Component Selection

Team 302:

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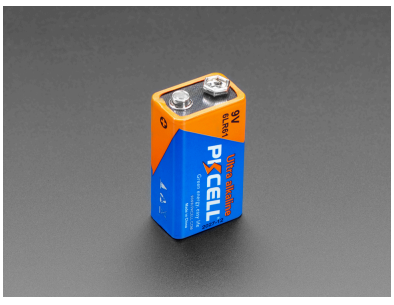
Power Source:

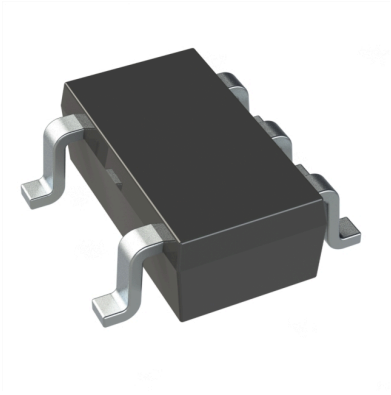
Solution	Pros	Cons
 Option 1: 12V 12 V Lead Acid (VRLA) Battery Rechargeable (Secondary) 10.5Ah Price: $50.13 Link to Item	-Single 12V battery. -High capacity at 10.5Ah -Rechargeable with any standard 12V battery charger.	-Expensive at $50.35 each. -Heavy at 7lbs - Requires a large storage space.
 Option 2:	- Affordable - Compact - Instant replacement	- Non-rechargeable - Would require either a 9V or 18V input. - Low capacity at 500mAh

Alkaline 9V Battery Price: $1.50/each Link to Item		
 Option 3: Energizer replaceable AA batteries Price: $0.69 each Link to Item	- Low Cost - Compact - High capacity (2000mAh each)	-multiple required to reach the higher voltage (1.5V each) -Non-rechargeable -More expensive over time

Selection: We would choose to go with option 3 as they are the most common and readily available. When creating a mobile station, having an easy to move lightweight solution is vital to the design. Additionally, replacement batteries are easy to come across as well.

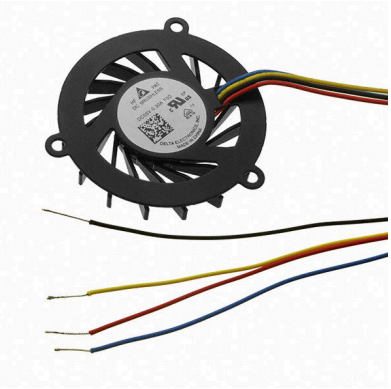
Temperature Sensor:

 Option 1: TMP126-Q1 SPI Temperature Sensor Price: $ 2.83 Link to Item	Pros: - Has the ability to measure temperature from -55 degrees Celsius to 175 degrees Celsius. - Can operate at a voltage as low as 1.62 volts. - Has a simple 3-wire SPI compatible interface.	Cons: - Its price at $ 2.83 is not the most cost effective of the other parts. - It can only operate at a maximum voltage of 5.5 volts. - Very small and will be difficult to solder most likely.
 Option 2: SENS HUMID/TEMP 3.6V I2C 5% 6DFN Price: $ 7.03 Link to Item	Pros: - Has an operating range of -40 degrees Celsius to 125 degrees Celsius. - Can read both the humidity and temperature. - It can operate at a minimum 1.9 volts	Cons: - Has an 18 second response time. - Is quite expensive compared to other devices. - May be difficult to implement and solder to the project.

 Option 3: SENSOR DIGITAL -40C-125C SOT23-5 Price: $1.15 Link to Item	Pros: - Very inexpensive to purchase - Has easy to use footprints and datasheets - Is simple enough to utilize in a system	Cons: - Very small chip will be difficult to solder - Manufacturer standard lead time is 30 weeks

Choice: Option 3: SENSOR DIGITAL -40C-125C SOT23-5
Rationale: The rationale behind choosing this device is the fact that it is easy to work with and executes the ideal function that we need it to. It is easy to incorporate into our system compared to other sensors that will need to be baked on and it is easy to code with on top of that. Additionally, it is inexpensive so more can be purchased.

Fan Motor:

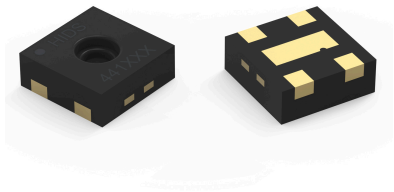
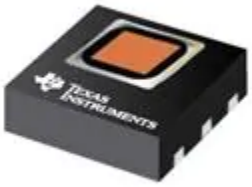
Solution	Pros	Cons
 Option 1: P/N : FAN AXIAL 80X25MM 12VDC WIRE Price: $5.35 each Link to Item	- Large fan to maximize air flow (80mm x 80mm) - Large Voltage range at 4.5 ~ 13.8VDC - Fan and motor come as one unit.	- Large Power Consumption at 1.44W (preferred 1 W. - Missing fan guards, would need to be purchased separately - Rectangular design
 Option 2: P/N: FAN IMP MTR FRAMEL 42X8.5MM 5VDC Price: $ 8.70 Link to Item	- 5V Power input. - only .8W Power consumption - Features locked Rotor protection	- Complicated wiring compared to other systems. (Requires a PWM input) - Complex mounting process - not very big 8.5mm width

 Option 3: P/N: FAN IMP MTRZD 254X89MM 12VDC Price: $175.93 Link to Item	- High airflow rate - 2 Wire design - Durable Metal Frame - The fan is pretty decent in size (89.00 mm).	- Very High current draw at 65W. - Complex mounting bracket. - 12V Input - The part is way out of the price range for what we would need it for.

Selection: I would select option 1. When comparing the current draw, this is by far the best option. Plus the square box design provides an easier mounting experience. Additionally the two wire design makes for an easy installation.

Humidity Sensor:

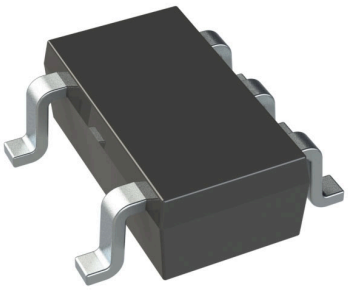
 Option 1: SHT40-AD1B-R3 SENSOR HUMIDITY 100 RH SMD Price: $ 2.49 Link to Item	Pros: - Has the ability to measure humidity from 0% degrees Celsius to 100% degrees Celsius. - Can operate at a voltage as low as 1.08 volts. - Can measure both humidity and temperature - Is cheaper than most comparable options	Cons: - It can only operate at a maximum voltage of 3.6 volts. - Very difficult to solder as there are no pins, necessitates soldering with heat pad.

 Option 2: 2525020210002 WSEN-HIDS/ HUMIDITY SENSOR Price: $ 3.03 Link to Item	Pros: - Can operate at a voltage as low as 1.08 volts. - It is a surface mount device which is imperative for our project. - Accuracy within 2% - Humidity repeatability within 0.25% - Current consumption is in microAmps	Cons: - More expensive than other alternatives - Difficult to solder - Less informative datasheet than alternatives
 Option 3: Board Mount Humidity Sensors 2% RH low-power digital relative humidity sensor 6-WSON -40 to 125 Price: $ 3.68 Link to Item	Pros: - Can operate at a voltage as high as 5.5V - It is a surface mount device which is imperative for our project. - Accuracy within +- 2% - Humidity repeatability within 0.1% - Lowest current requirement compared to comparable products	Cons: - More expensive than other alternatives - Difficult to solder - Lower accuracy than alternatives - Requires higher minimum input voltage (2.7)

Selection: Out of the different Humidity sensors listed above I would select option 1. My reasoning behind this choice is because it has the most informative data sheet, is the cheapest of the options, and still retains the similar, if not better quality when compared to the other options. It complies with the requirements for a surface mount environmental sensor and works best at 3.3V which is the necessary voltage for the sensors used for this project.

Voltage Regulator

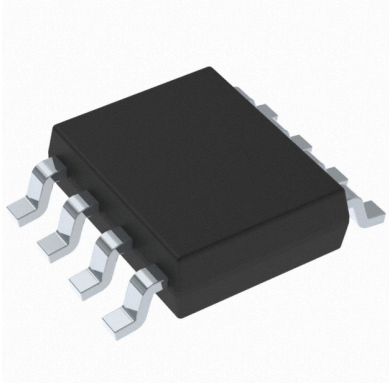
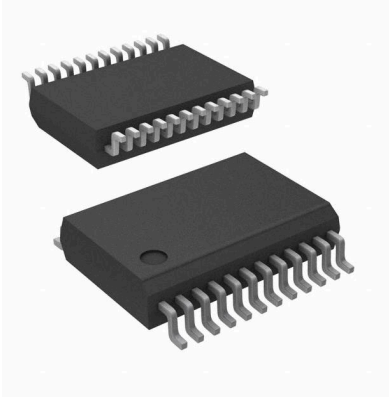
Solution	Pros	Cons
 Option 1: IC REG LINEAR POS ADJ 1A 10TDFN Price: $3.40 Link to Item	- Outputs 3.3V which is what is required for most of our project. - The output type of this regulator is adjustable. - Has an operating temperature range of -40 degrees Celsius to 125 degrees Celsius.	- Small piece with very little in the way to solder to a board. - The voltage input max is only 3.6 volts meaning it can't regulate large amounts of voltage.
 Option 2: IC REG LIN POS ADJ 1A/1A HRP-5 Price: $ 0.84 Link to Item	- Outputs 3.3 volts which is what we need for our project. - Has a voltage input max of 14 volts which gives us more to work with in terms of battery voltage. - The Item is inexpensive to purchase.	- If there is any different voltage requirements this regulator will most likely not work - Being surface mount it may be difficult to solder for our project.

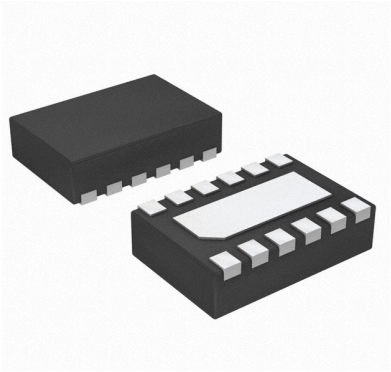
 Option 3: IC REG LIN POS ADJ 600MA SOT25 Price: $ 0.40 Link to Item	- Outputs 5 volts which may be required for the fan motor - It can receive up to a maximum input of 6 volts - It's inexpensive to purchase which means it can be bought in bulk.	- It may not be suitable for a large portion of our project. - While its cheap it has a manufacturer standard lead time of 25 weeks which could hurt production.

Choice: Option 2: IC REG LIN POS ADJ 1A/1A HRP-5

Rationale: The rationale behind this selection is because it suits most of our power supply needs as for the microcontroller we need 3.3 volts which this device can help us regulate down to. Additionally, this device has a voltage input max of 14 which allows us to be far more flexible without batteries and power supply which is important when we consider what it might take to power the fan.

Motor Controller:

Solution	Pros	Cons
 Option 1: P/N: IC MOTOR DRVR UNIPLR 8SO PWRPAD Price: $2.13 Link to Item	- High current rating (3.6A) - Outputs a large range of voltage. (6.5 - 45V) - Compact Design	- Maybe a bit larger than what we need. - Requires additional input for low current. - Requires a large ground.
 Option 2: P/N: IC MOTOR DRIVER 2.7V-5.5V 24SSOP Price: $1.97 Link to Item	- Has a standby power mode that reduces current draw when motor is not on - Low input current rating (5.5V max) - Allows for more flexibility if the design changes.	- Complex Wiring - Voltage requirements of fan are on the high side of the output range (13.5V) - Dual Channel, we would only need 1 channel

 Option 3: P/N: IC MTR DRVR BIPOLAR 2-7V 12WSON Price: $1.64 Link to Item	- Designed for battery application (Ours) - Well within current range and voltage range (1A max, 0-7.7V input current) - Two H-Bridges for flexible fan speeds. - Easy wiring.	- Fan is equivalent to the max output voltage. Reduced fan speed. - Difficult Soldering Points. - Complex footprint for board design

Selection: We choose option 1 as while it's small it is easier to integrate into our system through soldering. Rather than having to bake it on or solder a lot of pins it works with only 8 pins. Additionally, it has ecad and footprint models in digikey which allows us to implement it into our schematic and PCB's far more easily. Meets the requirements of what we need in a motor driver for our product.