

Power Budget - Mihir Patel

Team Number:	Team 302
Project Name:	R6 Recon Amphibot
Team Member Names:	Lakshanand Sugumar, Raunak Singh
Version:	1B (updated components)

A. List ALL major components (active devices, integrated circuits, etc.) except for power sources, voltage regulators, resistors, capacitors, or passive elements

All Major Components	Component Name	Part Number	Supply	#	Absolute	Total	Unit
	ESP32-S3-Wi-Fi Module	ESP32-S3-WROOM-1-N8R8	3.3V	1	500	500	mA
	Camera module (OV5640)	OV5640	3.3V	1	250	250	mA
	Debug LEDs (SMD 0805)	LG-R971-KN-1	3.3V	5	20	100	mA
	Tactile Switches	CTS 222AMVBAR	3.3V	2	1	2	mA
	USB VBUS sense/logic	-	3.3V	1	20	20	mA
	Misc overhead / margin	-	3.3V	1	50	50	mA

B. Assign each major component above to ONE power rail below. Try to minimize the number of different power rails in the design.

+3.3V Power Rail	Component Name	Part Number	Supply	#	Absolute	Total	Unit
	ESP32-S3-Wi-Fi Module	ESP32-S3-WROOM-1-N8R8	3.3V	1	500	500	mA
	Camera module (OV5640)	OV5640	3.3V	1	250	250	mA
	Debug LEDs (SMD 0805)	LG-R971-KN-1	3.3V	5	20	100	mA
	Tactile Switches	CTS 222AMVBAR	3.3V	2	1	2	mA
	USB VBUS sense/logic	-	3.3V	1	20	20	mA
	Misc overhead / margin	-	3.3V	1	50	50	mA
					<i>Subtotal</i>	922	mA
					<i>Safety Margin (25%)</i>	25%	
					<i>Total Current Required on +3.3V Rail</i>	1152.5	mA
<i>c1. Regulator or Source Choice</i>	Buck Switching Regulator 3.3V (2A)	AP63203WU-7	+3.8V - 32V	1	2000	2000	mA
					<i>Total Remaining Current Available on 3.3V Rail</i>	847.5	mA

C. For each power rail above, select a specific voltage regulator using the same process as for major component selection. Confirm that the Total Remaining Current Available on

Power Rail	Component Name	Part Number	Supply	#	Absolute	Total	Unit
3.3V Power Rail	Buck Regulator (1.5A variant)	AP63203WU-7	+3.8V - 32V	1	2000	2000	mA

D. Select a specific external power source (wall supply or battery) for your system, and confirm that it can supply all of the regulators for all of the power rails simultaneously. If

External Power Source 1	Component Name	Part Number	Supply	Output	Absolute	Total	Unit
Power Source 1 Selection	9V AC-DC Wall Adapter	WSU090-2500	100 ~ 240VAC	9V	2500	2500	mA
Power Rails Connected to External Power Source 1	+3.3V [Buck Regulator (2A variant)]	AP63203WU-7	+3.8V - 32V	1	2000	2000	mA
					<i>Total Remaining Current Available on External Power Source 1</i>	500	mA
External Power Source 2	Component Name	Part Number	Supply	Output	Absolute	Total	Unit
Power Source 2 Selection	Battery (12V) - Raunak's shared power	B09ZTKTLGW	12V	12V	7000	7000	mA
Power Rails Connected to External Power Source 1	+3.3V [Buck Regulator (2A variant)]	AP63203WU-7	+3.8V - 32V	1	2000	2000	mA
					<i>Total Remaining Current Available on External Power Source 1</i>	5000	mA

Notes

- External Supply Voltage should be determined by the dropout voltage for the highest-voltage regulator (e.g., +14V for a +12V regulator). The WSU090-2500 outputs 9V DC, which is well above the AP63203WU-7's minimum input voltage of 3.8V, providing adequate dropout margin.
- The AP63203WU-7 is rated for 2A continuous output current. Total required on the +3.3V rail including 25% safety margin is 1152.5 mA, well within the 2A rating, leaving 847.5 mA of regulator headroom.
- The ESP32-S3 and OV2640 camera are unlikely to simultaneously draw peak current. In typical operation (MQTT active + camera streaming), total draw remains well under 900 mA.
- If you have multiple units in your design (e.g., a base unit and remote unit) then you need a separate power budget for each unit.
- Passive components (resistors, capacitors, inductors) are excluded from this power budget per EGR314 course guidelines.