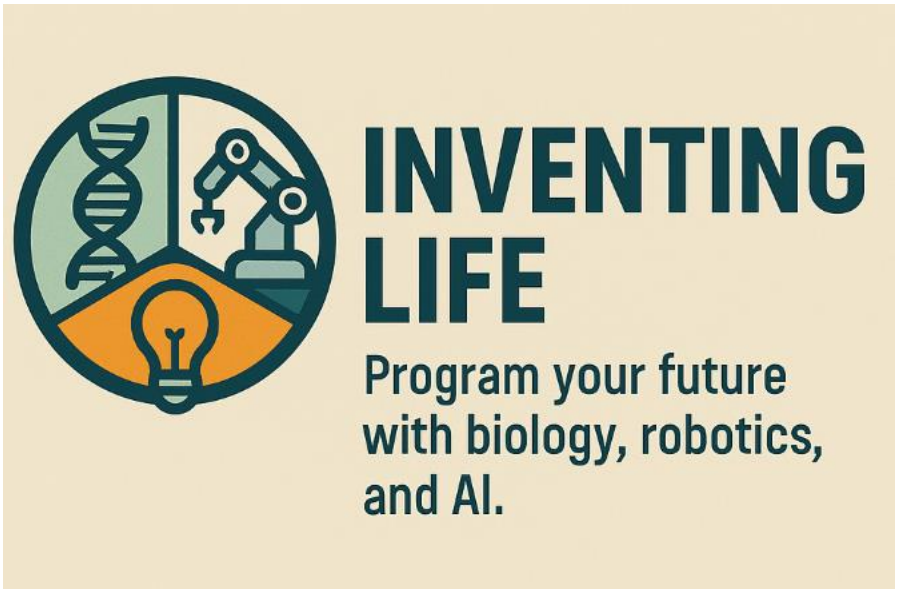
SUMMER BOOTCAMP

INVENTING LIFE WITH BIOLOGY, ROBOTICS AND AI



Curriculum

This internship introduces students to biotechnology, laboratory experiments, automation using NVIDIA Jetson, Python programming, teamwork and entrepreneurship. It is designed to inspire curiosity and innovative thinking while providing hands-on experience with modern tools and entrepreneurial skills.

Week 1: Biotech, Innovation & You

Theme: Orientation, basic biotech, intro to entrepreneurship

Theory

- - What is biotechnology? Real-world examples
- - Basics of DNA, proteins, cells
- - Introduction to entrepreneurship: what is a startup?

Lab

- - DNA extraction from fruit
- - Microscope observations

Startup

- - Brainstorm problems in health, food, environment
- - Ideation: “What biotech solution would you create?”

Project

Create a “Problem Pitch” (1-slide) + Present

Week 2: From Molecules to Markets

Theme: Biotech science + customer discovery

Theory

- - Central Dogma: DNA → RNA → Protein
- - Applications: Diagnostics, agriculture, biosensors

Lab

- - Enzyme activity demonstration
- - Colorimetric reactions

Startup

- - Define target users (patients, doctors, labs, farmers)
- - Interview roleplay: 'What do your users need?'

Project

Team 'Biotech Business Canvas' draft

Field Trip

- - TBD

Week 3: Python, Sensors & Jetson Setup

Theme: Build smart tools for biotech

Theory

- - Basics of Python programming
- - Jetson Nano/Orin & edge computing

Lab

- - Set up Jetson device
- - Python: LED blink, read sensors
- - Build: 'Hello Lab Bot' (logs temperature, light, etc.)

Startup

- - Identify your MVP (Minimum Viable Product)
- - Design mockup of product/app interface

Project

Working prototype + Python script

Week 4: Jetson Vision & Smart Sensing

Theme: Add AI and automation to your product

Theory

- - OpenCV basics: object, shape, color detection
- - Vision in biotech: colony counting, pill recognition

Lab

- - Jetson camera + vision: detect color/shape changes
- - Build: “Color Detector” or “Smart Sample Tracker”

Startup

- - Plan value proposition, costs, pricing
- - Create a brand + logo + product name

Project

Build your “bio-startup pitch deck” (5 slides)

Week 5: Build, Test, Refine

Theme: Final prototype + practice pitching

Lab

- - Finalize Jetson prototype
- - Collect test data and debug
- - Record short demo video

Startup

- - Pitch practice: elevator pitch + slide feedback
- - Identify competitors and market opportunity

Project

Team poster, live demo, startup pitch

Week 6: Demo Day – Pitch Your BioStartup

Theme: Celebration & showcase

Activities

- - Present startup + product demo to panel (teachers, mentors, guests)
- - Peer feedback and certificate ceremony

Deliverables

- - Demo video
- - Team pitch deck (Google Slides or PDF)
- - Poster board or digital one-pager
- - Internship reflection

Project

Final presentation and wrap-up.

Guest Speakers / Enrichment

- - Local biotech entrepreneur to talk about starting a company
- - Guest lecture by a scientist on lab automation or bioinformatics
- - Pitch coach session to help with final presentations
- - Workshop on branding and marketing for startups
- - **Biotech Basics:** 'Biotechnology 101' by BasicBiotech (online article or PDF)

- - **DNA & Genetics:** CrashCourse Biology Videos (YouTube – episodes on DNA, RNA, and protein synthesis)
- - **Python Programming:** 'Python for Kids' by Jason R. Briggs – Chapters 1–3
- - **Entrepreneurship:** 'What is a Startup?' – Article from Y Combinator's Startup School
- - **AI & Computer Vision:** NVIDIA Jetson Nano Getting Started Guide + 'What is Computer Vision?' (from NVIDIA Blog)

📚 Reading List

🧬 Biotechnology & Life Sciences

These resources introduce the fundamentals of DNA, genetics, biotech applications, and lab techniques.

Books & Articles

Biotechnology 101 by Brian Shmaefsky – A student-friendly overview of biotech history, tools, and ethics.

The Manga Guide to Molecular Biology by Masaharu Takemura – A fun, graphic-novel-style book explaining DNA and cells.

Synthetic Biology Explained (MIT OpenCourseWare article): link

Cells Are Us – TED-Ed short video explaining cellular function in simple terms.

Videos

CrashCourse Biology – Episodes on DNA, RNA, and protein synthesis.

How CRISPR lets us edit our DNA – Jennifer Doudna (TED Talk)

💻 Python Programming

Resources to help students start coding in Python, with a focus on data, sensors, and visual output.

Books

Python for Kids by Jason R. Briggs – An easy-to-follow guide with exercises and visual projects.

Coding Projects in Python by DK – A colorful book for young coders with step-by-step tutorials.

Platforms & Videos

Thonny IDE – Lightweight Python IDE recommended for beginners.

Python.org Beginner's Guide

CS50: Introduction to Computer Science (Harvard) – select introductory lectures

🤖 Automation & NVIDIA Jetson / Computer Vision

Great intros to sensors, AI, vision processing, and the Jetson platform.

Jetson & AI

Getting Started with NVIDIA Jetson Nano (NVIDIA Developer site) – Hands-on tutorials and setup guide.

Jetson AI Fundamentals Course (NVIDIA DLI)

What is Computer Vision? – NVIDIA Blog link

Maker Books

Adventures in Raspberry Pi by Carrie Anne Philbin – Excellent intro to circuits, sensors, and Python, also applicable to Jetson setups.

💡 Entrepreneurship & Innovation

Books and resources that teach students how to think like a founder and build solutions.

Books

Start It Up by Kenrya Rankin – A young entrepreneur's guide to turning ideas into action.

Kid Start-Up: How YOU Can Be an Entrepreneur by Mark Cuban, Shaan Patel, Ian McCue

The Lean Startup (Youth Summary/Adaptation) – Focus on MVP and iteration

Videos & Activities

Startup School for Students (Y Combinator) – Real-world startup lessons

IDEO Design Thinking for Students Toolkit – Great for ideation and empathy interviews

🧠 Optional Stretch Reads

For advanced or highly motivated students:

Genome: The Autobiography of a Species in 23 Chapters by Matt Ridley

The Code Book by Simon Singh – for students curious about encryption, computation, and DNA parallels

Hello World: Being Human in the Age of Algorithms by Hannah Fry – an accessible read about AI ethics and automation