Hatchling

Meeting Times

- **Wednesday:** 6 – 8 PM
- **Thursday:** 6 – 8 PM
- **Friday:** 4 – 6 PM

The same material is presented during the three meeting times. You only need to attend one.

Schedule

- **Week 1: Introductions** (9/15–9/19)
  - Learn about Hatchling and learning objectives
  - Meet the Director team
  - Meet Hatchling Peers
  - Install software
- **Week 2: SolidWorks (CAD) Foundation** (9/22–9/26)
  - What is CAD?
  - Engineering Drawing navigation
  - Navigating SolidWorks
  - Introduce design intent
- **Week 3: SolidWorks 3D** (9/29–10/3)
  - SolidWorks big 3 features: extrude, revolve, and finishing operations
  - Origin selection and symmetry
  - Important tools
- **Week 4: Tools, Project, and Process** (10/6–10/10)

  - Design Process
  - Additive Manufacturing with best practices
  - Tool safety and usage
  - Available project resources
  - **Project Milestone: Project Introduction**
- **Week 5: Design Review and C++** (10/20–10/24)
  - Syntax, variables, loops, if-else statements, and classes
  - Signal processing
  - Design review
  - **Project Milestone: Design Review**
- **Week 6: SolidWorks Assembly** (10/27–10/31)
  - Mates
  - Sub-Assemblies
  - Component states and configurations
  - COTS usage
  - Tolerance vs Clearance
  - Gear ratios
- **Week 7: Programming and Git/GitHub** (11/3–11/7)
  - Importance of Git
  - Git commands and VS Code integration
  - Documentation reading for hardware control
  - **Project Milestone: Assembly Review**
- **Week 8: Electronics and Soldering** (11/10–11/14)
  - Circuit components and terminology
  - Pulse Width Modulation
  - Microcontroller (MCU) vs Single-Board Controller (SBC)
  - Linux
  - Communication Protocols
  - Soldering, Crimping, and Multimeter usage
  - Documentation navigation
- **Week 9: Prototype Week** (11/17–11/21)

  - Project work week
  - **Project Milestone: Prototype Review**
- **Week 10: Build Week** (12/1–12/5)
  - Project work week
  - **Project Milestone: Build**
- **Competition Day!!!** (12/6)

Posted Material Available at

`https://turtlerobotics.org/hatchling`

Learning Objectives

- **SolidWorks (CAD) Competency :**
  - Design custom parts and modify assemblies
  - Reading and designing around manufacturing constraints
- **Electronics**
  - Evaluating hardware specifications and datasheets
  - Circuit design and implementation
- **Programming**
  - Utilize Git/GitHub
  - Control hardware via a microcontroller
  - Python and C++
- **Manufacturing**
  - Soldering and crimping
  - Additive manufacturing
- **Problem Solving and Critical Thinking**
  - Teams go through the design process from concept creation to testing

Installations

SolidWorks (TAMU Software Center): https://software.tamu.edu/

- Do NOT install in OneDrive. Things will break.

SolidWorks (TAMU Virtual Open Access Lab) for Mac users: https://voal.tamu.edu/ **Bambu Lab Slicer:** https://bambulab.com/en-us/download/studio

- **Printers:** X1 Carbon 0.4 mm / P1S 0.4 and 0.6 mm
- **Filaments:** Generic PLA, Generic PETG, Bambu PLA Basic, Bambu PETG-HF

Visual Studio Code: https://code.visualstudio.com/

- **Extensions:** C/C++ Extension Pack by Microsoft, PlatformIO IDE

Git: https://git-scm.com/downloads

- Override the default branch name from "master" to "main"

Silicon Labs "CP201X" Driver: https://www.silabs.com/software-and-tools/usb-to-uart-bric **Raspberry Pi Imager:** https://www.raspberrypi.com/software/ **Google Drive for Desktop:** https://workspace.google.com/products/drive/#download **TAMU LinkedIn Learning Activation:** https://linkedinlearning.tamu.edu/ **GitHub Student Developer Pack:** https://education.github.com/discount_requests/application

External Links

- **Soldering:** https://www.makerspaces.com/how-to-solder/
- **McMaster-Carr:** https://www.mcmaster.com/
- **Misumi:** https://us.misumi-ec.com/
- **Adafruit:** https://www.adafruit.com/
- **FREE SolidWorks CSWA/CSWP Exam Vouchers for TAMU Students:** https://fedc.engr.tamu.edu/pop-up-classes/cad-cam-design/solidworks-exam-request/

Free Textbooks (Extra, More Advanced Resources)

- **Modern Robotics Textbook:** https://hades.mech.northwestern.edu/images/7/7f/MR.pdf
- **Structural/Renaissance/Numerical Robotics:** https://github.com/tbewley/RR/tree/main