

Description of component, subsystem, or function	Symptom (what?)	Effect (so what)	Failure mode (why?)	Probability of failure	Severity of effect	Risk priority	Remedial action
Wireless LightBar System	System Fails to Operate	User cannot use the desired system	1) User's Computer is not set up correctly 2) User failed to set up parts as directed	1	1	1	Make simple and clear directions for user
LightBar	LightBar fails to Operate	User sees no effect from lightbar during operation	1) Wireless Protocol Error 2) Computer Error	2	1	1	Warn Users of Wireless Protol and Computer Errors
TowerPlayer Program	Audio/Frames for Display is Unsynced	User experience is frustrating/ruined and fails to meet design intent	1) User's Computer permissions/libaries not correct 2) Missing permissions/libraries 3) Wireless Protocol Error	2	1	1	Inform user of required libraries/software, warn of Wireless Protocol Errors
TowerArduino Program	Arduino does nothing	Cannot send or receive data (LightBar will show nothing)	1) Incorrect use of "Arduino" Software 2) Wireless Protocol Error	1	1	1	Inform user of required libraries/software, warn of Wireless Protocol Errors
LED Driver Circuit	Data is sent, but LightBar displays nothing	No feedback/display for User	1) Circuit became damaged	1	4	4	Warn User to handle LightBar carefully or create more protective case for circuit
Logic Diode	Temperature Increase	Major Damage to LED Driver Circuit Will Eventually Occur	1) Component Failure	1	4	4	Add "Warning" to Product

2-Pin to 9V Adapter	No Power Supply	The LightBar Will not Operate	1) Component Failure	1	2	2	Add "Warning" to Product
4-Pin Header	No Connection to LEDs	LEDs will not operate, thus no display	1) Component Failure	1	3	3	Add "Warning" to Product
6-Pin Header	NA	NA	NA	NA	NA	NA	NA
Atmega48-10p	Circuit Cannot Evaluate Data Received	Rest of circuit useless, depends on microcontroler for control	1) Component Failure	1	2	2	Add "Warning" to Product
BoardPadSma II	NA	NA	NA	NA	NA	NA	NA
CAP5mm (Ceramic Capacitor)	Short Circuit or High (Voltage) Leakage for Circuit	Prolonged use will bring about permanent damage (or system may fail to start entriely)	1) Component Failure	1	3	3	Add "Warning" to Product
Disccacap	Short Circuit or High (Voltage) Leakage for Circuit	Prolonged use will bring about permanent damage (or system may failt to start entriely)	1) Component Failure	1	3	3	Add "Warning" to Product

FET Nchan - TN0604	Thermal Runaway, Short Circuit, Excessive Gate Leakage	Prolonged use will result in permanent damage and failure of system, short term, reduce reliability of system	1) Component Failure	1	3	3	Add "Warning" to Product
LED-T1 (Through Hole Red Diffuse)	No Red LED shining when Circuit is on	User doesn't know if circuit is on or off (dangerous) (on/off switch doesn't say "on" or "off")	1) Component Failure	1	4	4	Add "Warning" to Product. Add label for "On" and "Off" to switch
LM78L05	Short Circuit, or Open Circuit Burnout	Prolonged may bring about permanent damage (or system may fail to start entirely)	1) Component Failure	1	3	3	Add "Warning" to Product
MCP1700 3.3V 250 mA	Fluctuating Voltage (usually too high), or high temperature near microcontroller	Prolonged use will bring about permanent damage. Short term system will be unstable (LEDs flicker/unbright)	1) Component Failure	1	3	3	Add "Warning" to Product
MRF24J40MA	No data received (from Xbee Transmitter)	Nothing will happen, circuit will act as though the towerplayer is not running	1) Component Failure 2) Wireless Protocol Error	1	2	2	Add "Warning" to Product & Discuss Wireless Protocols Errors
R0.25W (Carbon Film Resistor)	Open Circuit Faults	Prolonged may bring about permanent damage (or system may fail to start entirely)	1) Component Failure	1	3	3	Add "Warning" to Product
R1W (Metal Film Resistor - 15 ohm)	Fail-Open Fault	Prolonged may bring about permanent damage (or system may fail to start entirely)	1) Component Failure	1	3	3	Add "Warning" to Product

R1W (Metal Film Resistors - 22 ohm)	Fail-Open Fault	Prolonged may bring about permanent damage (or system may fail to start entirely)	1) Component Failure	1	3	3	Add "Warning" to Product
Rotary Dip (Coded Rotary Switch)	NA	NA	NA	NA	NA	NA	NA
Switch - Mini Slide PCB	Circuit cannot connect/disconnect	User cannot turn the circuit on/off (dangerous)	1) Component Failure	1	4	4	Add "Warning" to Product
XTAL/Resonator (Ceramic)	Timing of circuitry is incorrect, LightBars are not displaying, high failure rate	Whole System appears to be unreliable, may be harmful to overall functionality	1) Component Failure	1	2	2	Add "Warning" to Product
9V Li Ion Battery	LED Circuit Fails to turn on, or doesn't respond	LightBar won't display anything, no feedback to running towerplayer	1) Component Failure	1	1	1	Add "Warning" to Product. Remind user what battery type is required
1 in. x 2 in. x 8 in. Furring Strip Board	LightBar Doesn't stay in desired location or Components are loose on it	Odd-looking displays or components become damaged over time	1) Component Failure 2) Misuse of Component	1	1	3	Add "Warning" to Product. Advise user to handle LightBar carefully
Atmega 328P Chip	Cannot run towerplayer.cpp and send data	LED circuit relies on this data, thus circuit/LightBar will do nothing	1) Component Failure 2) Computer Software Failure	1	2	2	Add "Warning" to Product. Inform user to check their "Arduino" software was installed correctly on computer

Xbee Shield	Cannot transmit data from towerplayer.cpp	LED circuit relies on this data, thus circuit/LightBar will do nothing	1) Component Failure	1	2	2	Add "Warning" to Product
Xbee Transmitter Chip	Cannot transmit data from towerplayer.cpp	LED circuit relies on this data, thus circuit/LightBar will do nothing	1) Component Failure 2) Wireless Protocol Error 3) Permission Errors	1	2	2	Add "Warning" to Product. Provide User with Instruction on how to set correct permission for use of product
towerarduino.ino	LED Circuits are unresponsive and do nothing during execution of towerplayer.cpp	LightBar does nothing during execution of towerplayer.cpp, so nothing happens in eyes of the user	1) Wireless Protocol Error 2) Atmega error	1	2	2	Inform user of required libraries/software, warn of Wireless Protocol Errors
towerplayer.cpp	User's computer gives error when trying to run towerplayer or data is not sent	Towerplayer and LightBars both do nothing, system completely fails	1) User's Computer permissions/libraries not correct 2) Missing permissions/libraries 3) Wireless Protocol Error	1	2	2	Inform user of required libraries/software, warn of Wireless Protocol Errors
yswavfile.cpp (& .h)	During execution of product, audio either doesn't sync or doesn't play at all	Ruins user experience of product and fails to meet design intent	1) User's Computer permissions/libraries not correct 2) Missing permissions/libraries 3) Wireless Protocol Error	1	2	2	Inform user of required libraries/software, warn of Wireless Protocol Errors

		Very Probable	Probable	Occasional	Remote	Improbable
		5	4	3	2	1
Catastrophic	4	20	16	12	8	4
Critical	3	15	12	9	6	3
Marginal	2	10	8	6	4	2
Negligible	1	5	4	3	2	1

Severity of Effect

Catastrophic The failure causes substantial damage to the product itself or related items (including people), requiring repair.

Critical The failure causes significant damage to the product itself or related items, requiring repair.

Marginal The failure causes some damage to the product itself or related items, potentially requiring repair.

Negligible The failure causes no significant damage.

Probability of Failure

Very Every time

Probable Most times

Occasional Observed multiple times during the project.

Remote Might be possible during the project.

Improbable Maybe observed once during the project or predicted to happen after hand off.