Description of Features

In the dataset **"CPS-IDS_V1"** (Cyber-Physical System Intrusion detection dataset version 1) different features of 3D printer are measured and recorded. In different scenarios combinations of these features are used. A brief description of features is given below:

G28: This command instructs the printer to perform homing. It causes the printer's extruder to move to its home position, typically the origin (0,0,0) on the X, Y, and Z axes.

G1: The G1 command is used for controlled movement. It instructs the printer to move the extruder or build platform to a specific position. The movements can be specified in terms of X, Y, and Z coordinates. For example, "G1 X50 Y20 Z10" would move the extruder to X=50, Y=20, and Z=10.

G92: This command sets the current position of the extruder or build platform. It is used to define the current position without physically moving the motors.

G21: This command sets the unit of measurement to millimeters. It is used to specify that distances in subsequent G-code commands should be interpreted in millimeters.

G90: This command sets the coordinate system to absolute positioning. It instructs the printer to interpret subsequent movements as absolute positions, where coordinates represent specific positions relative to the origin.

M82: This command sets the extruder to use absolute mode for extrusion. It is used to specify that subsequent extrusion distances should be interpreted as absolute values rather than relative to the previous position.

M84: This command disables the stepper motors. It is commonly used to turn off the motors after a print is completed or when the printer is idle to save power.

M107: This command turns off the fan. It is often used to disable the cooling fan that is typically used to cool the printed object.

M190: This command sets and waits for the bed temperature to reach the specified value. It is commonly used to heat the printer's build platform or bed to a specific temperature before starting a print.

M104: This command sets the target temperature for the extruder. It is used to define the temperature that the extruder should reach before starting or continuing a print. For instance, "M104 S200" sets the extruder temperature to 200 degrees Celsius.

M140: This command sets the target temperature for the bed. It is used to define the temperature that the bed should reach before starting or continuing a print.

M106: This command turns on the fan and adjusts its speed. It is used to control the cooling fan's speed, which can help with cooling the printed object during the printing process.

M109: This command sets the target temperature for the extruder and waits until it reaches that temperature before continuing. It is similar to the M104 command but includes a built-in wait time.

M220: This command slows down the print speed by percentage.

S: The "S" attribute is normally used to define speed, temperature, or other setting-related characteristics. For instance, "S" might be used to control the extruder's or the build plate's target temperature or the movement speed.

F: The "F" feature controls the speed or feed rate of movements. It indicates how quickly a certain activity should be performed by the extruder or build platform. It is common to measure feed rates in millimeters per minute or millimeters per second.

E: The quantity of filament to be extruded is specified using the "E" variable. It stands for the length of the extrusion or the volume of filament that needs to be forced through the nozzle. The G1 command for directed movement is frequently related to the "E" parameter.

Physical Directions:

X, Y, Z: These variables stand in for the positions relative to the X, Y, and Z axes. To indicate the desired location for the extruder or build platform, they are utilized in G-code instructions.

Labels: Description of the labels/classes.
No: Normal operation
YES: Anomaly detected