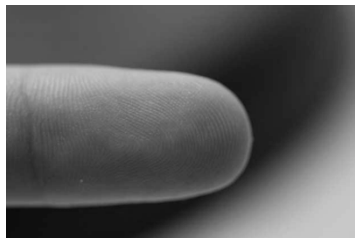# The Beauty and Joy of Computing

bjc

Lecture #4
Creativity

Your Coding Style Can Give You Away…

Researchers have discovered "Code Stylometry", which "uses natural language processing and machine learning" to determine the author of code based on their code style. Could de-anonymize malicious code, and resolve plagiarism.

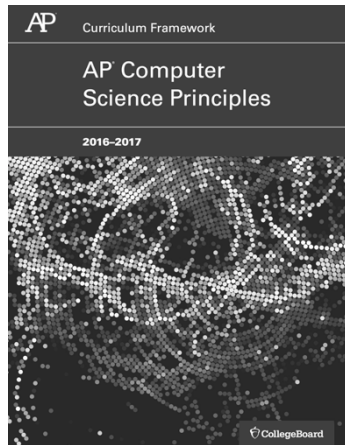www.itworld.com/article/2876179/csi-computer-science-your-coding-style-can-give-you-away.html

Creativity: Introduction

7 Big Ideas

- Creativity
- Abstraction
- Data and Information
- Algorithms
- Programming
- The Internet
- Global Impact

AP Curriculum Framework

AP® Computer Science Principles

2016–2017

CollegeBoard

Computing is a *Creative* Activity!

- "Creativity and computing are prominent forces in innovation; the innovations enabled by computing have had and will continue to have far-reaching impact.

- At the same time, computing facilitates exploration and the creation of computational artifacts and new knowledge that help people solve personal, societal, and global problems."

- This course will emphasize these creative aspects of computing.

Creative development can be…

- **<u>an essential process for creating computational artifacts</u>**
  - A creative process in the development of a computational artifact can include, but is not limited to, employing nontraditional, nonprescribed techniques; the use of novel combinations of artifacts, tools, and techniques; and the exploration of personal curiosities.
  - Creating computational artifacts employs an iterative and often exploratory process to translate ideas into tangible form.

A prepared guitar
(Wikipedia)

Computational Artifacts

🖉 Computing enables people to…

- **…use creative development processes to create computational artifacts for creative expression or to solve a problem.**

- **A computational artifact is created by a human using a computer. Can be…**
  - Program, digital music, videos, images, documents, 3D model, ..

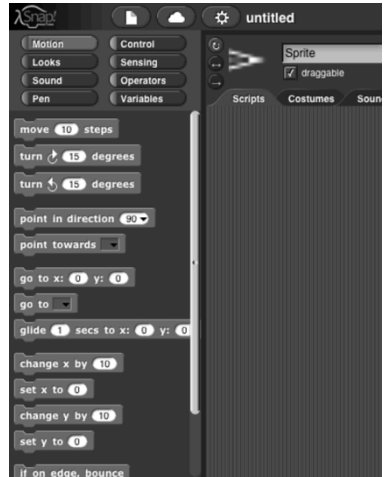- **Creating computational artifacts requires understanding of and use of software tools and services**

Quarxs, series poster, (*Wikipedia,* MoBen)

Computing tools and techniques are…

- used to create computational artifacts and can include, but are not limited to, programming integrated development environments (IDEs), spreadsheets, 3D printers, or text editors.

- A creatively developed computational artifact can be created by using nontraditional, nonprescribed computing techniques.

- Creative expressions in a computational artifact can reflect personal expressions of ideas or interests.

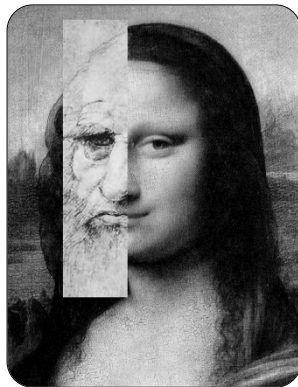- Computing tools and techniques can enhance the process of finding a solution to a problem.

Garcia

- **for creating computational artifacts can be used to solve problems when traditional or prescribed computing techniques are not effective.**

- **Creating computational artifacts can be done by combining and modifying existing artifacts or by creating new artifacts.**

- **Computation facilitates the creation and modification of computational artifacts with enhanced detail and precision.**

- **Combining or modifying existing artifacts can show personal expression of ideas.**

Digitally Manipulated Photos,
(*Wikipedia,* LoadMaster)

Collaboration, Analysis, Power!

Collaboration is an essential part

- A collaboratively created computational artifact reflects effort by > 1 person.

- Effective collaborative teams consider the use of online collaborative tools.

- Effective collaborative teams practice interpersonal communication, consensus building, conflict resolution, & negotiation.

- Effective collaboration strategies enhance performance.

- Collaboration facilitates the application of multiple perspectives (including sociocultural perspectives) and diverse talents and skills in developing computational artifacts.

- A collaboratively created computational artifact can reflect personal expressions of ideas.
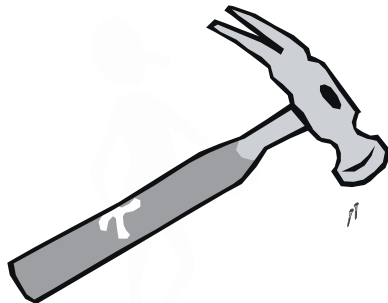
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- The context in which an artifact is used determines the correctness, usability, functionality, and suitability of the artifact.

- A computational artifact may have weaknesses, mistakes, or errors depending on the type of artifact.

- The functionality and suitability (or appropriateness) of a computational artifact may be related to how it is used or perceived

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Computing extends traditional forms…

- <u>…of human expression and experience.</u>
- **Creating digital effects, images, audio, video, and animations has transformed industries.**
- **Digital audio and music can be created by synthesizing sounds, sampling existing audio and music, and recording and manipulating sounds, including layering and looping.**
- **Digital images can be created by generating pixel patterns, manipulating existing digital images, or combining images.**
- **Digital effects and animations can be created by using existing software or modified software that includes functionality to implement the effects and animations.**
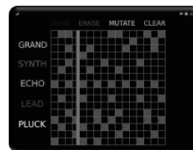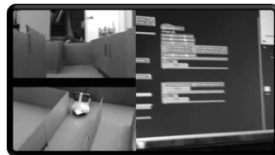- **Computing enables creative exploration of both real and virtual phenomena.**

3D Jack inside Cube,
(*Wikipedia,* GregL)

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ᵇʲᶜ Summary

- **You will create interesting and relevant artifacts with the tools and techniques of computer science.**

(Cal) What is key to success in CS10? Grit!