

Abstract

Renewable energy is on demand worldwide because of high oil prices, concerns for the environmental impacts that in turn causes significant societal problems, which arise from the use of traditional sources of energy like fossil and nuclear fuels. In recent years, progress on solar-powered air condition has increased, as nowadays air condition systems is necessary in every vehicle. Therefore, this thesis focuses on an investigation on the performance of solar powered air conditioning system for vehicles. This investigational study was set to understand the feasibility of utilizing solar power energy to run an air conditioning system on a vehicle in Srilanka in comparison with the other traditional modes of air conditioning systems that is available in the modern market. In turn, design a conceptual design of a direct current (DC) air condition system integrated with photovoltaic (PV) system, which consists of PV panels, solar charger, DC motor/compressor and lithium ion batteries.

The air conditioning system is operated on solar power and can be used in non-electrified areas, as we all know that solar energy is cost effective, renewable and environmental friendly. The system consisted of a flat-plate collector array Trina Honey module with an area of 1650x992x35 mm, that delivers high efficiency of up to 15.9%, combined with its high performance under low light conditions allows for consistently high output and the ability to maximize the return. The Trina Honey panels have a guaranteed power output of $-0/+3\%$, meaning the performance of the panel will not be below its rated output and may potentially be up to 3% higher.

Most of the energy generated can be lost in the compressor, so an alternative approach to reduce energy consumption is to use an electrically- driven compressor (EDC)(Dahlan et al. 2014) powered by a 100v lithium ion vehicle battery which is charged by the solar energy. This system makes the speed of the compressor to be independent of the engine crankshaft speed. Typical belt-driven compressor of automotive air conditioning system (AAC) caused cooling capacity to vary with engine speed.

