

ID	Type of Risk	Risk Item	Effect	Cause	Likelihood	Severity	Importance	Action to Minimize Risk	Owner
	Technical or Non-Technical	Describe the risk briefly	What is the effect on any or all of the project deliverables if the cause actually happens?	What are the possible cause(s) of this risk?			L*S	What action(s) will you take (and by when) to prevent, reduce the impact of, or transfer the risk of this occurring?	Who is responsible for following through on mitigation?
1	Technical	Design does not work with all bicycle types	The usefulness of the design is lessened	Large array of bicycle types/sizes in the market. Cost for making universal solution may exceed budget.	3	3	9	Test design on at least 5 different bicycles that are within the specified size requirements. Check before prototype construction that the solution theoretically works. Utilize CAD programs as appropriate. Research the most common types & sizes of bikes in target countries.	Aaron
2	Technical	Water proofing is not absolute	The device may short	Bike may need to remain outdoors during heavy rain. May be exposed to severe elements.	3	3	9	Conduct waterproofing test prior to installation of electronics conduct according to IEC60529	Dan
3	Technical	Bracket cannot hold the device or the box to the bike frame while the device in use.	The device or the phone could fall off and break	The Bracket is too weak or screws become loose or device slips.	2	3	6	Test device in variance conditions, and make sure the bracket is tight and secure against to the bike.	Dan
4	Technical	Devices does not work with every possible type of cell phone (and other small electronic devices)	The device will not be useful to people with those phones and devices	Large number of incompatible proprietary electronic devices not compatible with universal charger.	2	3	6	As many devices as possible need to be tested with the solution (minimum 10), Design needs to be monitored every few weeks to check to make sure that solution is theoretically working. (Mitigation we have called Digi Cell Haiti and have determined that there are two connectors which are most	Brenda

								common. We have located USB to phone adaptors for 50 cents and users can select or purchase one of those with the product.	
5	Technical	Roads in target country are not paved/level.	Device may snap off holder	Cannot go to those countries Inappropriate approximation/experiments	2	3	6	Experiment on different road conditions Pick the one that is closest to the target countries. Ensure device works at same effectiveness when charged on smooth and rough terrain.	Brenda
6	Technical	Device casing does not prevent vibration damage	The device will no longer function	Bike may ride over rough, uneven terrain.	2	3	6	Prior to electronics install conduct tests/calculations until desired level of damping is achieved	Dan
7	Technical	Device does not generate enough power	Phone will not charge, device failure	Inferior friction between roller and bike wheel (Base on the design we picked, the likelihood that the roller slip on the tire is reduced)	2	3	6	Conduct many tests to insure that proper power is generated	Flora
8	Non- Technical	Parts are ordered too late	Design cannot be built and tested on time	Lack of overall planning Not identified and ordered on time. Lead-time longer than manufacturer stated.	2	3	6	Utilize Gantt chart, plan and understand anticipated lead times and delivery constraints. Have multiple manufacturers who can supply part.	Amina
9	Non- Technical	Necessary parts are not available within budget constraints	We might not be able to make the budget as required by the design specifications	Did not keep budget in mind enough during design review and assessment (After the research on different part, we found lower price motors and other materials. Also, after communicate with the customer, we now know that the cost requirement is not as straight as before.)	2	2	4	Do cost analysis at each step. Reduce cost if possible and insure that the technology considered is available (within the budget). Analyze tradeoffs between cost and other specifications.	Amina
10	Technical	Device cannot be	Increase the	Inappropriate technology	2	2	4	Concept/technology selection	Aaron

		installed without professional tools or people	cost, time, and number of people required for installation	selection. Single tool installation not possible.				process to avoid designs that need extra tools or people	
11	Technical	Generator cannot be efficiently designed and manufactured in-house.	The design cannot be completed without this main part	Inadequate expertise, equipment, and materials (We decided to buy a motor)	1	3	3	Purchase commercially available generator or hire a consultant.	Flora
12	Technical	Device damages cell phone battery	Cell phone rendered unusable. Project Failure	Inadequate circuit design. Including lack of surge protection. (Base on the circuit design, it is very unlikely to damage the phone)	1	3	3	Test protection mechanisms to insure phone is charged sufficiently and safely	Flora
13	Non- Technical	Device is not aesthetically pleasing	Device works, but not attractive to user.	Lack of time spent on aesthetics.	3	1	3	Spend time making the device attractive. Possibly team up with Industrial Design students. Loosen restrictions for this criterion to reduce cost (if necessary).	Dan
14	Technical	Phone dislodges during testing	The phone may be damaged	Phone attachment not strong enough	1	3	3	Test phone attachments prior to attaching phone itself	Aaron
15	Non- Technical	UI is not easily viewable by user	The user will not have a pleasant experience and may be unaware if the device is working	Through vigorous riding, the UI dislodges. Initial placement may not be favorable to all users.	1	2	2	Need to consult with ergonomics expert and test with several people. Design needs to take into consideration the user. Mitigation: We have consulted the expert and there does not seem to be major issues with ergonomics and the box we have selected should be clear.	Amina
16	Non- Technical	Only one electrical engineering student on team	This may delay some electrical engineering aspects of the design.	This is a constraint of the team environment and senior design class (Design of electrical part is in good progress. EE has asked for help from teammate and professors)	1	2	2	Insure that additional assistance is sought for issues from experts or ask for help as soon as possible. Possibly hire a consultant	Flora

17	Technical	Device cannot withstand temperature changes	Additional time and money may be required in order to find replacement parts.	Wires bend and break in cold, solder melts in heat.	2	1	2	Make sure extra parts are available to pick up in stores, not online. test bike in hot and cold temps, rapidly	Aaron
18	Technical	Device produces too much power	Added cost, will have to redesign circuits, cause device not to work at all due to overload	Gearing for generator too high, insufficient circuitry, too large a generator	1	2	2	Conduct tests for proper power generation; see if rerouting power to another storage device is possible.	Flora + Aaron
19	Technical	Device breaks/becomes unusable due to particulate matter	Increased cost due to need for a guard.	Rocks or mud jam gears or cause roller to lose friction	2	1	2	Conduct tests in which generator experiences harsh off road conditions. Test according to IEC60529.	Dan
20	Technical	The device collects static electricity during a ride and shocks user	Unsafe for use, urgent safety hazard, Project Failure	Poor choice of materials, poor design without a ground	1	2	2	Test prototype before mass production to ensure safety of user is maintained, static discharge testing	Flora
21	Technical	Device breaks/becomes unusable due to particulate matter	Increased cost due to need for a guard.	Rocks or mud jam gears or cause roller to lose friction	2	1	2	Conduct tests in which generator experiences harsh off road conditions. Test according to IEC60529.	Dan
22	Technical	Wires detach	Device will not charge the cell phone and may break other components when pulled. This would make the project more expensive by having to	User becomes entangled in loose wires. Device is not secure enough and the road vibrations pull on the wires.	1	1	1	Create quick connect/ quick release end to wires to be easily reconnected. Purchase thicker wire ahead of assembly. Ensure plan to secure wires properly.	Brenda

			replace parts						
23	Technical	Device can be easily stolen	Presents need for professional install. Adds extra cost to design.	Easy and nonpermanent attachment method.	1	1	1	Decide if it is necessary to have a professional install the device	Dan

Risk added The importance of the Risk is lower Mistakes that have been fixed

Likelihood scale	Severity scale
1 - This cause is unlikely to happen	1 - The impact on the project is very minor. We will still meet deliverables on time and within budget, but it will cause extra work
2 - This cause could conceivably happen	2 - The impact on the project is noticeable. We will deliver reduced functionality, go over budget, or fail to meet some of our Engineering Specifications.
3 - This cause is very likely to happen	3 - The impact on the project is severe. We will not be able to deliver, or what we deliver will not meet the customer's needs.

"Importance Score" (Likelihood x Severity) – use this to guide your preference for a risk management strategy	
Prevent	Action will be taken to prevent the cause(s) from occurring in the first place.
Reduce	Action will be taken to reduce the likelihood of the cause and/or the severity of the effect on the project, should the cause occur
Transfer	Action will be taken to transfer the risk to something else. Insurance is an example of this. You purchase an insurance policy that contractually binds an insurance company to pay for your loss in the event of accident. This transfers the financial consequences of the accident to someone else. Your car is still a wreck, of course.
Accept	Low importance risks may not justify any action at all. If they happen, you simply accept the consequences.