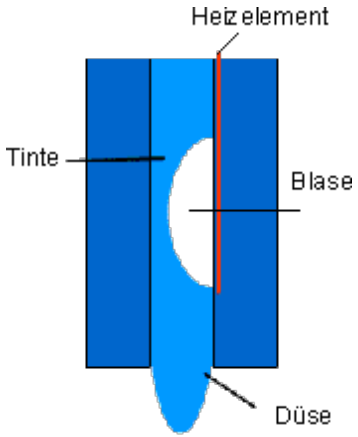
Interactive tools in module 334017 Media & Didactics
Semester task: “Infographic inkjet printer”

HOCHSCHULE
DER MEDIEN

Prof. Ralph Tille

Submission and upload of the executable processing code as an individual task:

February 20, 2024 (see moodle)



Semester assignment: “Infographic inkjet printer”

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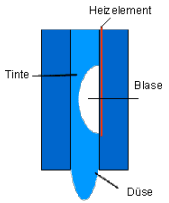
The task is that**How inkjet printers work**to explain via an infographic and to design and develop via processing.



The application should have a main menu (start screen). From this you should get to a subpage 1. The infographic is there. On subpage 2 there is a small quiz on the topic and content appear in the infographic. You can return to the main page from the subpages.

The graphic should show its own creative interpretation with the components that are important for understanding and convey the basic principle in an appealing and motivating way. That also includes**Animations**, so**Twists**,**zoom**,**Translation**but also**appropriate visual effects**such as transparency. Possible target groups would be high school seniors or young adults.

Components of the levy

In addition to the executable code as a processing sketch, the submission also consists of a PDF with preliminary sketches of your own application, which contains meaningful information about the implementation (display of details, pseudocode, interaction descriptions).

The submission must be prepared independently and without outside help. A declaration on honor will be made in this regard. The use of AI tools to generate program code is also possible, but this means that the weighting factor “independence” can be given a reduced weighting in the points distribution. If ChatGPT was used for research, inspiration or code etc., which prompts and outputs were available and how and where they were used are documented informally in the appendix (PDF).

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Scope:
The following topics should appear in the code as part of programming, provided we have covered the topics. The higher the level of difficulty you choose, the higher the score in this rating category. If several or more complex/demanding topics are included, the quality of the assessment increases.

- Variables and system variables
- Integration of external media such as bitmaps, basic graphic elements (circles, geometry...), complex graphics
- Control structures (if... > switch/case)
- Randomness, rounding as well as boundaries and value range transformations (map, constrain...)
- Functions (system functions, custom functions, return value, complex function calculations)
- System variables and events (keyboard, mouse...)
- Text output, integrate fonts and use them sensibly
- Movements (rotations, translation, visual effects such as transparency or zoom and corresponding theme commands)
- Time and sound (text output, noises)

Weighting:
100 points of the examination performance in the “Interactive Tools” part are omitted

- 20 on the conception and pseudo-code
  (among other things, the concept should be presented coherently, “pseudo codes” and sketches should work together)
- 30 on the design
  (including graphic quality of the infographic, color concept, good contrasts, animations)
- 50 on the thematic breadth and depth in the area of programming and the appropriate, correct use of the components and the selected level of difficulty in programming.
  The result is also weighted with regard to the independence of the solution.

Bonus points:
A maximum of 10 bonus points can be earned through tasks during the semester that are marked as “bonus”.
Within the 10 points, a maximum of 5 bonus points can be earned through topics that were not taught or provided.

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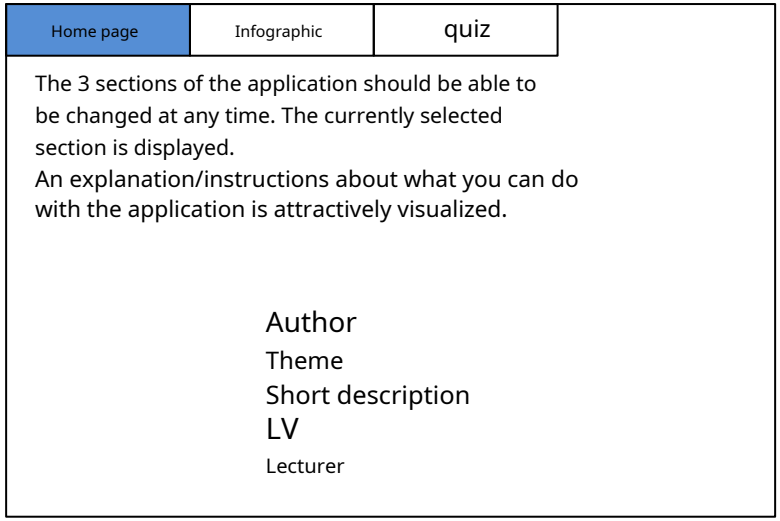
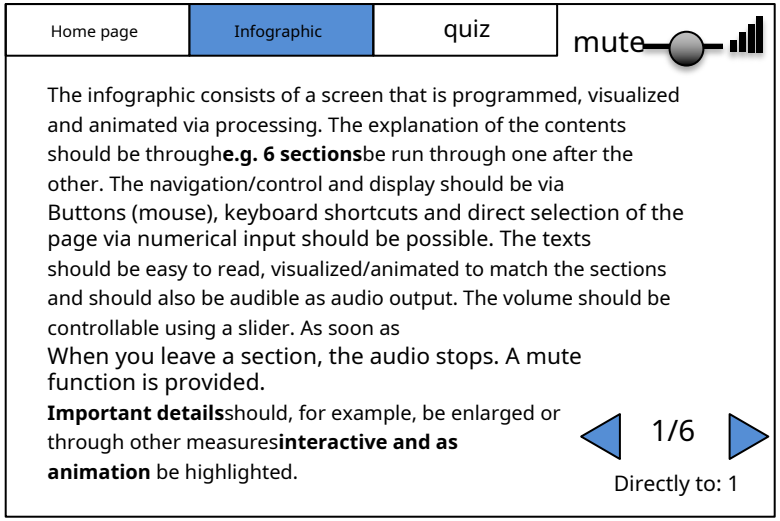
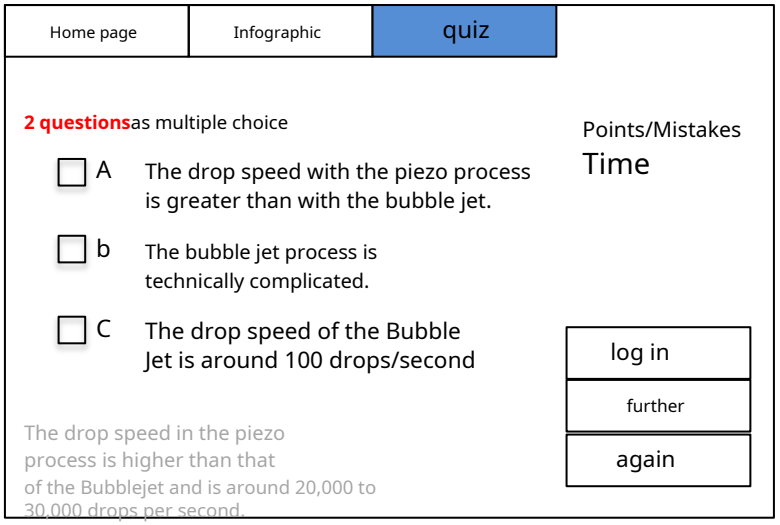
Sketch and description of the interaction processes

Mute as “toggle” with status display.
Volume as a slider with column display.







In the quiz part, 2 questions should be asked, each with 3 multiple choice answer options on the topic. The answers should be edited using the mouse and key. The answers must be logged in in order to then give feedback. Then it continues. However, you cannot change the entry again.

As soon as the user starts the quiz, the time starts, points are calculated and displayed. The questions are visually supported by screenshots from the infographic (loading external media, SVG...).
After logging in, feedback on correct/incorrect information is given on each page. Incorrect answers result in “penalty times” or
Point deduction. This will be displayed when the time has expired. At the end there is another screen that shows the result and gives a motivating assessment. You can start the quiz again from the beginning.

A restart is possible. The time is calculated from the start of the task and visualized accordingly.

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Content focus/scope

The task should be in the infographic part
make all three typical processes (piezo, bubble, continuous) clear and gradually explain them textually, visually and acoustically on 6 sub-pages.

Movements, color changes, size changes or other representation options are used to make things easier to understand.

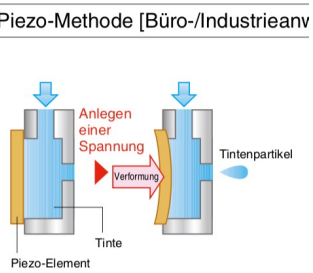
You choose which individual graphic style and direction (“from the left or from above...”) you use. Some on the right typical examples from the internet.

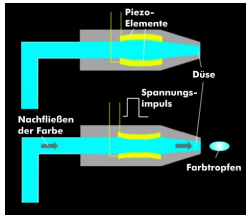
Interactions when operating the subpages/chapters (“2 of 6”) should also be included, for example via “MouseOver”, pressing an element/switch or other options in order to better understand what is being shown.

The level of difficulty also determines, among other things, the possible maximum number of points, ie a sequence of individual images (animated GIF) usually scores fewer points/is weighted lower than an animation or components created by code.

Technical terms and processes that are important for basic understanding (what does xy...?, what follows after..., how fast is...?) must be clearly shown.

Principles
Explanation
Text (sound)
and picture





Principles
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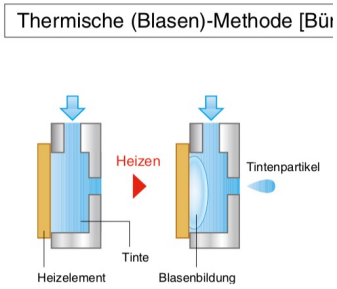

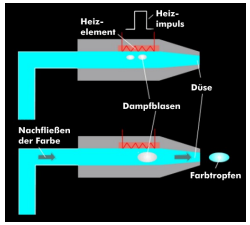

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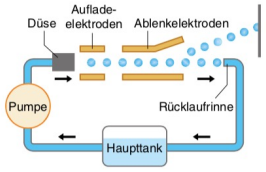
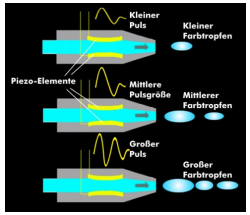
Text (sound)
and picture





Sources: see following pages

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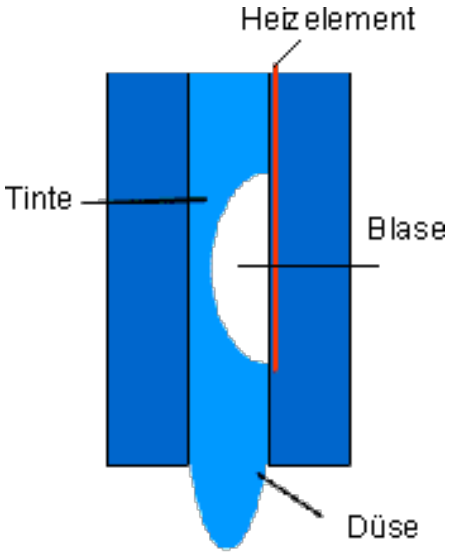

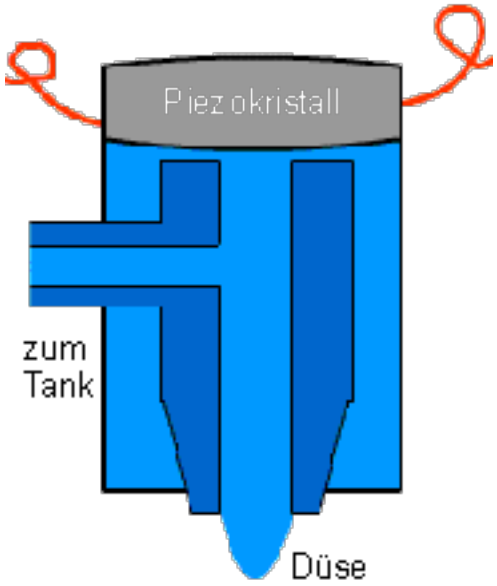

https://www.leifiphysik.de/elektrizitaetslehre/laden-felder-mittelstufe/ausblick/tintenstrahldrucker

Task Interactive Tools WiSe 23/24 – Infographic Inkjet Printer

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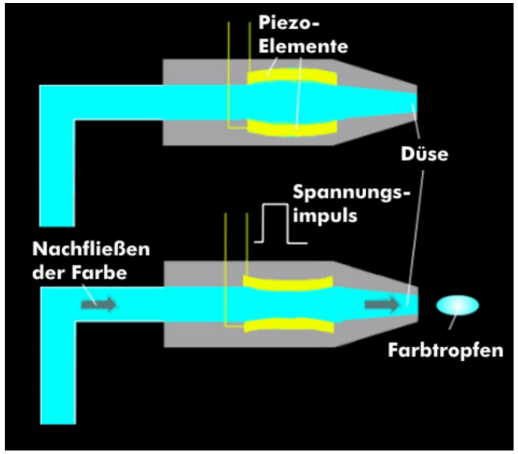
ITWissen.info

Diesen Piezo-Effekt macht man sich in Piezo- Druckern zunutze, indem man mit einem Piezo-Element einen Tintenstrahl durch eine Düse steuert. Beim Drop-On-Demand-Verfahren verformt das Piezo-Element die Druckdüse kurzzeitig, wodurch ein hoher Druck auf die Drucktinte entsteht, der dazu führt, dass ein Tintentropfen Geschwindigkeit aus dem Druckkopf ausgestoßen und auf das Papier gespritzt wird. Die Tintentropfen haben dabei eine Geschwindigkeit zwischen 10 m/s und 40 m/s. Damit die Tinte nicht weiter aus der Düse austreten kann, wird die Spannung am Piezo-Element umgepolt. Die Polaritätsumkehrung hat zur Folge, dass sich das Piezo-Element in die andere Richtung verformt und die Tinte aus dem Vorratsbehälter in den Düsenbereich zieht.



Piezo-elektrisches Druckverfahren

https://www.itwissen.info/Piezo-Drucker-piezoelectric-printer.html

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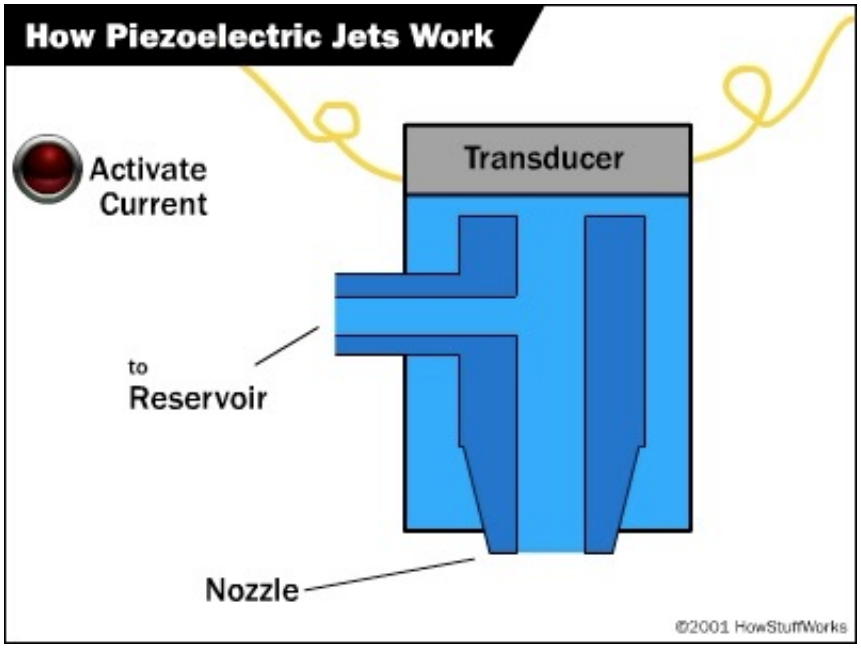

https://computer.howstuffworks.com/inkjet-printer.htm

https://computer.howstuffworks.com/printer-ink.htm

Task Interactive Tools WiSe 23/24 – Infographic Inkjet Printer

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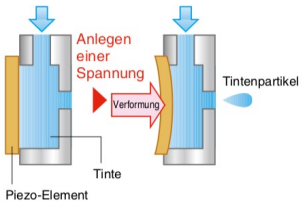
3. Druckmethoden mit Tintenstrahldruckern

On-Demand-Typ

Bei dieser Methode wird nur die Menge an Tintenpartikeln ausgestoßen, die für den Druck notwendig ist.
Die Tintendüsen sind vertikal innerhalb des Druckers angeordnet. Die Tintenpartikel werden von der Düse ausgestoßen und auf das Ziel gesprüht. Piezo-, thermische und Ventilmethode sind die Methoden, mit denen Druck auf die Tintenpartikel aufgebaut und diese ausgestoßen werden.

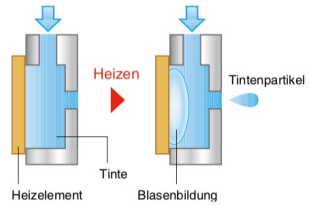
Piezo-Methode [Büro-/Industrieanwendung]



Bei dieser Methode wird ein piezoelektrisches (Piezo-)Element, dessen Volumen sich bei Anlegen einer Spannung verformt, verwendet, um die Tintenpartikel auszustoßen. Das Element ist hinter einem Reservoir befestigt, das mit Tinte gefüllt ist. Danach werden die Volumenverformungen verwendet, um Druck auf die Tinte aufzubauen, wodurch Tintenpartikel aus der Düse ausgestoßen werden.

Vorteile	• Die Menge der ausgestoßenen Tinte kann mit hoher Präzision durch Steuern der Spannung reguliert werden. • Weil keine Wärme auf die Tinte angewendet wird, ist diese Methode sehr stabil und beständig gegen Einflüsse der Betriebsumgebung.
Nachteile	• Da ein Piezo-Element für jede Düse erforderlich ist, kann die Struktur leicht kompliziert werden. • Die Düsen verstopfen leicht, wenn sich Blasen in der Tinte bilden.

Thermische (Blasen)-Methode [Büro-/Industrieanwendung]



Bei diesem Verfahren wird ein Heizelement verwendet, um Wärme auf die Tinte anzuwenden, was dazu führt, dass sich Blasen bilden und Tintenpartikel ausstoßen. Das Heizelement wird hinter einem Reservoir angebracht, das mit Tinte gefüllt ist. Das Einwirken von Wärme auf die Tinte verursacht die Bildung einer Blase, die die Tintenpartikel aus der Düse stößt.

Vorteile	• Die Struktur ist vergleichsweise einfach, weswegen sich diese Drucker einfach miniaturisieren lassen. • Die Druckauflösung kann einfach verbessert werden.
Nachteile	• Aufgrund der angewendeten Wärme kann sich die Qualität der Tinte schnell verschlechtern. • Druckköpfe haben kurze Betriebszeiten. • Weil der Wasserinhalt der Düse verdampft, kann die Düse durch Austrocknen leicht verstopfen.

https://www.keyence.de/mykeyence/?ptn=001

PDF is provided