increase access to information and education, and enable poor people to take part in more of the decisions that affect their lives"

– United Nations Development Program Report, 2001

The Dual DS Initiative Dualler Vision to bring ICT to poor people throughout the developing world using low cost equipment can only be achieved with the contribution of volunteers and industrial support.

Thank you.

The Dual Development & Skill-base ICT Initiative Team