

Choosing a Microcontroller

- Here are things to consider when choosing a microcontroller for your project

Project Course Requirements

- Any MCU can be used as long as it is justified by project requirements

Practical Considerations

- While any MCU from any manufacturer may be used, the NXP Kinetis MCUs were chosen for the program because there is such a wide range of parts that it is likely that you can find an appropriate MCU for any project. This allows you to use an appropriate part without having to learn new tools and on-chip peripherals
- If choosing non-NXP MCUs stick to, Microchip (Atmel), TI, STMicro, or Cypress. Nordic is also a popular MCU for Bluetooth
- The PCB layout and assembly process in EECE 492 have the following constraints:
 1. No BGAs, array packages, or chip-scale packages. Some BGA packages are designed with via size and escape routing in mind. In rare cases they may work with our fabrication limitations. In this situation, please verify the escape routing will work with .3mm vias, .6mm annular rings, and .15mm traces. Quad flat packs are good (and most common), chip carrier packages are good, small outline packages are good.
 2. It's best to keep your pin pitch at 0.5 mm or above. 0.4 mm pitch is okay if required, but more challenging. Under .4 mm is out of the question.
 3. If using an uncommon MCU, try to find a minimum circuit diagram or another project that implements the MCU so you can easily identify a minimum circuit. Some MCUs, especially newer ones that can adjust core voltages to save power, require the implementation of several buck regulators external to the MCU, so even if you don't want to implement those features, you still have to add those extra components.
 4. MCUs under 260 MHz are easiest to design. Above 260 MHz is doable, but the groups using these devices need to do some extra review of best practices in high-frequency systems.
 5. Make sure you are able to source all the components you need, verifying the component you are purchasing has the footprint you anticipate. Many manufacturers use proprietary package footprints which have names similar to common footprints but are actually very different. Check parts you are purchasing against the datasheet and once the parts arrive, manually inspect they have the anticipated footprint. About 20% of students buy parts that do not have the necessary footprint, requiring them to buy replacement parts which may not be available or add considerable cost.

Process

- **Determine all project requirements**
- **System-level design to meet requirements**
- **Determine minimum MCU requirements – Core, clock, pins, peripherals**
- **Try to find the best match in selector guides. Always be conservative by choosing an MCU that exceeds minimum requirements**
- **Best to have a development board for the specific part but a board with a similar, related, part may be ok.**
- **If needed, check SDK availability, or MicroC/OS port availability**