

Philosophy of Designing and Operating a Solar Car

Caden Pong
SSCT Captain

Seattle Solar Car Team



What we will talk about

- Why reliability is the most important aspect of solar racing
- How to optimize your car and *team* for your goals
- Lessons that we have learned and methods we use

The Problem:

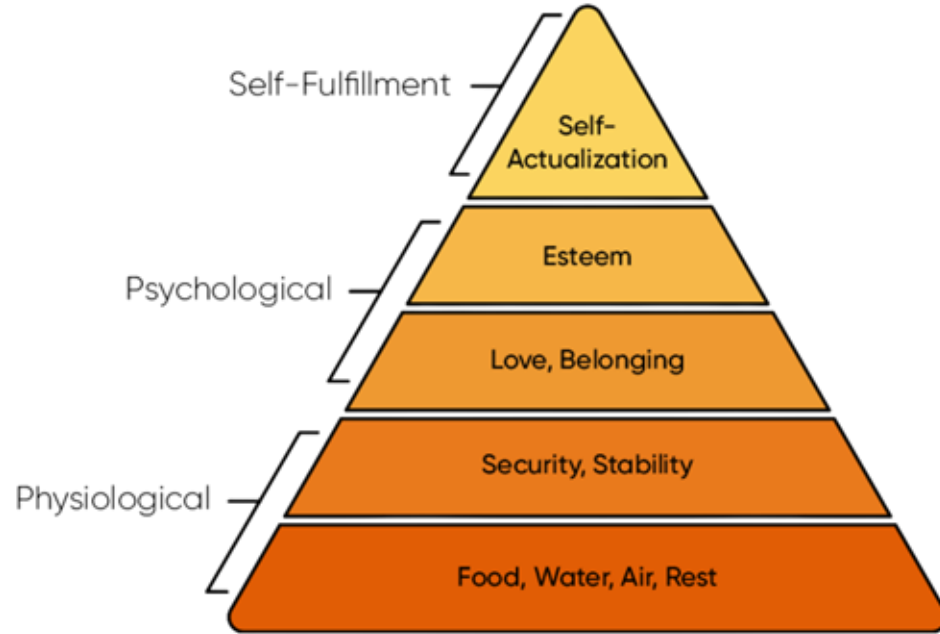


The Problem:

- Make a car that can hold the highest average speed on the energy it captures.



Solar Racing in Practice



Solar Racing in Practice



Reliability

Mileage Lost = Time not spent driving * Usual Average Speed



Reliability

Mileage Lost = Time not spent driving * Usual Average Speed

Mileage Lost = 2 hours * 50 MPH



Reliability

Mileage Lost = Time not spent driving * Usual Average Speed

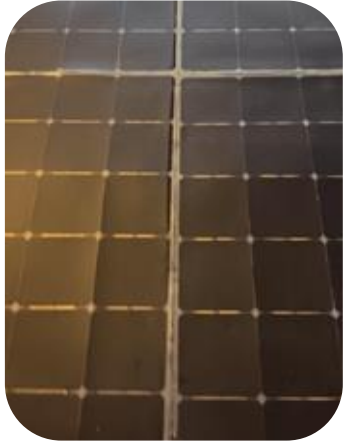
Mileage Lost = 2 hours * 50 MPH

Mileage Lost = 100 Miles

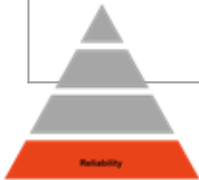
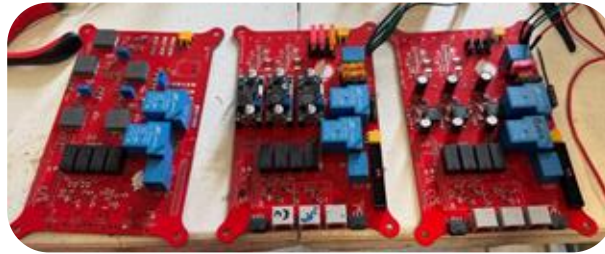


Reliability

Durability



Repairability



Effectiveness?

Make a car that can hold the highest average speed on the energy it captures.



Effectiveness?



Jimmy (2022)

- 8 m² Array
- Below Average Efficiency



Sockeye (2024)

- 4 m² Array
- Super Efficient



Effectiveness

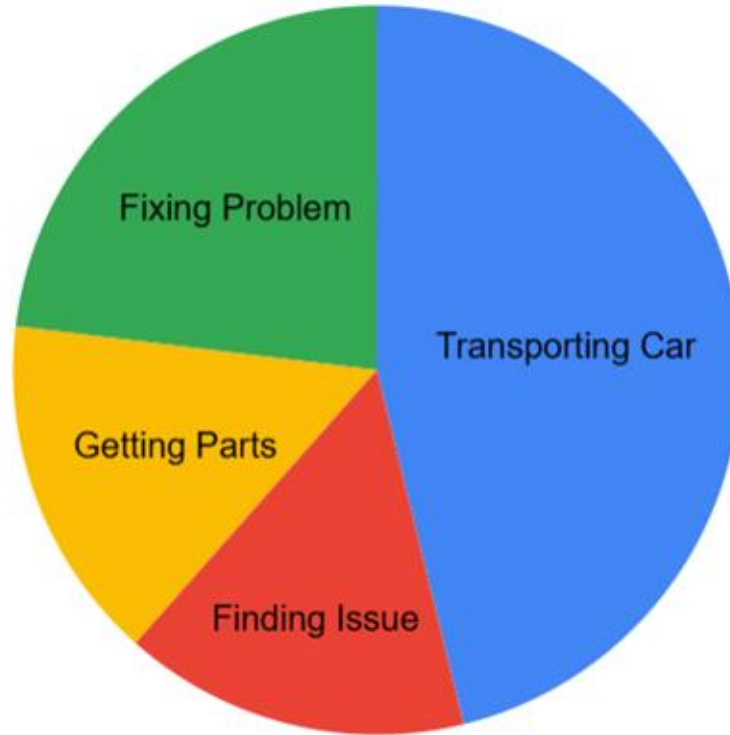
Efficiency	Energy Collection
Smaller Car Lighter Materials Better Components	Larger Solar Array More Sophisticated Solar Array Better MPPTs



Why do we care about Operations?



Why do we care about Operations?

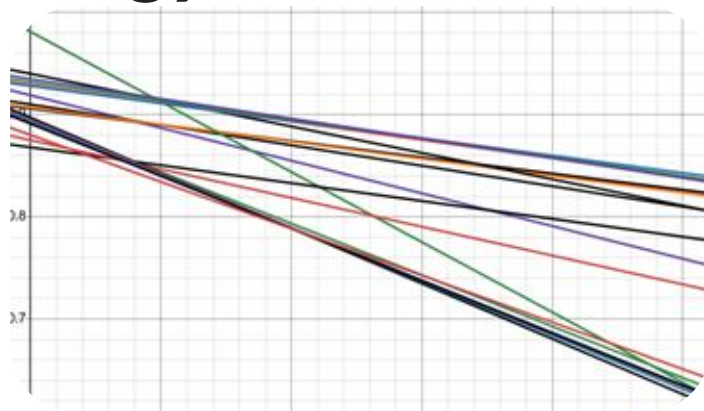


How to make Operations better?

3	Full Pit Practice Schedule 2025 V3 Practice Day 1		
4	Person	Task run 1	Task run 2
5	Hika	Driver	N/A
6	Shou	Driver Replacement	Driver
7	Caden	Wheel Swap 1	Driver Replacement
8	Jude	Wheel Swap 2	Wheel Swap 1
9	Atticus	HV Fuse Change	Wheel Swap 2
	Breiden	N/A	HV Fuse Change



Strategy

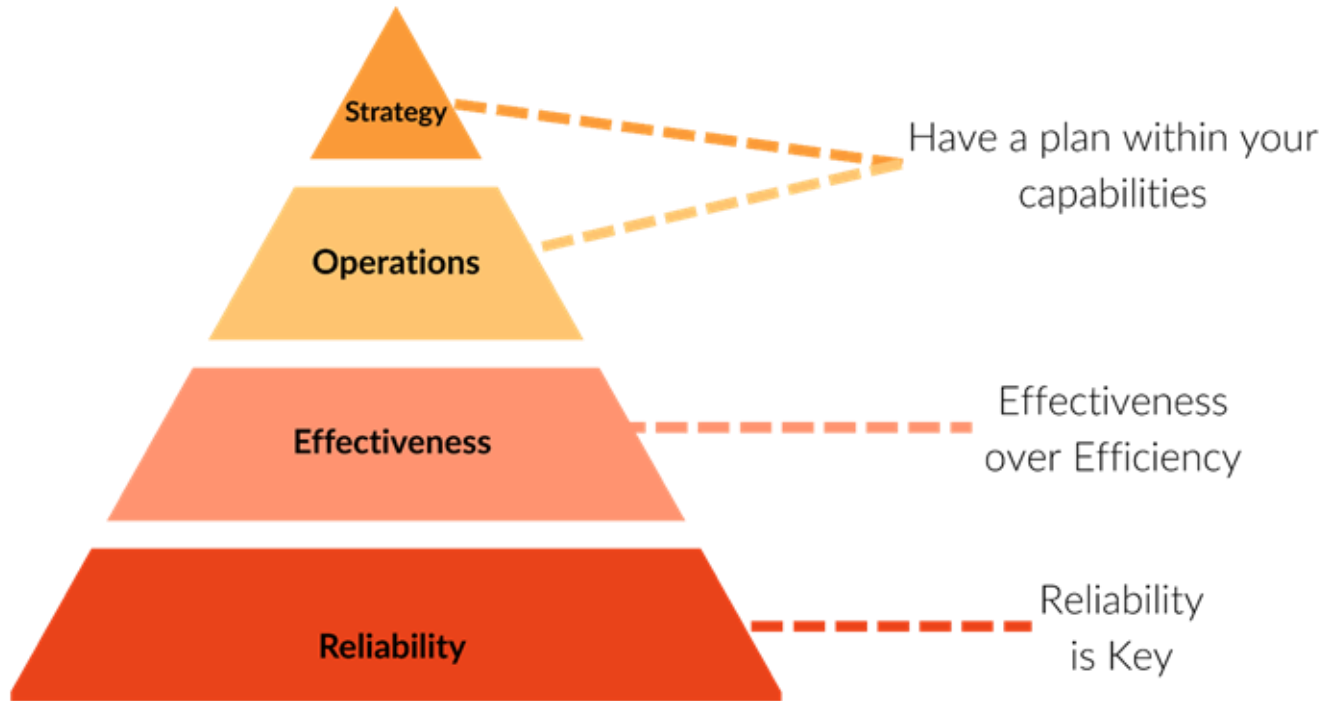


	A	B	C	D	E	F	G
1	Start	End	Notes	Driving	Rest	Spot	Pits
5	9:00 AM	10:00 AM	Racing Period	Hika	Jude	Atticus Caden	Brandon Alex Shou
6	10:00 AM	11:00 AM	Racing Period	Hika	Jude	Atticus Caden	Brandon Alex Shou
7	11:00 AM	12:00 PM	Racing Period	Brandon	Hika	Alex Jude	Caden Atticus Shou
8	12:00 PM	1:00 PM	Racing Period	Brandon	Hika	Alex Jude	Caden Atticus Shou
9	1:00 PM	2:00 PM	Racing Period	Caden	Brandon	Shou Atticus	Jude Hika Alex
10	2:00 PM	3:00 PM	Racing Period	Caden	Brandon	Shou Atticus	Jude Hika Alex
11	3:00 PM	4:00 PM	Racing Period	Jude	Caden	Hika Alex	Brandon Atticus Shou

0.4779	0.4726798034	2.196480042	0.7365635187	0.455273884	1094.05237b
0.2710222	0.4944012014	2.107460942	0.7490572776	0.4745046421	527.9385826
0.57378526	0.5161599251	2.026161835	0.7608054912	0.4935439918	557.7343806
0.62239661	0.5379523391	1.951661752	0.7718668923	0.5123786185	567.4370311
0.07273367	0.5597748026	1.86325554	0.7822937997	0.5309953848	617.0048009
0.32458023	0.5816236489	1.820229299	0.7921329704	0.5493813338	646.3978425
0.57772518	0.6034951522	1.762040975	0.8014263195	0.5675236922	675.5780122
0.83195109	0.6253855239	1.708204871	0.8102115297	0.5854098751	704.5087186
0.08703484	0.6472908677	1.65829919	0.8185225713	0.6030274912	733.1547964
0.34274601	0.6692071621	1.611955946	0.8263901452	0.6203643484	761.4823996
0.59884521	0.6911302289	1.568852726	0.8338420648	0.63740846	789.4589131
0.8550822	0.7130557066	1.526705923	0.8409035833	0.6541480511	817.0528773
1.11119379	0.7349789836	1.491265142	0.8475976773	0.6705719649	844.239254
0.36690145	0.7568952166	1.456308553	0.853945293	0.6866676694	870.9727302
0.62190862	0.7787992239	1.423638999	0.8599655598	0.7024252644	897.2409597
0.87589762	0.8006854808	1.393080732	0.8656750772	0.7178334875	923.0112392
1.12852609	0.8225479519	1.364476655	0.871062578	0.7328817214	948.2571203
0.7942282	0.8443802184	1.337685985	0.876230072	0.7475996001	972.9530545
0.18294	0.866175194	1.312582255	0.881101972	0.7618570159	997.0743713



Main Takeaways



Questions?

pongcaden@gmail.com

