Preface

Various renewable energies have existed well before the apparition of human beings, yet we have failed to harness their true potential. The bottleneck with renewable energy systems is that they are extremely expensive to initiate and their production capacity is much less when compared to fossil-fuels. The primordial aim in publishing this book is tackle the first problem of high commencing cost by carving the path to a cheap but powerful, precise, and robust tracking solar concentrator. Since solar energy is the most abundant form of renewable energy, often present for days without faltering, it was the default starting choice.

The exorbitant cost of solar trackers is tackled from its roots. To ensure that the tracking mechanism was affordable to the general public, a very limited budget was allocated to building the steerable solar tracker. To maintain low price, an investigation was first carried out without leaving any stones unturned and then a blueprint of the solar tracker was implemented. To shift the design from paper to the real world, the skeleton of the system was first built followed by the gearing mechanics which was built from scratch using components instead of embedded commercial systems.

After the generic solar tracker had been conceptualized, a solar concentrator which helps focussing the light of the sun to a minuscule point was analyzed. The design phase and subsequently the implementation part took over. Emphasizing on inexpensive raw materials, a concentrator was made from fibre glass which has both the advantages of being malleable and low-priced. To really focus sun energy, the concentrator was lined up with a mirror film.

The only way to ascertain that our proposed solution is a viable option was to thoroughly test the machine in the field. It was shown that the tight-budget robot was successful in resisting the harsh conditions prevailing outside and proved to be a decent contestant in the commercial world in terms of cost, power, and reliability if the system is scaled up.

This work was written with three kinds of reader in mind:

- *general readers* who wants a treatment of the field that has both breadth and technical depth;
- *teachers and students* who want an authoritative text that covers all areas of solar concentrator and solar tracking;
- *researchers and engineers* who are interested in introductory treatments of advanced topics and also are interested in gaining expertise in this area and want a practical guide with some theoretical basis.
  Being an all-audience manuscript, no prior know-how is expected on the part of readers. All relevant equations have been derived from first principle and all notions have been elaborated using simple comprehensive analogies.

This research bears the imprints of many people who have contributed in one way or the other in its completion.

First of all I wish to express my thanks and gratitude to Dr. S. Oree for his unrelenting attention, excellent guidance, and comments while reviewing my book. Project manager, Dr. Oree initiated the theme of solar concentrators and encouraged me to start an ongoing research in the field of renewable energy. I would also like to thank Dr. G. Beeharry who helped me with microcontroller programming and to thank Dr. R. Somanah who agreed to support me while I was embarked on the research journey.

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A special thank goes to all those people not mentioned but have in one way or another supported me to achieve this work of art. I would like to thank my mother and my father for their moral, spiritual support, and ongoing kindness throughout this project.

Last but not least, I am grateful to God who has sorted me out of every difficult situation.

I hope that you enjoy reading this book as much as I enjoyed researching and writing it. If you have suggestions or comments about this book or would even like to glimpse on my algorithms/scripts, please do not hesitate to shoot me an email (*zaf@physicist.net*).

Mauritius, November 2012 Zafrullah Jagoo

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