



Creating Public Awareness of Renewable Energy by Combining Photovoltaic System and Nature

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Abstract. Energy is seemingly permanently and nearly everywhere in the western world available to the end consumer. While a majority of the western civilization is aware of the downsides of fossil energy sources and is favoring renewable energy sources, the energy consumption is still increasing. The situation is quite clear to the experts in the field, but further awareness in the public must be created. Therefore this paper addresses a method of creating this awareness: installations that stimulate conversations of renewable energy.

A solar tree was developed and built to serve young people with an AC outlet at a rock festival. The tree was realized under mechanical constraints and considerations of the electrical network to allow energy storage and conversion. This paper will introduce the principle of prototypes, which are provoking human thinking toward environmental friendly technology. The mechanical requirements and the developed solution is shown, before providing intensive insight into the electrical configuration, consisting of a battery, photovoltaic cells and a DC-AC converter. Furthermore a low complexity charge controller is presented. The resulting solar tree is capable of attracting peoples attention, surviving in harsh environments and providing power up to around 100 W.

Key words

Solar Energy, Technology Social Factors, DC-AC Power Conversion, Capacitive Energy Storage, Prototypes

1. Introduction

Engineering communities in universities and private companies are putting many resources into the development of efficient renewable energy technologies, and clean tech development is furthermore receiving political focus in environmental and research policies [1]. In the latest parliament settlement in Denmark energy and environment is one of five strategic research areas [2], and clean tech also plays a prominent role in a recent report of a government instituted climate commission [3]. In portuguese public institutions, i.e. universities and museums, the public was introduced to renewable energy sources through a solar festival

[4]. However, to further promote renewable energy there needs to be created extended awareness of the available technologies among citizens.

Roskilde festival, the largest rock festivals in Northern Europe, has designated a part of the festival area to promote environmental awareness among the 75.000 guests and 25.000 volunteer workers. Here volunteers place various sorts of installations aiming to illustrate and inform of environmental problems and possible solutions [5]. Renewable energy technologies are part of these solutions, and this paper deals with the development and production of an installation combining photovoltaic panels and biomass to raise awareness of these energy forms.

In the field of Human Computer Interaction (HCI) researchers and engineers have been working with Tangible User Interfaces (TUI) and Tangible Interaction (TI) for a while. These terms denote efforts to embed computing in the everyday environment of users in a material form in a manner where the user can interact physically with the computational resource which this way becomes intuitively accessible. Museums and artist experiment with TI as a means to make exhibition and museum visitors interact in order to develop the museum experience, product designers and architects create interactive spaces and products to induce meanings into products and reactive behaviour [6]. Artefacts in TI installations can be so-called prototypes [7] that provoke certain themes in the conversations of the interacting persons [8]. The described photovoltaic system in this paper aims to provoke the theme of renewable energy by means of a TI inspired installation at Roskilde Festival 2010.

Taking departure in nature and plants and how they transform the energy of the sun into biomass, we developed the idea of building a large tree that transformed solar energy to electricity by means of solar panels and had an AC outlet at the stem. Here festival guests could charge their mobile phones, and while the phones recharge, the guests were confined to the vicinity of the tree in order to keep an eye on their