Personalized Assessments for Introductory Computer Programming Courses

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This document contains a collection of project ideas that can be used to launch a new style of assessment in introductory computer programming courses. Below are the instructions that students receive:

All students must work on an independent Python project. This project must demonstrate the following five key elements of Python programming that you learn in this class:

- Control the program flow with branching and loops
- Use correct data structures for optimal computations, as relevant for engineering
- Use functions for modular code
- Load data from real-world files (or web), write outputs to files, and visualize outputs in graphs
- Document logic with comments, docstrings, and user-friendly messages

For more information on how to organize logistics, rubrics, and scaffolded milestones, refer to this document.

An automated open-ended grader compatible with these projects is available at github.com/pyEdTools/flexigrader.

Turn signals on a car

Animated sequential turn signals for cars using multiple LEDs. Ask the user their turn directions, then visualize an LED-based turn signal. Build a circuit with an LED and some switches for options of turn signals.

Categories: *hardware*

Traffic lights simulator

LED traffic light simulator that manages the lights for all four directions.

Categories: *hardware, simulations*

Circuit resistance calculator

Implement series and parallel circuits in Python. Provide series, parallel, and custom modes where the user can enter multiple resistors. Compute and output the effective resistance for each case.

Categories: *simulations*

Weather analysis

Collect temperature data (via sensor or web), plot graphs of temperature patterns over a week, highlight special events, and let the user choose which visualizations to see.

Categories: *data*

Electric vehicle batteries

Calculate EV energy consumption and cost (Wh/kWh). Collect battery specs into spreadsheets, analyze cost, efficiency, and power delivery in Python, and generate performance graphs per battery type.

Categories: *data*

Energy consumption vs solar panel analysis

Ask the user about their energy consumption, estimate costs, solar cell count and payoff time. Plot solar payback curves vs. usual energy costs.

Categories: *data*

Whatâ€™s the time?

Predict time of day from solar cell voltage-current data. Load multiple data files, predict their timestamps, and plot time vs. power alongside a battery-powered clock comparison.

Categories: *data*

Energy bill app

Python app to calculate and predict household appliance energy consumption. Users select appliances, view usage and cost graphs, and forecast next monthâ€™s energy bill.

Categories: *data*

Automated irrigation systems algorithm

Use soil moisture sensor data to generate PWM motor outputs that automate water pump flow for optimal moisture maintenance.

Categories: *hardware, data*

Logic gate detector

Load circuit I/O voltage data, analyze it in Python to identify whether the circuit functions as AND, OR, NOT, NAND, or NOR.

Categories: *simulations*

Brain tumor detection

Process brain MRI scans in Python to detect tumor patterns. Convert images to matrices, identify tumor regions algorithmically, and visualize results with marked regions.

Categories: *data*

Face detection analysis

Collect data from online face detectors, analyze dominant features, image categories, and accuracy in Python, then plot feature-usage statistics.

Categories: *data*

Predict circuit structure

Infer resistive circuit layouts (series, parallel, combination) from voltage-current measurements by solving circuit equations and presenting matching diagrams.

Categories: *simulations*

Color detector

Process color images in Python to find user-selected colors. Perform color-space conversions and matrix operations to highlight chosen colors in the image.

Categories: *data*

Algorithmic LED patterns

Generate LED patterns (blinking, fading, chasing) with Python that mirror a four-LED circuit. Include EV-LED pattern info in the app.

Categories: *hardware, simulations*

RGB LED color mixing

Simulate RGB LED color mixing in Python. Users input a target color; compute resistor values for a real RGB LED, build the circuit, and verify model predictions.

Categories: *hardware, simulations*

Circuit analyzer

Let users build virtual circuits (resistors, capacitors) step by step in Python, calculate total resistance or capacitance, and save circuit data to a file.

Categories: *simulations*

Resistor color code decoder

GUI-based Python app to select resistor color bands and display the corresponding resistance value and tolerance.

Categories: *hardware, simulations*

Speaker noise filter design

Assist in designing speaker noise filters. Users input cutoff frequencies; Python computes resistor and capacitor values. Optionally validate with a real speaker circuit.

Categories: *hardware, data*

Low-pass filter design

Design a speaker low-pass filter using resistors and capacitors.

Categories: *hardware*

High-pass filter design

Design a speaker high-pass filter using resistors and capacitors.

Categories: *hardware*

IR sensor data cleanup

Stabilize IR sensor readings in Python via noise filters. Let users choose filter strength, then plot raw vs. filtered distance over time.

Categories: *data*

I-V curve plotter

Plot and analyze current-voltage curves in Python. Input measured data, graph the I-V curve, and compute threshold voltage, max power point, and degradation rates.

Categories: *data*

Solar cell analysis

Analyze monthly solar cell voltage-current data to find max power points. Compute P=VÃ—I, plot power vs. time, and correlate peaks with time or weather.

Categories: *data*

Temperature monitor

Use Arduino to log temperature data over multiple days, then read the CSV in Python to plot thresholds, max/min labels, and detect trends per user choice.

Categories: *hardware, data*

PWM motor controller analyzer

Generate and simulate PWM signals in Python to control motor speed and torque, with options for home-automation use cases.

Categories: *hardware, simulations*

Py-scilloscope

Python signal generator and oscilloscope simulator. Generate sine, square, triangle waves, allow frequency/amplitude control, and simulate circuit I/O.

Categories: *simulations*

Automatic night light

Simulate a motion-activated night light in Python. Users input motion levels; the program adjusts brightness accordingly.

Categories: *hardware, simulations*

Automatic water filter

Control water dispensing via Python and sensor input. Detect bottle placement, dispense/stop based on sensor or timeout, and increment a dispense counter.

Categories: *hardware*

Bike movement analysis

Collect gyroscope data (roll, pitch, yaw) on a bike ride, analyze patterns and power-accuracy trade-offs in Python, and plot motion variables over time.

Categories: *data*

Nerf gun optimization

Predict PWM signals for nerf blaster motors to optimize power, velocity, and stability. Visualize signals in Python and validate on hardware.

Categories: *hardware, simulations*

Energy time-keeper app

Read activity logs (activity, start/end times) in Python, compute electrical energy per category over a week, and graph time vs. energy consumption.

Categories: *data*

Noise cancelling

Remove noise from recorded audio files in Python, graph frequency components, and highlight removed frequencies.

Categories: *data*

Sound amplification

Amplify specific frequencies in audio files with Python, graph frequency and intensity, and optionally build a transistor amplifier to match software results.

Categories: *hardware, data*

EV braking analysis

Predict EV stopping distances under various braking conditions. Simulate braking with IR sensors and LEDs, then plot performance in Python.

Categories: *simulations, hardware*

RC car EV simulator

Analyze RC car voltage-efficiency data, compare to EVs, and plot efficiency comparisons using Python.

Categories: *data, simulations*

Battery performance comparison

Measure voltage over time for multiple batteries, analyze performance statistics in Python, and plot key markers.

Categories: *data*

Water turbine performance

Analyze water turbine motor data in Python.

Categories: *data*

Solar panel tracking simulation

Generate PWM signals to rotate a solar panel toward its max power angle in Python.

Categories: *simulations, hardware*

EE curriculum advisor

Use Python to survey user interests and recommend EE major tracks and technical courses.

Categories: *data*

Memory usage analyzer

Analyze memory usage across RAM, GPU, and cache for various file types in Python, reporting distributions and metrics.

Categories: *data*

Cybersecurity simulation

Simulate encryption, storage, and decryption flows in a cybersecurity stack with Python, offering scenario options and summaries.

Categories: *simulations, data*

Crop sustainability predictor

Collect soil moisture and plant growth data, analyze crop sustainability in Python, plot moisture vs. longevity, and optionally build a sensor circuit.

Categories: *data, hardware*

Laptop heat analysis

Record PC heat levels under various workloads, analyze and predict temperature profiles with Python, and graph power vs. heat over time.

Categories: *data*

Speaker recording analysis

Record audio via a speaker circuit, analyze loudness and frequency properties in Python, and provide interactive waveform visualizations.

Categories: *hardware, data*

Power outage simulation

Simulate a power outage circuit with LEDs and motor, log voltage/current data, and analyze regulator performance in Python.

Categories: *hardware, data*

Self-driving radar simulation

Build a 360Â° IR sensor array to mimic vehicle radar, collect obstacle voltages/distances, and visualize readings in Python.

Categories: *hardware, simulations*

Motion sensing light

Create a motion-sensing LED circuit, log performance data, and analyze circuit vs. commercial device outputs in Python.

Categories: *hardware, data*

Phone rotation analysis

Log phone rotation angles and screen behavior, analyze triggers with Python, and graph rotation properties alongside gyroscope voltages.

Categories: *data*

Smart cruise control

Collect GPS and speed limit data to simulate cruise control logic in Python, plotting suggested speeds and restrictions.

Categories: *simulations*

PC temperature profiling

Monitor PC component temperatures under varied tasks, analyze heating/cooling requirements in Python, and compare profiles.

Categories: *data*

Voice recognition analysis

Record multiple voices, analyze audio waveforms and frequencies with Python to study voice recognition systems, and plot distinguishing features.

Categories: *data*

Power monitoring system

Build a sensor-based power monitor, collect real-time voltage/current data, and visualize power usage in Python.

Categories: *hardware, data*

Encrypted circuit communications

Implement encrypted messaging with Python and a SOS-LED demonstration, with optional GUI for key management.

Categories: *simulations, data*

Battery management system

Read battery cell voltage/temperature in Python, adjust parameters for efficiency, and present interactive graphs.

Categories: *hardware, data*

Self-driving path planner

Implement grid-based path planning algorithms in Python for autonomous vehicles with multiple map scenarios.

Categories: *simulations*

Phone battery analysis

Analyze phone battery performance data in Python, graph statistics, and provide user-driven visualizations.

Categories: *data*

Self-driving braking system

Build a wheeled cart with IR sensors to measure braking response, log data, and analyze braking patterns in Python.

Categories: *hardware, simulations*

Automotive warning system

Build an analog sensor warning circuit, log temperature data, and analyze warning performance in Python.

Categories: *hardware, data*

Morse code translator

Create a Python Morse code translator with LED/buzzer circuit demonstration.

Categories: *simulations, hardware*

Voltage multiplier analysis

Design diode-capacitor voltage multipliers, collect voltage/current data, and analyze error/noise with Python.

Categories: *hardware, data*

Architectural power modeling

Model a 3D-printed structureâ€™s power needs in Python, allow user component selection, and verify predictions with measurements.

Categories: *simulations, hardware*

Tic-Tac-Toe LED game

Light up LEDs on a tic-tac-toe board with Python logic and simulate gameplay via switch inputs.

Categories: *game, hardware*

Music note analyzer

Measure musical notes with a circuit and analyze soundwaves with Python for accuracy feedback.

Categories: *hardware, data*

PID control simulation

Simulate PID motor speed control with encoder feedback in Python, optionally validate with hardware tests.

Categories: *simulations*

Wind impact on solar energy

Analyze solar cell performance under varying wind and temperature conditions in Python.

Categories: *data*

Sleep-synchronized lighting

Simulate lighting schedules based on user sleep preferences in Python and visualize on/off patterns.

Categories: *simulations*

Renewable energy data analysis

Collect and analyze data from three renewable sources in Python, visualize costs and performance metrics.

Categories: *data*

Car speed control

Use encoder feedback to simulate PWM-based DC motor speed control in Python and graph performance metrics.

Categories: *hardware, simulations*

Phone brightness modeling

Analyze phone ambient light sensor data in Python to study brightness adjustment behavior and battery impact.

Categories: *data*

EV brand performance comparison

Compare Tesla vs. Toyota EV battery performance data in Python with query-driven visualizations.

Categories: *data*

Power grid simulation

Simulate Californiaâ€™s power grid in Python, analyze distribution scenarios, and visualize system dynamics.

Categories: *simulations*

Comprehensive battery analysis

Calculate battery performance and cost in Python, analyze efficiency and power delivery, and build a verification circuit.

Categories: *hardware, data*

Voice assistant application

Design a Python voice assistant that processes voice inputs and summarizes audio properties.

Categories: *data, simulations*

Ultrasonic radar

Build an ultrasonic IR radar system, collect obstacle motion data, and analyze detection properties in Python.

Categories: *hardware, simulations*

Solar-powered clock simulator

Simulate a solar-charged clock in Python using I-V curves and optionally build a physical prototype.

Categories: *simulations*

Water flow efficiency analysis

Model and solve water flow equations for dispensers in Python, analyze efficiencies, and visualize results.

Categories: *data, simulations*

Automatic door analysis

Collect data on automatic door operation and analyze sensor range, accuracy, and performance with Python.

Categories: *hardware, data*

Weather analysis

Output highest and lowest temperatures recorded, average temperature, number of rainy days, and days forecast as dry but with rainfall. Visualize and report using real-world weather data.

Categories: *data*

Real estate analysis

Histogram of for-sale houses per state. Output the most expensive house overall, the most expensive in a user-selected state, and average prices by state.

Categories: *data*

Movie rating analysis

Compute average ratings for three movies by matching movie IDs across two CSV files, then visualize the results.

Categories: *data*

Employment analysis

Output top three majors by employment, average unemployment and employment rates for a specific job, and averages by major category.

Categories: *data*

Steak cook preference analysis

Determine average preferred steak doneness percentage from votes, and allow users to record their own preference.

Categories: *data*

Contact Book

Read, add, delete, and modify contact entries in a file, then save updates back to the file.

Categories: *data*

Gradebook

Allow teachers to input student grades across subjects, calculate averages, and retrieve individual performance.

Categories: *data*

Password Manager

Store and retrieve passwords securely with encryption in a simple command-line tool.

Categories: *data*

Calculator

Perform addition, subtraction, multiplication, and division. Store the last three results in a file and display history on demand.

Categories: *data*

Flashcard quizzer

Create and manage a Q&A; file. Users can add cards or take a quiz, then receive a score.

Categories: *game*

Rock Paper Scissors

Play rock-paper-scissors against the computer. Maintain win/loss score in a file, display and update before each game.

Categories: *game*

Birthdays Reminder

Store friendsâ€™ birthdays in a file sorted chronologically. Output the next and furthest upcoming birthdays and days until each, or a specific personâ€™s birthday.

Categories: *data*

Work logger

Log daily work hours in a file. Calculate monthly earnings at minimum wage, add visual reports, multi-employee support, and a live timesheet.

Categories: *data*

Dictionary creator

Maintain a word dictionary. Users can look up definitions or list words starting with a given letter.

Categories: *data*

Hangman

Play hangman with random words loaded from a file.

Categories: *game*

Tic Tac Toe

Play tic-tac-toe vs. computer. Store and display win/loss record in a file.

Categories: *game*

Music Playlist Creator

Create, load, edit, and save music playlists. Track listening statistics and visualize listening history.

Categories: *data*

Address Book

Store, retrieve, add, edit, search, and delete personal contact details in a file.

Categories: *data*

Student Grade Management System

Command-line tool to manage and analyze student grades with add/view/average features, saving to and loading from JSON.

Categories: *data*

Movie Watchlist

Manage a watchlist of movies: add titles, mark as watched, rate/review entries.

Categories: *data*

Number guesser

Guess a random number with 'very cold' to 'very hot' hints. Record attempts per game in a file and show the last gameâ€™s attempt count.

Categories: *game*

Blackjack

Play Blackjack (21) vs. computer. Display and update win/loss record stored in a file at each gameâ€™s start and end.

Categories: *game*

Coin toss game

Simulate coin tosses vs. computer, display and update score in a text file.

Categories: *game*

Recipe suggester

Suggest recipes based on user-provided ingredients. Provide an exploration menu and realistic recipes from a database.

Categories: *data*

News Aggregator

Compile top news from real-world APIs by user preference. Navigate via menu and adapt recommendations based on stored user scores.

Categories: *data*

Currency Converter

Convert currencies using a public API. Visualize rate trends over time for selected currency pairs.

Categories: *data*

Trivia quiz game

Play trivia from a question database. Display score and optional end-game fact sheet based on answered questions.

Categories: *game*

Fitness tracker

Log daily activity and diet, show progress graphs, workout summaries, and dietary recommendations over multiple days.

Categories: *data*

E-commerce platform

Display products, reviews, and orders. Implement shopping cart and order summaries, saving data to files with optional visualizations.

Categories: *data*

Russian Roulette

Simulate Russian Roulette vs. computer.

Categories: *game*

Car sale finder

Recommend cars from a database/CSV based on cost, ratings, and user criteria.

Categories: *data*

Password manager

Generate, store, and retrieve passwords across websites. Securely write to and load from an encrypted file. Optionally visualize common passwords.

Categories: *data*

Adventure text game

Interactive story with puzzle items to solve challenges.

Categories: *game*

Baseball player analysis

Fetch and visualize baseball player stats from a dataset, highlighting interesting facts.

Categories: *data*

SimSteam platform

Manage owned games file, record hours played, levels, achievements, and visualize consolidated data.

Categories: *data*

Task Scheduler

Add, edit, and delete tasks with deadlines. Display priority based on proximity to the current date.

Categories: *data*

Recipe Cookbook

Display, search, and add recipes from a CSV/TXT file via a menu interface.

Categories: *data*

Workout Generator

Recommend workouts by body part or full routines from a CSV database.

Categories: *data*

Car performance finder

Recommend cars based on performance criteria specified by the user.

Categories: *data*

Mortgage analyzer

Visualize historical mortgage rate trends. Analyze future payments based on user input and stored expense rates.

Categories: *data*

Activity Guide

Ask the user questions to recommend activities in a chosen city, reading activity options from a CSV file.

Categories: *data*

Air Quality checker

Display historical and current air quality for your area by reading and updating a CSV of previous checks.

Categories: *data*

Electric vehicle charging cost calculator

Calculate EV charging costs at various stations based on battery capacity, target charge percentage, and travel distance.

Categories: *data*

Morse Code translator

Translate text to and from Morse code, save translation history to a file, and allow viewing past translations.

Categories: *data*

Notepad

Read, append, find, replace, and delete words in a text or CSV file via a simple notepad interface.

Categories: *data*

QR Generator

Manage a CSV of names and links, generate and display QR codes for a selected person and link using Matplotlib.

Categories: *data*

Palindrome checker

Read words from a CSV file and identify which entries are palindromes, then display the results.

Categories: *data*

Goldbach's conjecture

Given an even number >5, output pairs of primes that sum to it and record input and results to a file.

Categories: *simulations*

Song recommender

Ask the user questions to recommend three songs from a CSV/database, with options to add new songs and prevent duplicates.

Categories: *data*

Make your own dice for board games

Simulate dice of various types, allow custom dice creation, record rolls to a file, and visualize faces and probability distributions.

Categories: *simulations*

CatCard interface

Duplicate CatCard functionalities in Python: add funds, check balance, report lost card, access resources, and chart expense distributions.

Categories: *data*

Pavilion menu generator

Automate UC Merced Pavilion dining menus (breakfast, lunch, dinner) ensuring nutritional balance, fun items, and write weekly tables to a file.

Categories: *data*

Gacha simulator

Simulate gacha game mechanics and rates.

Categories: *simulations*

Wordle game

Implement Wordle using a CSV of valid words.

Categories: *game*

Speedometer Calculator

Calculate required speed given start, destination, and time constraints using city-distance data from a CSV.

Categories: *data*

Video game recommender

Recommend video games by querying a CSV database based on user preferences.

Categories: *data*

Battleship game

Play Battleship with randomly placed ships; track and display scores between user and computer from a file.

Categories: *game*

Bobcat Shuttle Tracker

Simulate Bobcat Shuttle locations, update positions via loops, read initial data from a file, and visualize routes.

Categories: *simulations*

Library Resource Locator

Help students find and reserve study rooms, computers, or books in Kolligian Library using dictionaries and file-based availability.

Categories: *data*

UCM Event Calendar

Fetch and display UC Merced events from an .ics file, sort by category, and save organized calendars for offline use.

Categories: *data*

Course Schedule Optimizer

Optimize student course schedules based on preferences (free days, professors, requirements) and save viable combinations to a file.

Categories: *data*

Housing Roommate Matcher

Match roommates based on stored profiles and preferences, outputting compatible pairs saved for future reference.

Categories: *data*

Text adventure

Navigate a text-based world with puzzles, timed challenges, and file-driven random events based on player input.

Categories: *game*

Financial Aid Calculator

Estimate student costs and aid using conditional logic, output detailed breakdowns saved to a text file.

Categories: *data*

ProfRateUCM

Allow students to rate and comment on professors/courses, calculate averages, and save top-rated lists and visualizations to a file.

Categories: *data*

Merced Outdoors Trip Planner

Plan trips around Merced by selecting hiking trails, lakes, and campsites, generating itineraries saved to a file.

Categories: *data*

Alphabet game

Guess a random letter by indicating if the target is before or after the guess, with a timer and fastest-time logging.

Categories: *game*

UCM Club Finder

Match student interests to campus clubs using dictionaries and save recommended lists for later.

Categories: *data*

Research Opportunity Finder

Compile and filter research positions by department or skills, outputting lists saved to a file.

Categories: *data*

Cypher Decoder

Encode and decode messages with variable-letter shifts, generating and applying a shift key for each character.

Categories: *data*

Car building program

Select car models and parts, calculate total cost, and output a bill of materials.

Categories: *simulations*

Akinator implementation

Guess user-chosen characters via yes/no questions, logging history of correct and incorrect guesses.

Categories: *game*

Music tracker

Log per-user song plays with artist, title, and rating; rank songs by mean rating and plot histograms of artist rankings.

Categories: *data*

Poker probability

Compute win counts for poker hands from a dataset file and report per-player outcomes.

Categories: *simulations*

Gas trip requirement calculator

Calculate required gas for a trip given engine specs or car model and trip distance.

Categories: *data*

Wheel of Fortune

Emulate Wheel of Fortune using puzzles from a CSV/TXT file, store and display game results.

Categories: *game*

DeskFinder

Reserve desks for time slots, display availability and future reservations, updating a CSV/TXT file.

Categories: *data*

Jeopardy game

Play Jeopardy with questions loaded from a CSV/TXT file.

Categories: *game*

English to Spanish Translation

Translate English text to Spanish, caching past translations in a file and checking before translating.

Categories: *data*

Star catalog

Explore constellations, star sizes, colors, and distances via a prompt-driven interface.

Categories: *data*

Buzzfeed Quizzes

Run three multiple-choice quizzes (car, computer, phone) from TXT files, require all answers, and report correctness.

Categories: *game*

Turbos and Superchargers

Analyze turbocharger and supercharger operation modes and suggest improvements via code.

Categories: *data*

Geo Distance guesser

Game: guess distances between two random locations within 20% error or study mode to compute distances using geopy.

Categories: *game*

Weightlifting exercises recommender

Recommend exercises by muscle group from a CSV/TXT file of available routines.

Categories: *data*

Fruit tree success calculator

Determine fruit tree viability by USDA zone, rainfall, and temperature using city and plant data files.

Categories: *data*

Soccer statistics app

Provide player stats, reports, visualizations, and fun facts for soccer data.

Categories: *data*

Python linter

Implement a command-line Python linter to analyze code style and report issues.

Categories: *data*

Largest Prime Factor

Compute and cache largest prime factor for numbers <100, storing inputs and results in a CSV.

Categories: *simulations*

Estimate Pi

Use Monte Carlo sampling to estimate Ï€, output the estimate, and plot sampled points.

Categories: *simulations*

Fibonacci Sequence Generator

Generate the Fibonacci sequence up to a given limit, explore performance of different methods, and report timings.

Categories: *simulations*

Newton's Method for Root Finding

Implement Newtonâ€™s method with adjustable guesses and tolerances, output roots, and plot the function.

Categories: *simulations*

Traveling Salesman Problem Solver

Solve the TSP using heuristic methods (e.g., nearest neighbor), output the shortest path and distance.

Categories: *simulations*

Random Walk Simulator

Simulate and visualize 2D or 3D random walks, exploring step size and dimensional effects.

Categories: *simulations*

Simple Encryption Algorithms

Encrypt and decrypt text using Caesar and VigenÃ¨re ciphers, and compare algorithm strengths and weaknesses.

Categories: *simulations*

Maze Solver

Solve mazes with DFS/BFS algorithms and visualize the solved path.

Categories: *simulations*

Choice game

Branching narrative game allowing player choices that lead to different endings.

Categories: *game*

Game Theory Simulations

Simulate game theory scenarios like Prisonerâ€™s Dilemma, reporting strategy performance stats.

Categories: *simulations*

Simple Weather Simulator

Use mathematical models and historical data to simulate and predict weather patterns.

Categories: *simulations*

Loan Calculator

Calculate loan payments and generate amortization schedules, exploring rate and frequency impacts.

Categories: *data*

Statistics Calculator

Compute mean, median, mode, standard deviation, etc., visualize results, and save to CSV.

Categories: *data*

Enigma Machine

Replicate Enigma machine encryption by mapping alphabetic input through rotor configurations, allowing message scrambling and unscrambling using accurate rotor combinations.

Categories: *simulations*

Jumper.io

Manage event guest lines: add/remove people, view queue status, and verify payment.

Categories: *data*

Invisible map adventure

Navigate an unseen map similar to Oregon Trail, avoid traps, track deaths and completion time; levels read from CSV.

Categories: *game*

Loot collector game

Control a spaceship to collect loot using arrow keys; track and display current and high scores.

Categories: *game*

Ping Pong game

Play ping pong with score persistence: load scores at start and save results at end.

Categories: *game*

Color calculator

Combine two primary colors (red, yellow, blue) to produce secondary hues, with extended color mixing options.

Categories: *simulations*

Timer reminder

Set a message and time to trigger a reminder notification at the specified time.

Categories: *data*

Fish Bait Sorter

Select from a predefined list of bait types, manage a favorites list, ensuring no duplicates, and check bait categories (live/artificial).

Categories: *data*

Fast Food Ordering Simulator

Select a restaurant, load menu from CSV, place orders, and calculate total cost.

Categories: *simulations*

Housing Campus converter

Calculate living expenses for on/off campus housing including commuting costs based on distance and gas price inputs.

Categories: *data*

Average technological output of college freshman

Analyze and visualize average time spent on academic vs. personal technology use using Matplotlib.

Categories: *data*

Age/Food Simulator

Recommend healthy or unhealthy food based on user age, height, gender, nationality, and weight statistics, with a follow-up health survey.

Categories: *simulations*

Cake ordering form

Capture contact details, calculate cake order price, and suggest premade flavors.

Categories: *data*

Fun/Personality quizzes

Offer multiple personality quizzes from CSV; update and store result tallies for each outcome.

Categories: *game*

Class progress visualizer

Input quiz scores for a class, then display a histogram of score distribution using Matplotlib.

Categories: *data*

Product analyzer

Plot sales history from CSV; allow users to select a product and view its sales trend line chart.

Categories: *data*

Attendance tracker

Manage attendance records for a class CSV, mark daily presence, and visualize attendance rates per student.

Categories: *data*

Pattern memorizing game

Show a letter pattern briefly, then prompt user recall; increase length each round, record highest score in CSV.

Categories: *game*

Spell Checker

Identify misspelled words in user text or file input, suggest corrections interactively.

Categories: *data*

PR Weight Tracker

Track personal record lifts (bench, squat, deadlift) via CSV, update when broken, and generate reports and visualizations.

Categories: *data*

Scientific calculator

Perform basic arithmetic and trigonometric functions (sin, cos, tan) and log calculation history to a text file.

Categories: *data*

7/11 Dice game

Simulate the 7-11 dice game with Pygame, maintain and display score history.

Categories: *game*

Crime rate calculator

Compute crimes per 100,000 population based on user-input crime counts and population.

Categories: *data*

Stress Analysis on Materials

Simulate stress-strain curves for materials under tensile, compressive, and shear loads, plot curves, and generate fatigue reports.

Categories: *simulations*

Solar Panel Efficiency Calculator

Calculate solar panel efficiency under varying conditions (angle, weather, time) and plot daily efficiency graphs with summary.

Categories: *data*

Electrical Circuit Solver

Use Kirchhoffâ€™s laws to compute currents and voltages in circuits; explore effects of components and output distributions and CSV reports.

Categories: *simulations*

Energy Consumption Reporter

Model and optimize building energy usage based on insulation, HVAC, and weather; generate daily/monthly consumption charts.

Categories: *data*

Material Life Cycle Analysis

Assess environmental impact of materials from production to disposal, outputting impact scores and selection recommendations.

Categories: *data*

Message encoder

Encrypt and decrypt text messages with a key; share encoded messages for recipients with the correct key.

Categories: *simulations*

Skateboard part recommender

Recommend skateboard components for custom builds based on user requirements.

Categories: *data*

Logo Guess quiz

Identify brand logos in a quiz format.

Categories: *game*

Text Adventure game

Collect tokens through mini-games (word, number, puzzle) in a text-based adventure.

Categories: *game*

Food recommender

Suggest food items based on user-specified qualities.

Categories: *data*

Housing Roommate Finder

Match roommates by comparing student profiles and preferences, output saved match lists.

Categories: *data*

Video game recommender

Recommend games by platform, genre, player count, and duration from user preferences.

Categories: *data*

Periodic Table lookup

Display element properties by name or symbol.

Categories: *data*

Bobcat Shuttle Tracker

Simulate and display Bobcat shuttle locations and routes, update positions dynamically.

Categories: *simulations*

Vehicle Service Tracker

Record vehicle service history (mileage, year, make, model) and output maintenance logs.

Categories: *data*

Go Fish card game

Play Go Fish vs. computer; track win/loss history.

Categories: *game*

Soccer Code

Analyze and generate soccer-related code patterns.

Categories: *data*

Russian Roulette

Simulate Russian Roulette game against the computer.

Categories: *game*

Higher and Lower Game

Guess a hidden number by higher/lower prompts; log guess time to file.

Categories: *game*

Blackjack

Play Blackjack with deck manipulation, Ace valuation rules, and persistent scoring.

Categories: *game*

Trajectory Calculator

Compute 2D and 3D projectile trajectories from initial velocity vectors.

Categories: *simulations*

Shoe size comparer

Compare shoe size data for men and women and identify patterns.

Categories: *data*

Food Ordering simulator

Simulate restaurant ordering workflows.

Categories: *simulations*

Club Finder

Match student interests to campus clubs using stored club data.

Categories: *data*

Energy consumer

Analyze building energy consumption based on IVAC settings and weather inputs.

Categories: *simulations*

Personal Finance summary

Track user expenses and income, set savings goals, and recommend spending cuts.

Categories: *data*

Athlete Player stats

Self-rate athlete skills and compute overall ratings from input skill approximations.

Categories: *data*

Time Management App Project

Mobile app to organize tasks, schedules, and time usage.

Categories: *data*

Rock paper scissors game

Play rock-paper-scissors vs. computer with persistent scoring.

Categories: *game*

GI Character Analyzer

Analyze Genshin Impact team stats including characters, weapons, levels, and effects.

Categories: *data*

Interactive Program

Handle directional movement and quaternion rotations via user input.

Categories: *simulations*

Workout Planner

Generate weekly workout plans by splitting days and targeting muscle groups with recovery schedules and dietary options.

Categories: *data*