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outreach, education, innovation for sustainable development

Design Challenge Summary:
Multimedia Projector for Enhanced Education and Training

Summary

Design that Matters is recruiting volunteers to assist in the design and development of a multimedia projector system, as an extension of our current Kinkajou Microfilm Projector project.

DtM proposes to study the technical/economic feasibility of developing a low-cost multi-media display device as a stand-alone or as a companion product to a PC as a teaching tool and curriculum enhancement for underserved communities, primarily in developing countries. As a baseline, DtM is requesting assistance in reviewing the current situation and trends in commercially available data projectors. We are also interested in exploring design concepts that would enable lower cost with adequate functionality for the developing world. Desired features include low lifetime cost of ownership, meaning (a) low initial cost, (b) long life, (c) low maintenance costs and (d) low cost of lighting and other consumables. The resulting design must be maintainable on a local basis.

Background

One in five adults worldwide does not know how to read. In rural regions of West Africa, up to 75% of the population is illiterate. According to Barbara Garner of the World Education Organization, "It's the lack of resources"—specifically access to books and lighting—rather than the lack of interest in education that contributes to these numbers.


Night-time women's literacy course in rural Guinea


Student Team at MIT with prototype projection system

Microfilm Projection System in use in Bamako, Mali

Over the last two years, Design that Matters (DtM) has been developing a solution to this problem, in the form of a rugged, lightweight, low-power projection system. The Kinkajou Microfilm Projector uses a microfilm cassette to store up to 10,000 images at a fraction of the cost of paper books, and employs a state-of-the-art optics system to project an image large enough for the entire classroom to read.

In January 2005, DtM and partner World Education will conduct an extended pedagogical test of the Kinkajou projector in 50 villages in Mali. The field test will reach

over 1,500 students, in classes ranging in size of 20 to 40 students. Content material is produced on 16mm microfilm and projected onto an appropriate surface or screen. A typical class time, or the projector duty cycle, is two hours per weekday evening.

Over 180 volunteers have contributed to the development of the Kinkajou microfilm projector, including professionals and engineering and business students at MIT, Worcester Polytechnic, Babson College and Cambridge University in the UK. For a history of the project, please see the Kinkajou Design Journal here: http://www.designthatmatters.org/k2/

In field tests and customer interviews, DtM has uncovered interest in an enhanced, multimedia version of the Kinkajou projector. Proposals have ranged from something as simple as a stand-alone, text-only projector with an attached "Speak-and-Spell" type keypad, to a low-cost LCD (liquid crystal display), DLP (Digital Light Processing) or LCOS (liquid crystal on silicon) projector for use as a computer display. The specific project client chosen as a model will dictate cost and performance considerations.

The long-term impact, once a display device is brought to scale, is profound:

- The effectiveness of learning (through eLearning in classrooms) and the efficiency of teaching will be improved (assuming other components such as e-Curricula content, low cost PC and teacher training are also available) resulting in economic, social, health and environment benefits
- Infrastructure barriers to education will be lowered and the digital divide will be more easily bridged on a mass basis
- Access to information for the underserved will be increased
- A cost-effective alternative for teacher training will be available

Current technology:

In many part of the developing world, including India and the Middle East, governments and NGOs are investing in computer systems as teaching tools. Start-up costs now run as high as US$4,000 per class for a portable PC (laptop) and data-show projector. Off-the-shelf projectors of relatively low cost range from $700 to $1800 and replacement bulbs sell from $100 to $400 apiece. In order to achieve scale and sustainability, we must minimize both the up-front and lifetime cost of a classroom projection or alternative display system.

The demand for a low cost projector could be high in the developing world from government education departments and the donors and NGOs supporting education initiatives. A low-cost projector could be economically sustainable once it reaches scale production, which it could do if it is taken up by even a fraction of the estimated 20m developing world teachers who could benefit as potential users.

Opportunity/Challenge:

The objectives of this project are the following:

- To define a feasible set of technologies based on standard components that are most useful to AND sustainable by potential users
- To specify how a system would be manufactured, distributed and supported in Jordan and the whole of the developing world
- To specify how users would come to obtain, install, and maintain this system

The goal of this study is to produce the following deliverables:

- Report of user needs and preliminary product requirement
- Current and future display technology assessment, preliminary patent risks/opportunities and assessment
- Recommendation for approach to develop a durable, and reliable, cost effective display system, well-suited for use in developing countries and elsewhere that represents an order-of-magnitude improvement over commercially available solutions which are designed for the developed world.
- Proof-of-concept for projection system using standard available technology (such as LCD display components used in cell phones and digital cameras)
- Definition of the process by which users come to obtain, install, and maintain this system
- A business plan for providing these devices to the developing world that is self-sustaining and scales to a very large number of users
- Estimate of unit cost and recommended sourcing