Digital Skills

# Future Device Pseudocode

Get creative and let the campers design their own device that they would like to use in the future! Campers will then use their device to continue to explore how to write and create their own pseudocode. By the end of this activity, campers will have designed their own future device and have pseudocode to match their invention!

## Materials

- Paper
- Writing utensil



Idea → Pseudocode → Actual Code
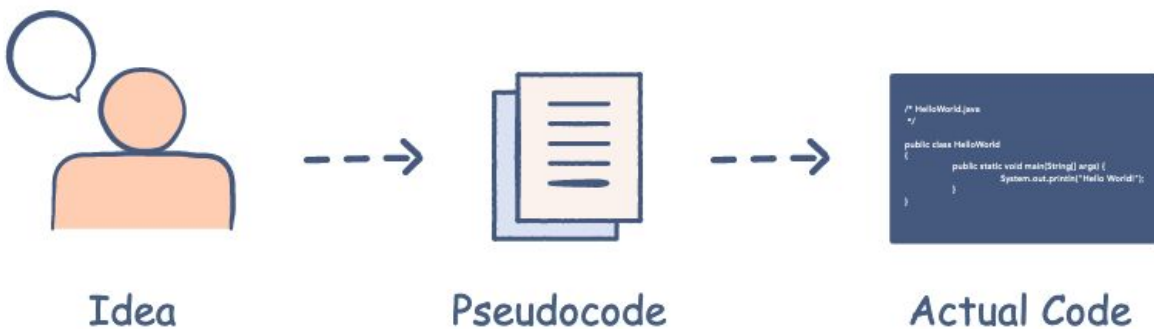
## Background Information

**Pseudocode** is an informal way to write a program from start to finish without worrying about the syntax of a computer language. Programmers write pseudocode as a rough draft or outline of their ideas to tackle a certain computer programming problem. Since pseudocode is not written in a specific programming language, any programmer should be able to read the pseudocode and translate it into code for a specific computer language.

Pseudocode can be really helpful for programmers in many different ways. It can help keep focus on the algorithm, make ideas easier to edit, and can be used and understood by all programmers. Pseudocode is usually the second step when writing and working through a problem. When writing a program, it usually starts with an idea, then making pseudocode, and then writing proper code for the program.

# Future Device Pseudocode

**What is pseudocode?**

Pseudocode is an informal way to write a program from start to finish without worrying about the syntax of a computer language.

Programmers usually write out pseudocode of a program before they write the real code. Why might this be a helpful approach?

Pseudocode can act as a "blueprint" for the real code that programmers must write. Because pseudocode is fast to write and easy to read, it lets programmers plan out how their program will work before they start coding. This way, they have a sort of "guide" to follow and are less likely to run into bugs or other problems. If they do run into problems, they can check their pseudocode and make changes before having to change the real code, which can sometimes create even more problems if it isn't done correctly!

Programming is quickly becoming common in our everyday lives! Think of all the things we use on a daily basis that require code to work properly.

# Future Device Pseudocode

1) Brainstorm a list of household or other common objects that use code. A few examples to get you started are calculators, thermostats, fridges, and cars. What kinds of things do these devices need to accomplish? What do they need to keep track of in order to complete their tasks?

2) After you brainstormed a list of everyday objects that use code, what tasks they have to do, and what variables they must keep track of, check out the examples below:

   - **Thermostat**: Must detect the temperature in the house and use cool/hot air accordingly until the temperature is correct. Some thermostats also can be scheduled to turn off during the day while everyone is out of the home, or turn on at night when it gets colder outside, and so on.
   - **Fridge**: Must detect the temperature inside, like a thermostat, and adjust it until it is correct. Some fridges also beep if they're left open for too long, have ice/water dispensers, show warnings when the water filter needs to be replaced, have child locks, and more.
   - **Internet of things**: smart lights, home surveillance cameras, automatic blinds, and more can be controlled by a smartphone and often work together to function. Some of these things will change automatically based on the time of day, how bright it is outside, what time the sun sets, whether motion is detected outside the house, and so on.

3) Choose a household object, and write some pseudocode that describes how it works. Things to think about when writing the pseudocode:
   - What is the main purpose of this device? What is it meant to do?
   - What other features does this device have, besides its main purpose (if any)?
   - What input does this device collect (from users or from the environment)?
   - What output does this device give to accomplish its main task? Does the output change depending on what the input is?

# Future Device Pseudocode

4) If you're stuck on ideas, here are some examples of pseudocode:

**Thermostat**:
- Purpose: Regulate the indoor temperature based on what the user wants
- Input: Current indoor temperature, temperature that user desires
- Output: either hot or cool air, depending on what the input is
- Pseudocode:

>**While** home temperature doesn't equal desired temperature:
>>**If** home temperature is warmer than desired temperature:
>>>Circulate cool air through house
>>
>>**Else** if home temperature is cooler than desired temperature:
>>>Circulate warm air through the house

**Fridge**:
- Purpose: Keep the air inside cold enough so that food is preserved
- Other features: Alerts the user if fridge door has been left open for too long, can dispense water and ice, will not dispense anything if the child lock is on, can give alert when the water filter needs to be changed.
- Input: Current temperature of fridge, amount of time fridge door has been open
- Output: Cool air if needed, beeping noise if fridge is left open too long
- Pseudocode:

>**While** air inside fridge is too warm:
>>Circulate cool air into fridge
>
>**If** fridge door has stayed open too long
>>Make beeping sound
>
>**While** button is pressed AND child lock is off
>>**If** option is set to ice
>>>Dispense ice
>>
>>**Else if** option is set to water
>>>Dispense water
>
>**If** water filter age is greater than 6 months
>>Turn on water filter alert light
>
>**If** water filter gets changed
>>Turn off water filter light
>>
>>Set water filter age to 0 months

# Future Device Pseudocode

**Smart lights**

- Purpose: Control when the lights in the house turn on and off, based on what time the sun rises and sets.
- Other features: Can be scheduled to turn on and off at random times when the user is on vacation, to give the illusion that someone is home.
- Input: Sunrise and sunset times, dates of user's vacation.
- Output: Turn lights on or off.
- Pseudocode:

> **If sun** is setting now:
>> Turn off lights
>
> **Else if** sun is rising now:
>> Turn on lights
>
> **If** today the user is on vacation:
>> Turn lights on at a random time between 3pm and 7pm
>>
>> Turn lights off at a random time between 10pm and 2am

5) The devices we have in our homes have been evolving since they were first invented, and they will continue to evolve as we move into the future. How do you think your device might change in the future? What new features might it have? What will it be able to do to make everyday tasks easier? Write down the key features and additions that your future device will have. You can also sketch out how the device looks if you would like to.

6) Write out the purpose, other features, input, and output again, but this time do it for the "future version" of your device. If you get stuck, here is an example:

- Future Fridge:
  - Purpose: Keeps each drawer of the fridge at an optimal temperature for the food being stored there.
  - Other features: All features that the present day fridge has, plus the ability to make a shopping list based on what is in the fridge and suggest meal ideas based on what is currently in the fridge.
  - Inputs: Temperature of each drawer,
  - Outputs: cool air in each drawer if needed, grocery list, meal ideas

# Future Device Pseudocode

7. Using the new purpose, features, inputs, and outputs, write some pseudocode for your future device! If you are stuck, here is an example of some Future Fridge pseudocode:

> **If** it has been more than an hour since the last temperature check:
>> **For** however many drawers there are to check:
>>> Check temperature of the drawer
>>> **If** the temperature of the drawer is too low:
>>>> Circulate cold air in the drawer
>
> **If** a food item runs out:
>> Add that food item to the grocery list
>> Remove that food item from the list of foods currently in Fridge
>
> **If** the user asks what they can cook:
>> Check the list of food currently in the fridge
>
> **For** all possible recipes in database:
>> **If** the list of food in fridge matches the ingredient list for this recipe
>>> Suggest this recipe to the user

Not all the pseudocode has been added to the Future Fridge. If you get stuck making pseudocode of your own, try adding onto the fridge's pseudocode and give it more features.

Challenge friends or family members to draw the device or suggest features for it that you can add!

**Additional Resources:**

"FizzBuzz" pseudocode activity:
https://www.futurelearn.com/courses/block-to-text-based-programming/0/steps/39492

Advanced pseudocode challenges:
https://sites.google.com/a/ismanila.org/oliverab_cp/python/pseudocode

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