Expanding the Arduino Mega Useful Peripherals
Expanding the Arduino Mega

• You can enhance your project by adding additional shields to the microcontroller
  – Commercial shields are available to perform specific tasks
  – They can be used for prototyping before adding a more permanent component to your PCB
  – Custom shields can be designed, like the MegaSat
Commercial Shields

• Using a shield can simplify a project because there is less assembly required and discrete components are already calculated and soldered on.
• More information is available online to help with troubleshooting because many others have purchased and used the same shield(s).
• There is existing documentation on the device.
• Because the design is complete, you will not be able to easily make changes.
Ultimate GPS Logger Shield

• This shield is a datalogger, and it incorporates GPS with an SD card for storage
• It connects directly to the Arduino Mega and is being used to enhance the MegaSat’s datalogging features
Proto-Shields

• Proto-shields are perfboards that connect to the pins on the microcontroller
• Perfboards contain holes for soldering in components and are used to test your circuit before making it permanent on your PCB
• You are limited on space and the wiring can get messy
Arduino Mega Proto-Shield

- There’s minimal assembly required and several rows of empty sockets for soldering in components
- It connects directly to the Mega in the same manner as the datalogger
- You can use this to test your circuit before soldering

Figure 1: Arduino Mega Protoshield (not assembled)
Custom PCB Shields

- You can customize a shield for your microcontroller using PCB software
- This allows for more complex designs with custom functions
- There is a learning curve for PCB design software and PCB boards can be costly and can have a long lead time
MegaSat

• The MegaSat was designed as a custom shield to facilitate an easier learning environment for students
• It attaches directly to an Arduino Mega

Figure 2: MegaSat prototype with datalogger and accelerometer breakout board
External Breakout Boards

• External boards are different from shields because they do not stack on the microcontroller
• They can be made to connect directly to a PCB and usually act as modules to perform specific tasks
• These have to be wired correctly and may increase the complexity of your design
SparkFun Triple Axis Accelerometer and Gyroscope Breakout

• The MegaSat uses a breakout board to further enhance your experience
• The accelerometer/gyroscope microchip is very small and would be difficult for a beginner to solder
• Breakout boards come with all components soldered in place and are easy to incorporate into your PCB design

Figure 3: Sparkfun accelerometer/gyroscope breakout board
Expansion

• Students are encouraged to explore further options to expand their payload

• Make sure you select a shield that is compatible with your microcontroller
  – There are differences between the Arduino Mega and other Arduino microcontrollers, such as the UNO, so most shields are not interchangeable
Addendum

- https://www.sparkfun.com/products/11028