Guidelines for Projects Using Computer Science/Technology

A project involving only computer hardware or software systems would be entered in the **Computer Science category**. It is the study of information processes, the structures and procedures that represent processes, and their implementation in information processing systems. It includes system analysis and design, application and system software design, programming, and datacenter operations.

Subcategories in the Computer Science category would include:

- **Algorithms, Databases** – The study of algorithms and databases. Software developed to manage any form of data including text, images, sounds, and video.
- **Artificial Intelligence** - The study of the ability of a computer or other machine to perform those activities that are normally thought to require intelligence, such as solving problems, discriminating among objects, and/or responding to voice commands. This also includes speech analysis and synthesis.
- **Languages and Operating Systems:** Studies that involve the development or analysis of artificial languages used to write instructions that can be translated into machine language and then executed by a computer or system software responsible for the direct control and management of hardware and basic system operations of a computer or mobile device.
- **Mobile Apps:** A study involving a software application developed specifically for use on small, wireless computing devices. These studies may include front-end development techniques, such as user interface design and cross-platform support, and/or back-end development techniques, such as data services and business logic.
- **Networking and Communications** - The study of systems that transmits any combination of voice, video, and/or data among users.
- **Computational Science, Computer Graphics** - The study of the use of computers to perform research in other fields, such as computer simulations. Also includes the study of computer graphics or the transfer of pictorial data into and out of a computer by various means (analog-to-digital, optical scanning, etc.), such as in computer image processing.
- **Software Engineering, Programming Languages** - The study of software designed to control the hardware of a specific data processing system in order to allow users and application programs to make use of it. This sub-category includes web technologies, programming languages and human-computer interactions.
- **Computer System, Operating System** - The study of system software responsible for the direct control and management of hardware and basic system operations of a computer.

Other examples of Computer Science projects include:
- Study and development of computer hardware
- Robotics (depending on objectives – project can be placed in Engineering category)
- Control systems
- Simulations/virtual reality or computations science
- Data structures
- Encryption, cybersecurity
- Information theory

Computer Science projects which involve a hardware component, should additionally follow the engineering project guidelines.

Computer technology may be incorporated into science fair investigations in one or a combination of the following three ways, however, may not be fit the criteria as a Computer Science category project. Projects, which use the computer as a tool are **_not_** considered Computer Science projects.

The following are ways that projects may use computers but are **_not_** deemed Computer Science topics and **_should not_** be placed in the Computer Science category:

I. As a tool to record/statistically analyze data gathered in an experiment:
    Projects of this type would be entered in the **category of the experiment involved (not computer science)**. State whether the student wrote the program used, made a major adaptation of an existing program or used already available software. If the program is the original work of the student, that part of the project should be presented as outlined in 1 - 7 below.

II. Developing/building new computer circuits/hardware items:
    Project would be entered in an **Engineering category**. If the software/firmware programs are the original work of the student, they should be presented as outlined in 1 - 7 below.

III. Writing a new computer program/software (as stated in I and II). If the project fits in with the subcategories in the Computer Science category, it will be considered a Computer Science Project. The original work of the student should be presented as outlined in 1 - 7 below.

Writing software as a project should include the following:

1. A statement of the student OBJECTIVES. This should include a description of the computer system and its capabilities that will be used to achieve the final project.
2. A summary of the research done by the student before writing the program. What else has been written or programmed for this topic? State why this new program will be different/better/more useful.
3. A chronological description of the development of the project program. It should describe the various approaches tried and explain why they were accepted/rejected.
4. A concise block diagram or similar presentation to show the structure of the program design (maximum of two pages) and that is cross-referenced to the program listing (#5 below).
5. A program listing that includes explanatory remark statements and is cross-referenced to the block diagram (#4 above).
6. A sample run(s) to show the product(s) of the program.
7. A critique of the completed program showing how well objectives were achieved and/or how the program is qualitatively different from or better than other similar programs.