	Describe the risk briefly	*What is the effect on any or all of the project deliverables if the cause of this risk actually happens?*	*What is/are the possible cause(s) of this risk? (Be creative!)*	*1-->3*	*1-->3*	*L*S*	*What action(s) will you take, by when to prevent, reduce the impact of or transfer the risk of this cause occurring?*	*Who is responsible for following through on the mitigation?*	
Category	**Risk Item**	**Effect**	**Cause**	**Likelihood**	**Severity**	**Importance**	**Action to Minimize Risk**	**Owner**	
Completed:						46			
Design	Crankset fails/pedals fail	No power provided to bulb unit	Kids pedalling too fast or hard/general misuse of device and they come undone	1	3	3	Builld from structurally sound materials, use high factor of safety	Jess	
Design	Components Break	Device doesn't work/repairs have to be made	Large forces on weak/brittle components	1	3	3	Analyze forces on components and design for that; include repair instructions in manual	Kyle	
Electronics	All or 1 DC motor(s) stop functioning	Will not generate enough power to run Bulb or pump.	Physical damage, loose wiring, etc.	1	3	3	Mounted with screw, and step offs, so won't contact gears or wall.	Chris	
Electronics	Voltage Regulator stops functioning.	System will have no maximum voltage. May provide too much power and may damage pump and bulb.	Several; physical damage, malfunctioning ICs, blown caps, too much current	0	3	0	Physically protect the circuit and find a dependable supplier for components.	Chris	
Electronics	Wires come unsoldered	Various; electronics don't work as they should	Weak solder joints	1	3	3	Stabilize circuit board, minimize length and interference of wires	Chris	
Electronics	Miscellaneous wiring issues	Ranges from insignificant to critical depending where it takes place.	Either physical damage to the unit or bad manufacturing.	1	3	3	Physically protect all wiring.	Chris	
Design	Gearbox component damage	equipment inside gearbox can be damaged by moisture and other external issues	Not having an appropriate lid or bottom	1	2	2	Find a lid. Affix it to case.	Jess/Kyle	
Design	Seat back is unstable	Discomfort; seat back failure	User swivel loosens screws	1	2	2	Conduct analysis on screws holding backrest, add washers to screw, and through testing mitigate.	Liz, Jake	
Design	Durability	Wear/rust decreases stability, safety, ease-of-use	Device is made of highly corrosive parts	1	2	2	Use a lubricant to prevent rust and wear on carbon steel. Also encasing the gears will reduce wear caused by outside stuff.		
Ergonomics	Complexity of Design	New design requires more labor to construct	Number of Chains and Gears, Size of Motor	1	2	2	Provide an adequate straightforward instruction manual; pre-construct gear box.	Kyle, Liz, Jess	
Ergonomics	Poor User-End Assembly	Broken parts; no put-together device	Too much user-end assembly; unclear/inadequate manuals	1	2	2	Test user manuals on random people/children; pre-assemble major components before ship.	Erika, Jake	
Shipping	Difficult to Ship	Increases end cost to user/broken components upon arrival	Big, heavy	1	2	2	Minimize envelope, minimize weight, incorporate some user-end assembly; support unit for fragility		
Design	Large gear interferes with pinion gears	may damage or seize gears	the shaft is slipping inside the gear box or the MM is mounted too close	1	2	2	Increase the standoff size or machine a better flat for collar set screw	Jess	*could we bring this likelihood to 0 because we have ran it for testing and its okay?
Design	Seat back is uncomfortable	Users don't like it	It's not padded	1	1	1	Testing; possibly switching to Pool Noodle idea; adding foam	Erika	
Design	Seat collapses during use (bucket)	User will not be able to support their body in order to pedal	Misuse or lack of proper analysis of range of loads	0	1	0	Indicate a weight limit for users in user manual	Liz, Jake	
Electronics	LED interface stops functioning.	User will not be told when they are generating enough Power.	LED blown, circuit has physical damage, etc.	1	1	1	Physically protect the circuit.	Chris	
Ergonomics	Seat is too large/small for some users' comfort	End user discouraged from use	Not enough subjects tested device	1	1	1	Test subjects of many ages, sizes, weight	Jake, Erika, Liz	

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Ergonomics	Prototype doesn't accomodate intended users	Many end users dislike use	Not enough subjects tested device	1	1	1	Bring in sufficient range of subjects to test device	Jake, Erika, Liz	
Testing	Users tip backwards when using seat	seat tips backwards	not enough down force or weight on the track side versus the user's weight leaning backwards	0	3	0	Add support to the back of the seat	Jacob and Kyle	
Project Planning	Build Failure	No functional prototype	Inadequate analysis	0	3	0	Conduct appropriate analysis and source all necessary tools ahead of time.	Chris, Kyle, Liz, Jess	
Project Planning	Materials Missing for Prototype	Cannot show customer a functional prototype	Parts did not arrive in time	0	2	0	All components are in.	Jess	
Design	Shaft misalignment	"Wobbling" of shaft	Higher RPM than is proper for shaft size	0	3	0	Analysis shows not deflection worth mentioning.	Kyle	
Project Planning	Will not finish analysis on time	May cause problems with design funtionality	Not planning properly	0	3	0	Stay ahead of project plan by reveiwing action items	Jake	
Design	Gearbox falls over during use	May break pedals or device	Not stabilizing the gearbox properly	0	2	0	Added pin to linear track, adding support at base if needed		
Design	Complexity and Size of Design	Device is difficult to set up	Number of Components not minimized	0	1	0	Provide an adequate straightforward instruction manual		
Design	Gear Ratio too high	Gears hard to turn	Excessive inertia/torque to overcome	0	3	0	Mitigated by reducing gear ratio to 1: 28	Kyle and Jess	
Design	Gears shift along shaft	Gears will not mate	No collar	0	3	0	Use e clips with groove, also apply stepping, tolerance stack up calculated. Add shims if necessary	Kyle	
Design	Product Safety	Injuries to user and/or damages to device	Keeping costs down permits too many exposed parts	0	3	0	Encase (with plastic/acrylic material)		
Design	Drive/Power train seizes	Device doesn't work	Sand/debris in the mechanism	0	3	0	Enclose the mechanism, create drawing for B9 to manufacture case	Kyle	
Design	Gears wear prematurely	Failure of gearbox	Gears may be made from thermoset plastics, grind plastic down	0	3	0	Will use Carbon Steel for gear	Kyle	
Electronics	Too much power blows bulb and/or pump	Destroy intended use product, cause needed repair	Over-pedaling and not properly sizing the circuit. Or the regulator circuit malfunctions	0	3	0	Test the regulator circuit w/ out bulb attached	Chris	
Ergonomics	Uncomfortable/Non-ergonomic Seating	Using device places an unnecessary strain on users	Not being able to find a reliable source for an OTS seat	0	2	0	Explore all options for seating and choose most inexpensive and easily sourced and modify design as needed; prototype seating	Erika	
Ergonomics	Ergonomic Fit	Several people can't share workload	The device is too large/small	0	1	0	Adjustable seating		
Ergonomics	Adjustable Seat length(for intended users)	Adding flexibilty to accomodate user size increases costs	Range of users	0	1	0	Design for approximately 90% of women and 50% of children above the age of 6		
Shipping	Size of Device	Device is costly to ship due to size	Number of Chains and Gears, Size of Motor	0	2	0	All parts will fit inside packaging as pieces ready to assemble	All	
Design	Tolerance Issues	Gears will not mate or mesh properly	various parts with multiple uncontrollable tolerances	0	3	0	Precision machining	Jess	

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Design	shoulder-axis stability	bucket tips over	unstable			0	have handles or two legs http://www.homedepot.com/p/Simpson-Strong-Tie-2-in-x-4-in-Rigid-Tie-Connector-RTC24/100374900?N=5yc1vZaq9x		
Electronics	Circuit board comes off casing	breaks components due to loose in box	vibration causes nuts to wiggle out	3	3	9	Lock tight, another nut to lock in place		
Build	Crank Arms slip off	Cannot pedal and provide power,	will have to stop and put crank arm back on.	2	2	4	Add retaining ring to crank arms	Jess	
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