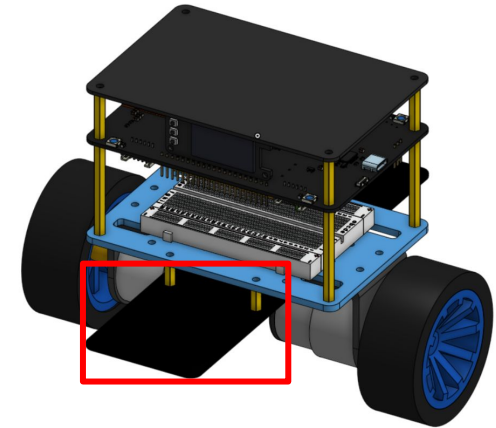
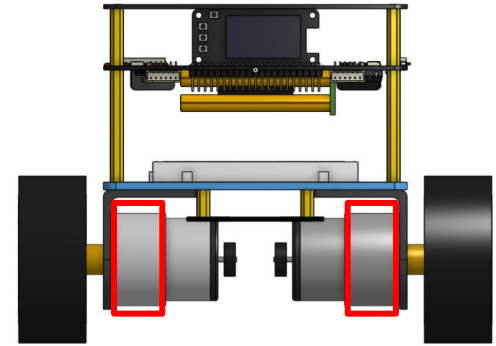


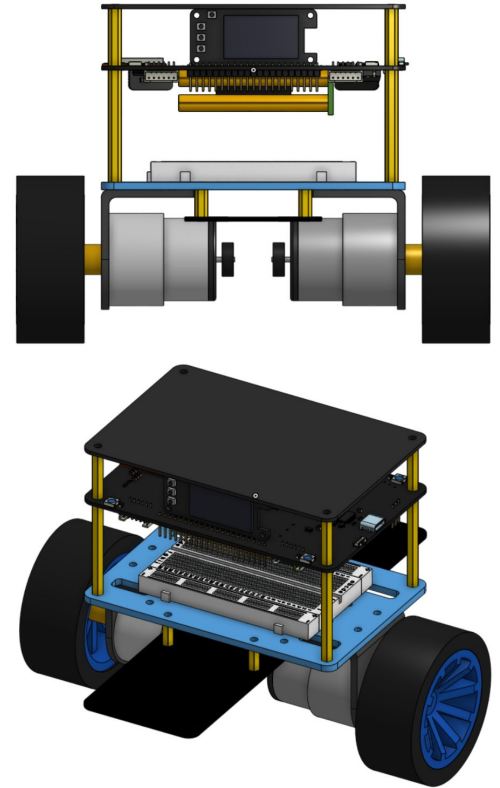
Handling the Biped

- Safely and securely hold the Biped by the gearbox of one of its motors, or by either side of the balancing paddle.
- Refrain from grabbing the Biped by its upper chassis or wheels.
 - Holding the Biped by the upper chassis may place your fingers dangerously close to the electronic components.
 - The wheels are not designed to support the weight of the Biped.
- Avoid contact with the electronic components on the Biped.
 - Electrostatic discharge (ESD) from your hands can damage the onboard components.
- Keep all metal objects away from the Biped to prevent shorts.
 - Small metal items can inadvertently bridge connections, leading to potential short circuits.



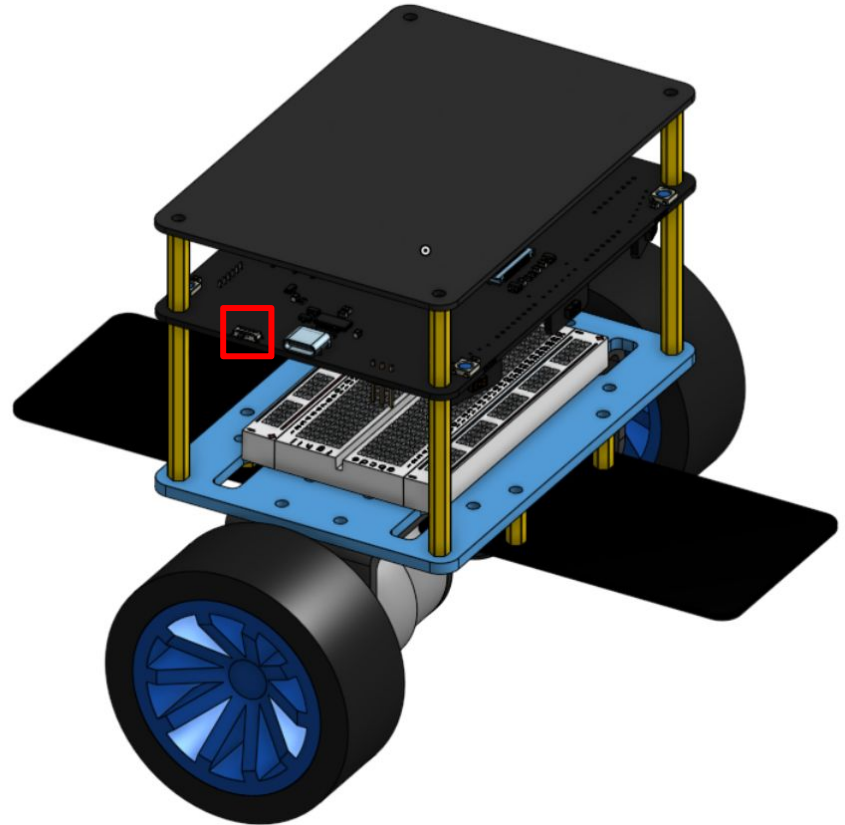
Handling the Biped: Continued

- Do not remove Biped from the lab under any circumstances.
 - Remember, students have 24/7 access to the lab.
- Conduct balancing experiments with the Biped on the ground.
 - Operating the Biped on a table risks having it falling off due to faults or bugs.
- Place the Biped upside down on the center table when done.
 - Centralized storage helps us better track and manage the Biped.
- Handle with extreme care, and **DO NOT DROP THE BIPED!**
 - Wheels are made of plastic and can break easily if dropped.
 - Biped is custom-made. Therefore, replacements are difficult and costly.
 - Be aware that any loss of equipment will result in automatic charges to the responsible student's account.



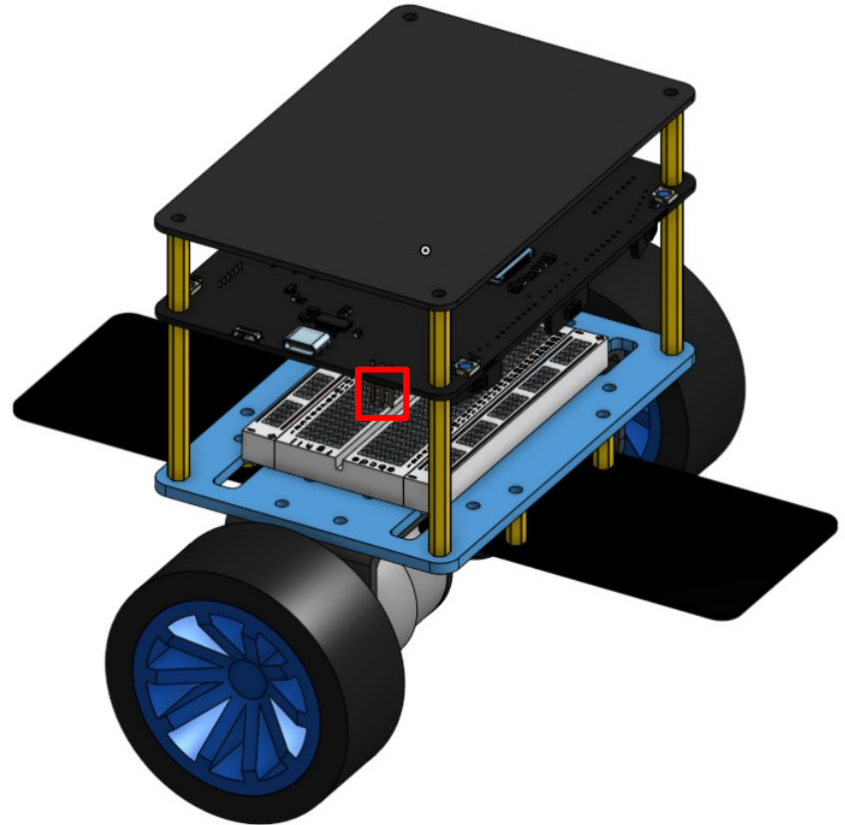
Buttons and Switches: Power Switch

- This is the main power switch of the Biped.
- On position: flip the switch towards the USB-C port.
- Off position: flip the switch away from the USB-C port.
- Power indicator: when the Biped is powered on, the green LED on the U12 module (MPU6050) will illuminate.



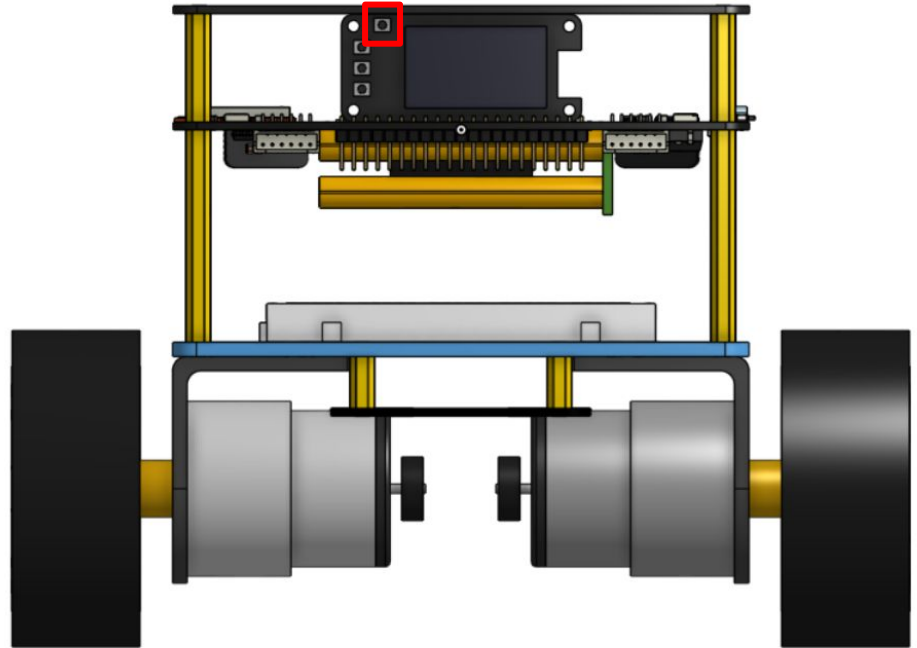
Buttons and Switches: Motor Jumper

- The motor jumper turns the motor voltage regulator on and off.
- On position: place the jumper on the two pins away from the USB-C port.
- Off position: place the jumper on the two pins towards the USB-C port.
- Unplugging the motor jumper disables the motors altogether, regardless of any software commands.
- Place the motor jumper in the off position during normal operations.
- Be careful not to lose the motor jumper!



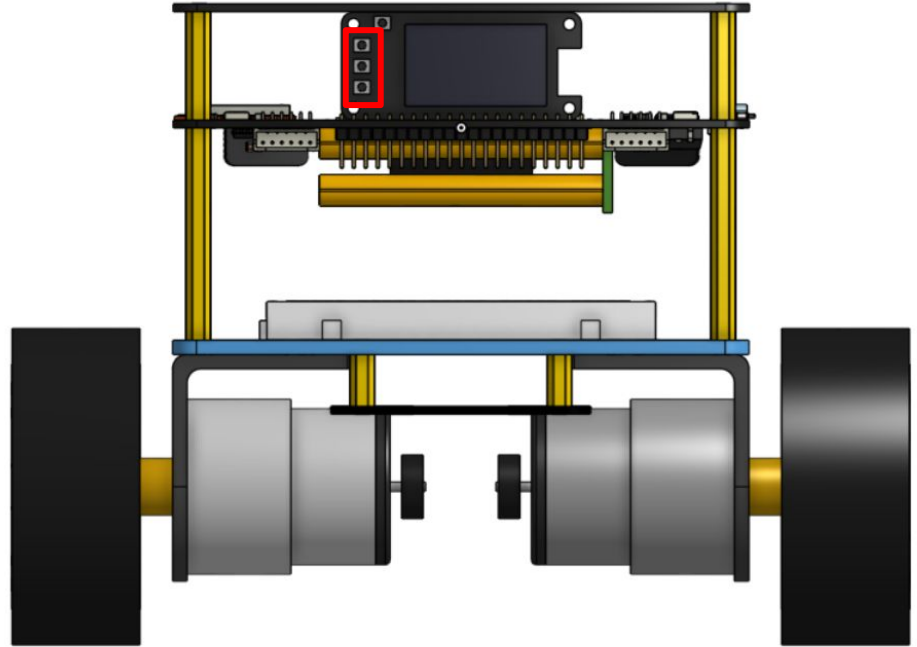
Buttons and Switches: Reset Button

- The reset button initiates a soft reset of the Biped.
- Pressing the reset button restarts all hardware and software components without the need to toggle the main power switch.



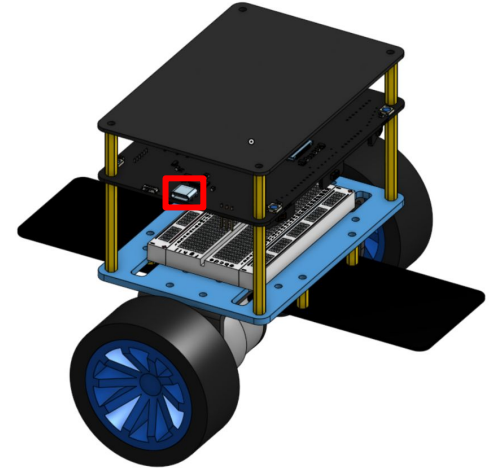
Buttons and Switches: Push Buttons

- The Biped features three programmable push buttons, labeled A, B, and C, arranged from top to bottom.
- The push buttons are connected to I/O expander A (U4).
- In Lab 4, you will develop a custom interrupt service framework to handle interrupts from these push buttons.



Flashing the Biped

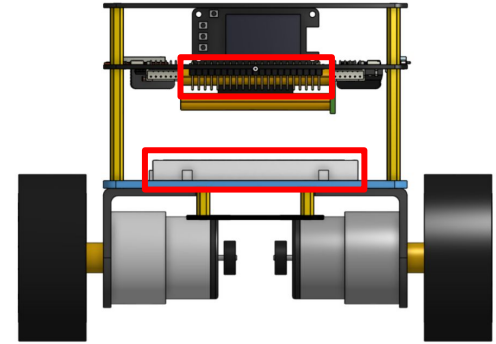
- Follow the lab instructions to flash the Biped.
 - Ensure the USB-C cable is securely connected to the Biped.
- What should I do if our Biped doesn't flash?
 - Try cycling the power switch during the flashing progress bar.
 - Contact the TA for further assistance if the issue persists.
- Avoid moving the Biped while the USB-C cable is connected.
 - Be aware of the cable's presence to protect the USB-C connector.
- Always place the Biped upside down on the table before flashing.
 - Bugs in your firmware might cause unintended motor activation.



```
[100%] Built target biped-firmware
esptool.py v3.1
Serial port /dev/ttyUSB0
Connecting..... ..
```

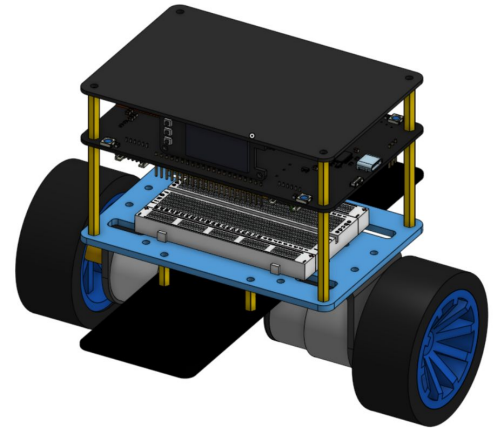
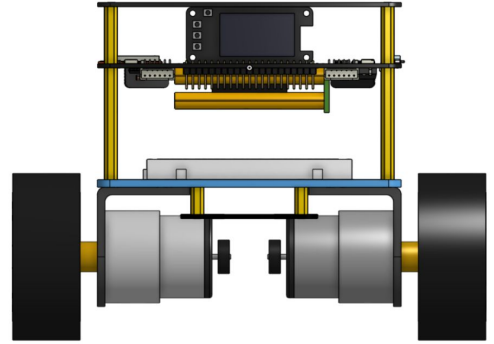
Expansion Header and Breadboard

- Do not attempt to hotwire the expansion headers.
 - Shorting the power rails can result in catastrophic damages.
- Use only the Dupont cables provided by the TA for connections to the expansion header.
 - Contact the TA for a hardware expansion kit for 4-credit projects.
- Always consult with the TA before using the expansion header.
 - The TA will perform a hardware test on the expansion header for safety.
- The breadboard on the Biped is removable and reattachable.
 - Exercise caution when handling the breadboard, especially near the battery and its connector cable located above the breadboard.



Summary: The Dos

- Handle the Biped gently and properly as per the provided instructions.
- Avoid contact with the electronic components on the Biped.
- Keep all metal objects away from the Biped to prevent shorts.
- Conduct balancing experiments with the Biped on the ground.
- Place the Biped upside down on the center table when done.
- Follow the instructions outlined in Lab 1 to flash the Biped.
- Always place the Biped upside down on the table before flashing.
- Use only the Dupont cables provided by the TA for the expansion header.
- Always consult with the TA before using the expansion header.
- Handle the breadboard with care and mind the battery above the breadboard.
- Promptly contact the TA for any hardware-related issues or questions.



Summary: The Don'ts

- No food and drinks in the lab.
- Refrain from grabbing the Biped by its upper chassis or wheels.
- Do not remove Biped from the lab under any circumstances.
- DO NOT DROP THE BIPED! Handle with extreme care.
- Avoid moving the Biped while the USB-C cable is connected.
- Do not attempt to hotwire the expansion headers.
- Do not ever attempt to disassemble the Biped on your own.
- Do not ever attempt to perform repairs on the Biped yourself.
- Do not tamper or unplug any connectors or cables on the Biped.

