

RESE412 - Project 3 Design Report

Remote Control Car Charge Station

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October 7, 2020

1 Introduction

2 Environmental Conditions

The primary and sole energy source of the charge station is solar, due to the elimination of wind due to non-functional turbine, and thus the resource examined was an solar irradiance availability as well as likely hood of external interference due to tree coverage/building occlusion and selection of array bearing and tilt.

To gather information to inform our design we utilised both NIWA solarView [1] for historical data and on site examination to access special setup and topology.

2.1 Solar Irradiance

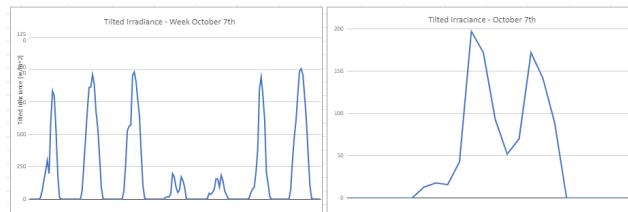


Figure 1: Solar View tilted irradiance

The historical data of track location, shows that on the day (October 7th) there is an expectation of significantly less nominal solar energy available. As shown 1 above the data expects a max of $200W \cdot m^{-2}$ with significant midday dips. From this we can infer the very real possiblty of heavy/intermittent cloud cover.

Average Irr race period 11:00 - 14:00	
Oct 7th	Week
96.75	612.61

To prevent drastically oversizing the final design and to ensure optimising for total costing of the system, we examined the average irradiance over the race time of both the week as a whole and of the day itself (see above). From this we proceeded forth with expectation that the panels may be

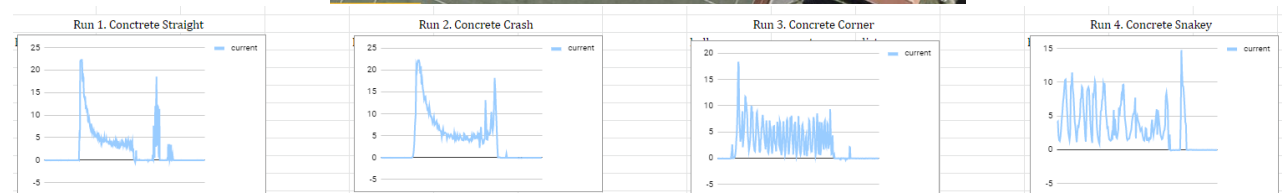
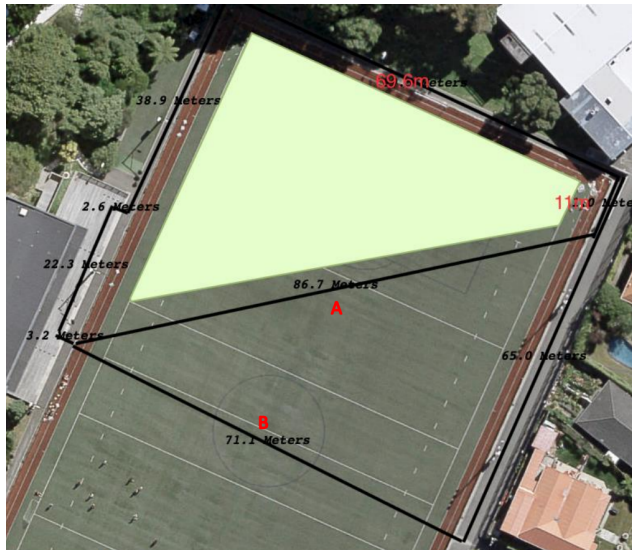
operating at half their possible maximum output. This directly informed the amount of panels we chose in order to supply our energy requirements, especially due to possible large fluctuation erring on a robust rather than exactly matched system.

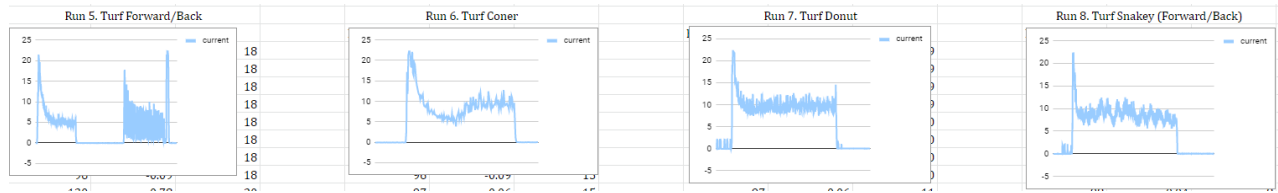
2.2 Topology



By visiting the site during the time on the week off the race, we were able to make an inspection of effects of shadows from building and trees. Seen above, the tree coverage of the northern tree line does not infringe on the section of field intended for solar collection, nor do any building. Therefore we can directly use the NIWA data under assumption that the only occlusion of direct sun we would experience would be cloud coverage.

3 Race/Track Conditions

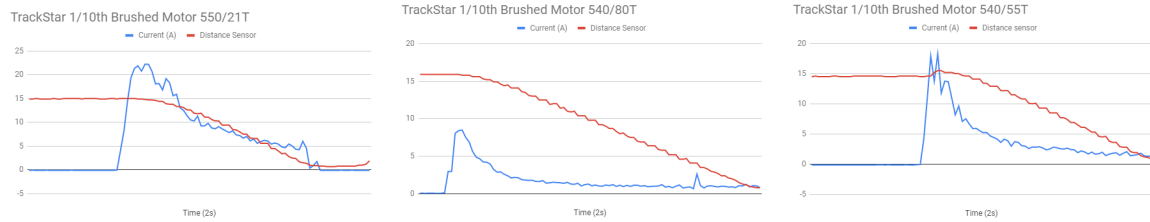




4 Component Testing

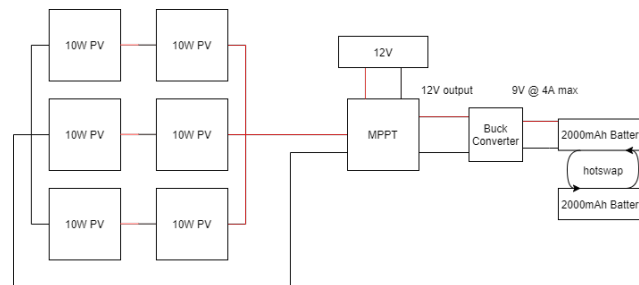
4.1 Battery Capacity and Charge Time

4.2 Motors

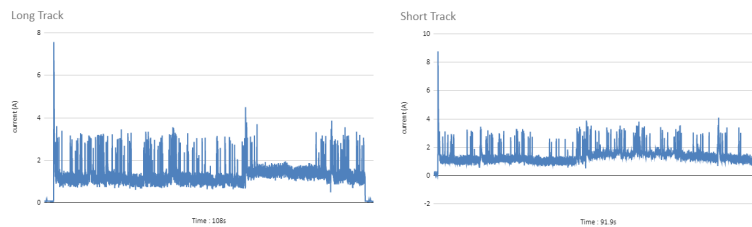


5 System Design

5.1 Charge Station



5.2 Car



6 Risk Analysis

7 Budget

Team ECO Budget	
6 x 12V 10W Polycrystalline solar panel	285.42
buck	12.39
MPPT + 12V bat	86.85
2 x NiMH battery 2000mAh	154.44
TrackStar 1/10th Brushed Motor 540/80T	14.04
total	553.14

8 Conclusion

References

- [1] NIWA, “Niwa solarview,” website. [Online]. Available: <https://solarview.niwa.co.nz/>