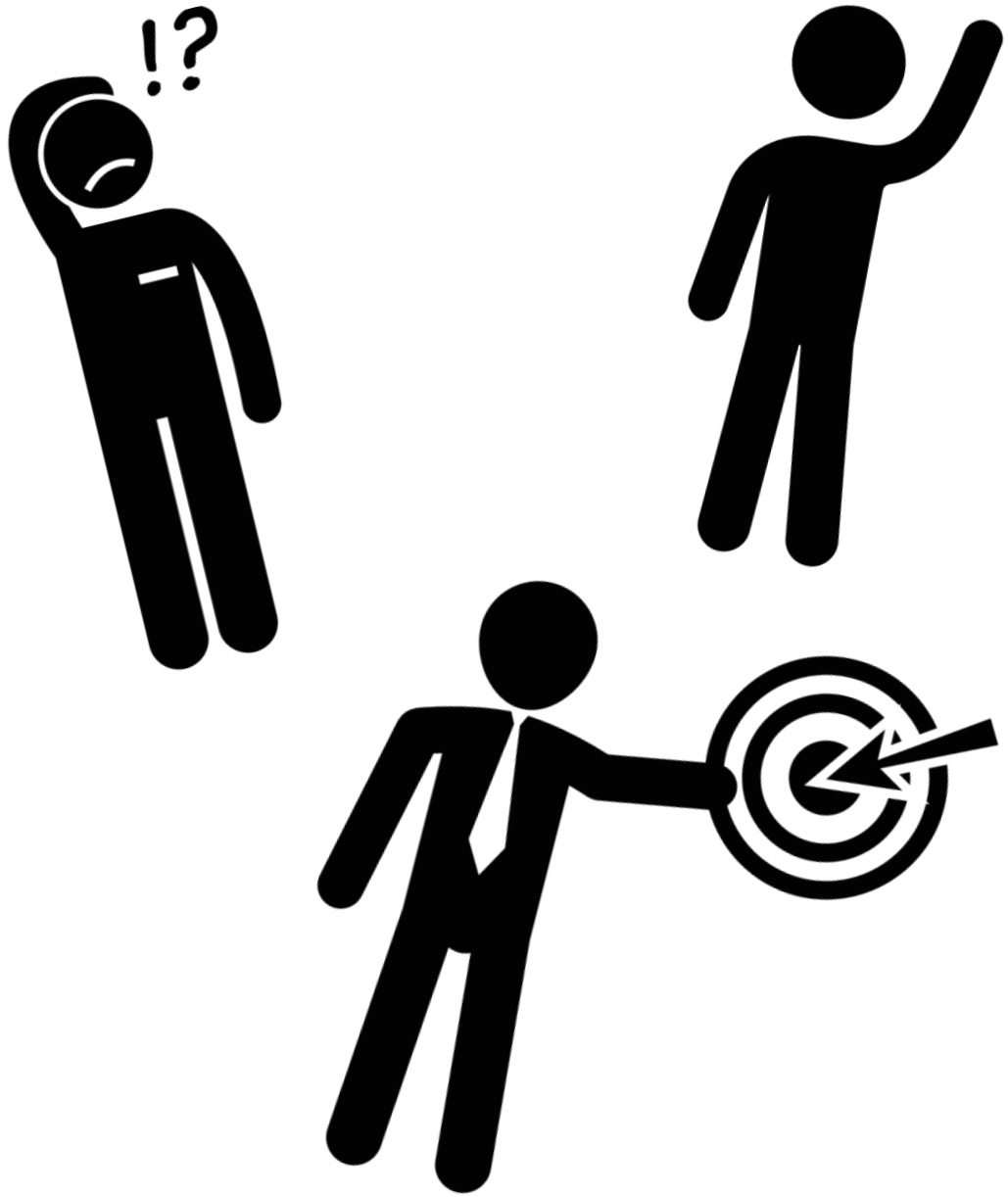
Razvijanje vještina kroz rad s mikrokontrolerima

Ivan Došlić

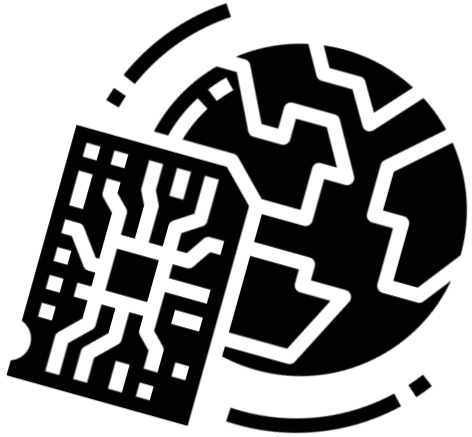
Kratak uvod

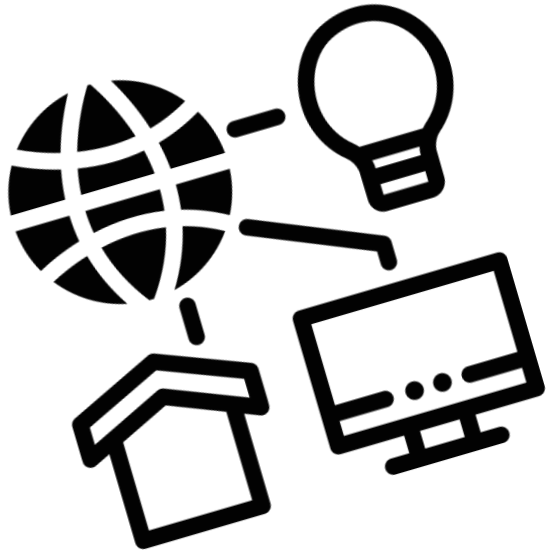
- Tko sam ja?
- Zašto sam ovdje?
- Koji je cilj današnjeg predavanja?
  - Zašto ja to vama pričam?



Moderni svijet

- Danas (gotovo) sve koristi neke elektroničke komponente
- Sve je povezano putem interneta (IoT)



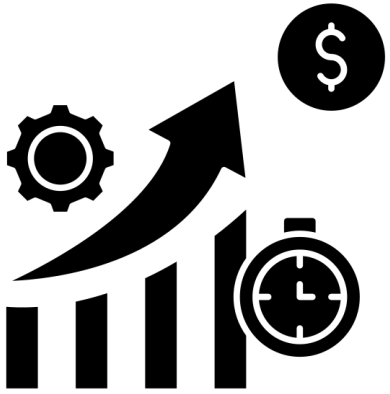


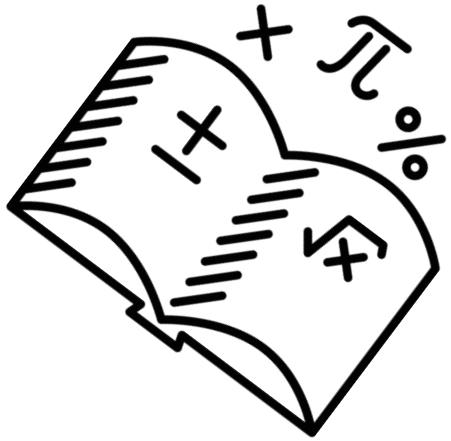
Gabe Newell,
osnivač tvrtke Valve, kreator “Half Life” video igre

The programmers of tomorrow are the wizards of the future. You’re going to look like you have magic powers compared to everybody else.”

“Niska” razina = Najviše sposobnosti

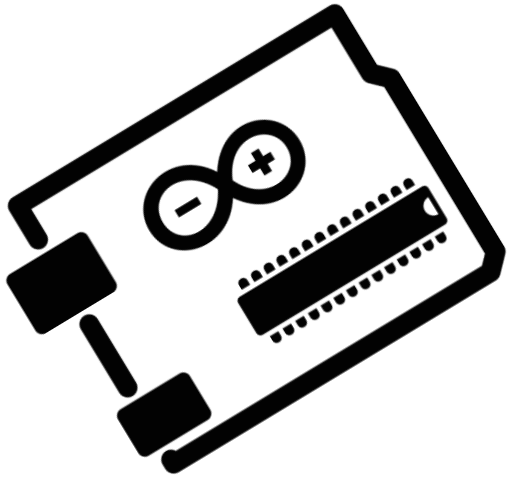
- Elektronika, binarni brojevi, digitalna logika
- **MATEMATIKA**
- Performanse, cijena, vrijeme

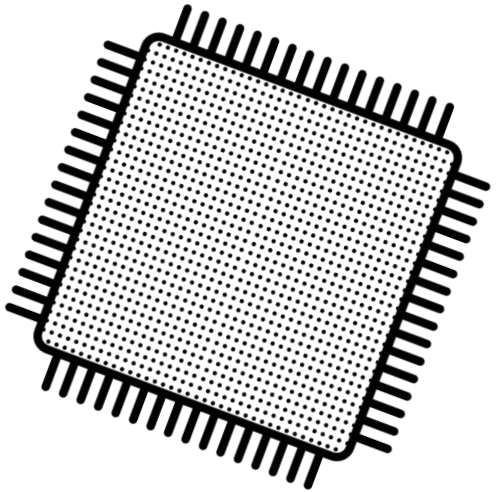




Mikroupravljači i mikroprocesori

Što je mikroupravljač?





Što je mikroprocesor?

S. F. Barrett; D. J. Pack:
Microcontrollers fundamentals for engineers and scientists

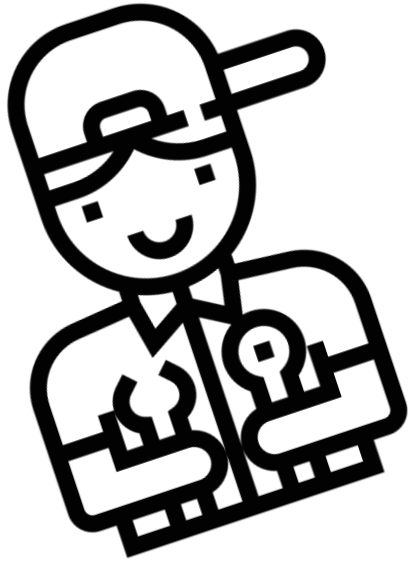
Mikroupravljač je u svojoj osnovnoj izvedbi cijeli računalni sustav sadržan u jednom integriranom krugu.

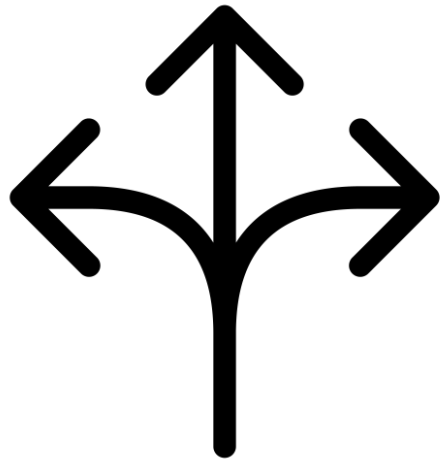
HRVATSKA ENCIKLOPEDIJA,
***mrežno izdanje*, Leksikografski zavod Miroslav Krleža**

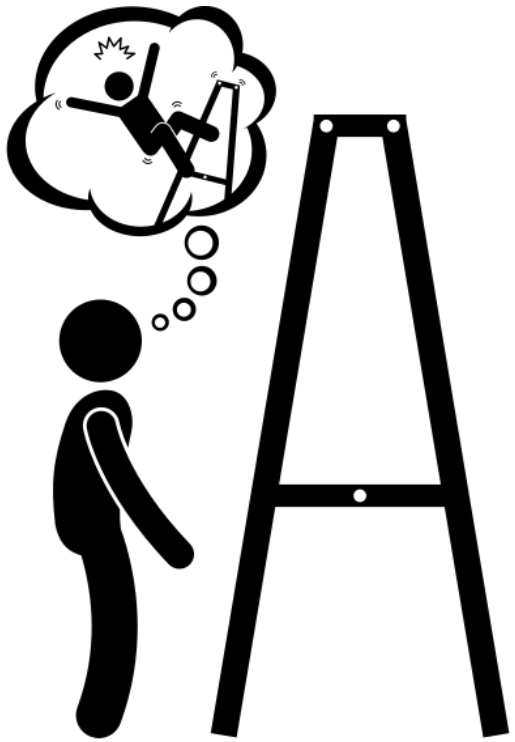
Mikroprocesor, integrirani sklop koji u računalima provodi aritmetičke i logičke operacije, danas se sve češće naziva samo *procesor*.

Gdje i kako početi?

- “Idealan put”
  - Ne postoji!
- Projekti
  - Mali? Veliki?
  - Nije bitno

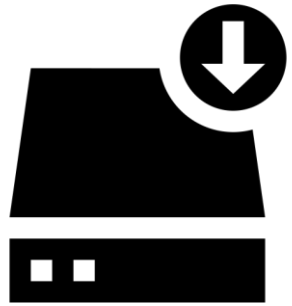






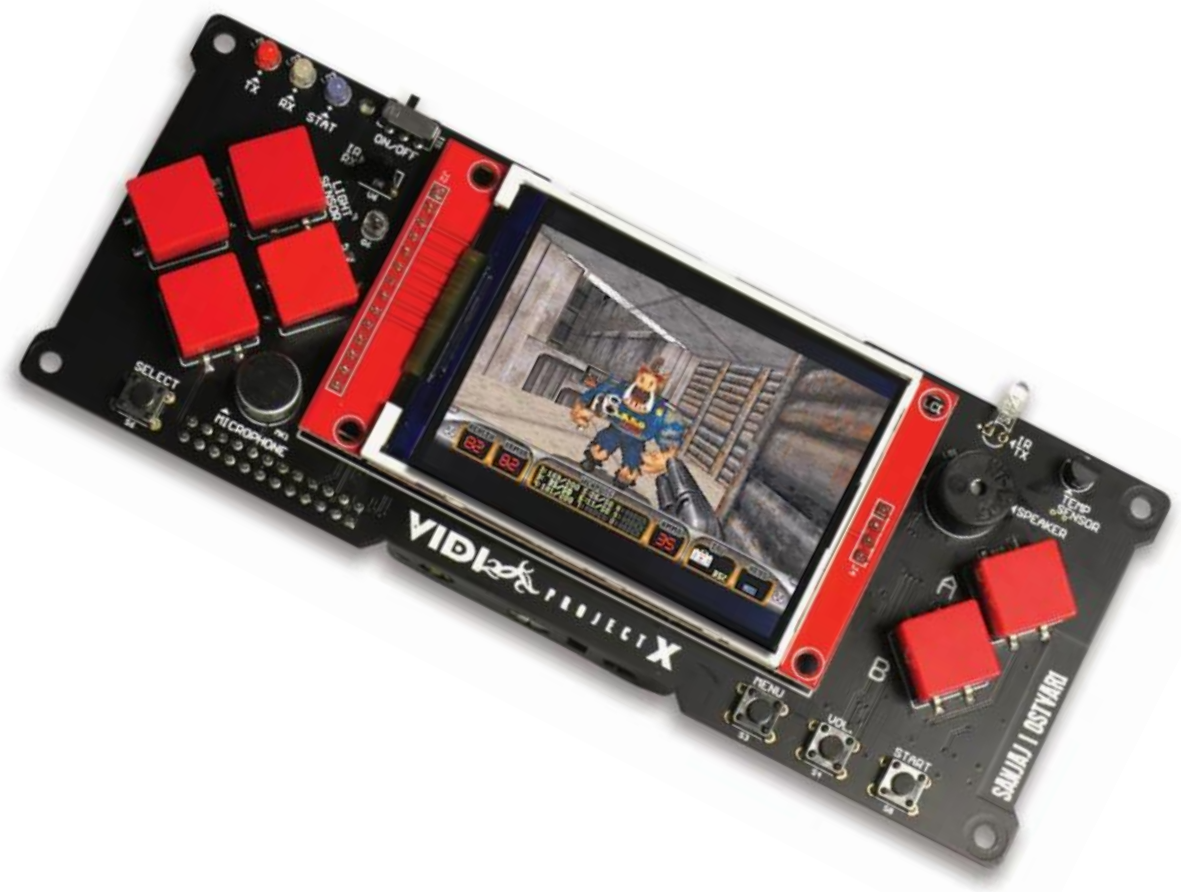
Radionica: početak

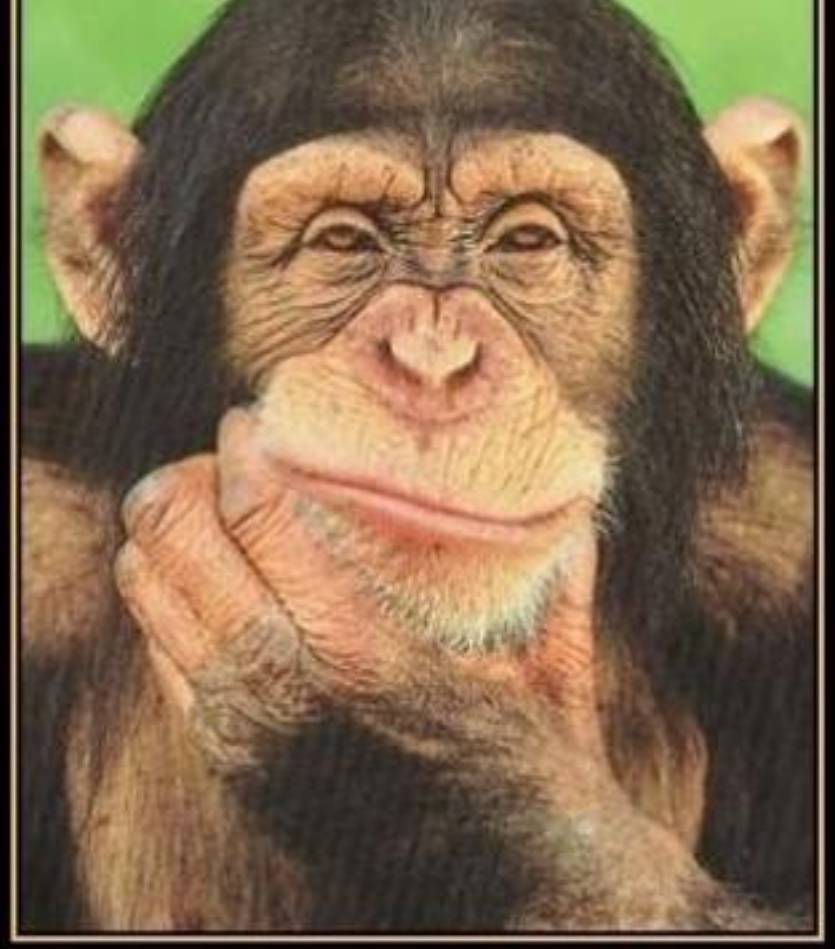
- Uređaj na kojemu možemo crtati
- Spremiti slike na prenosivi mediji
  - SD Kartica
- Ukratko: Želimo “*izmisliti*” snimak zaslona (eng. screenshot)



Alati i resursi

- Vidi-X razvojno mikroračunalo
- Internet
- Znanje iz srednje škole





THINKING

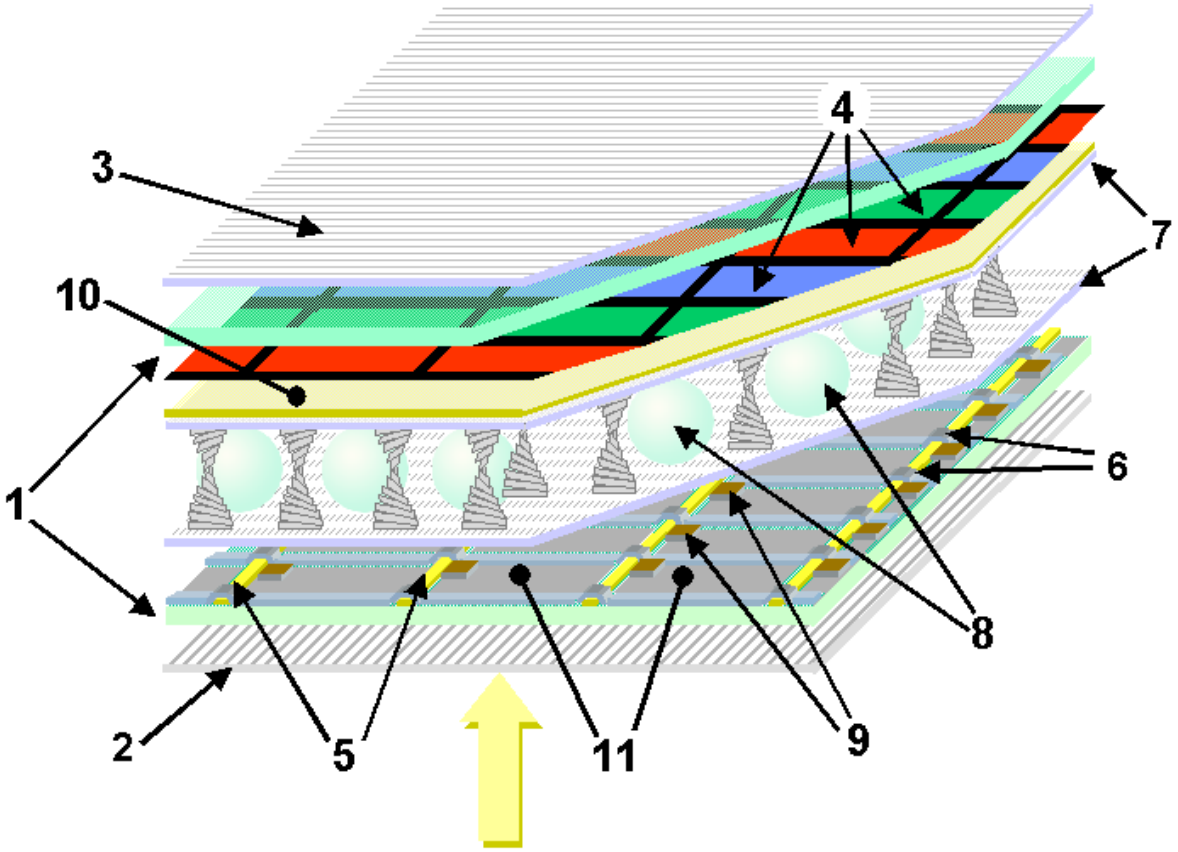
THE HARDEST WORK THERE IS,
WHICH IS PROBABLY THE REASON
SO FEW ENGAGE IN IT.

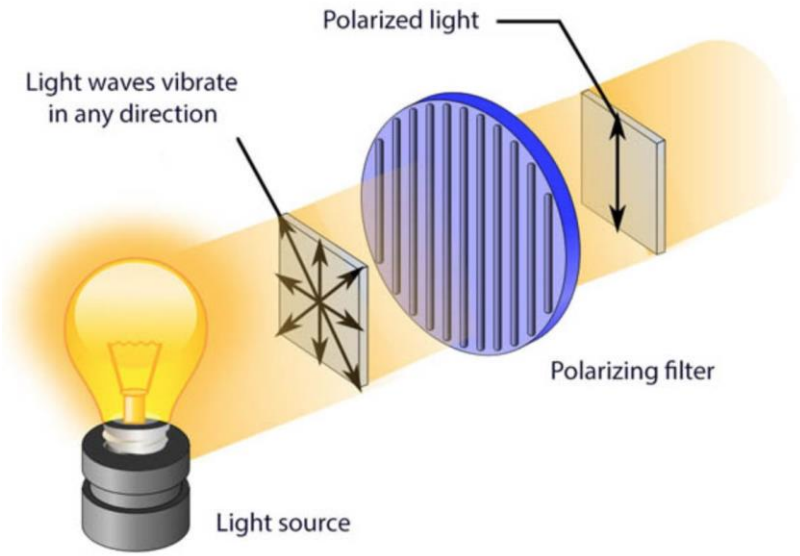
HENRY FORD

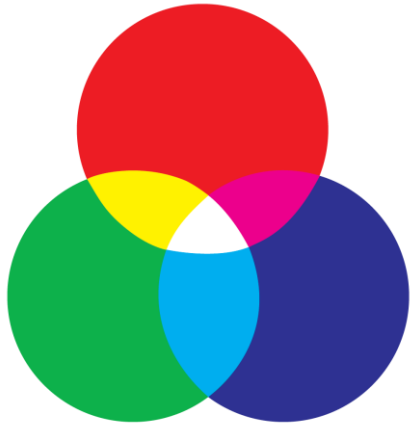
Zaslon (eng. *display*)

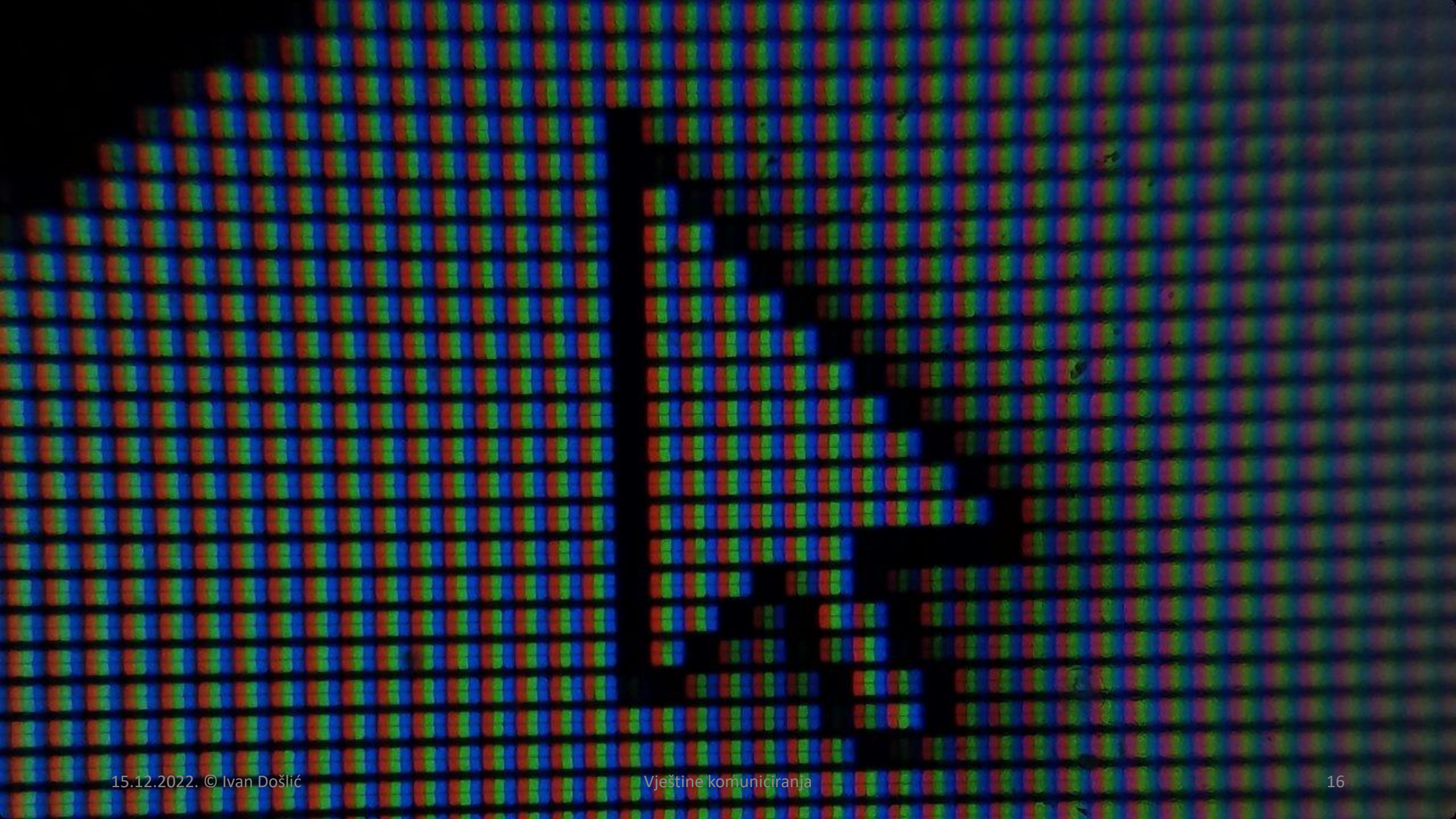
- Što je display?
- Opći podaci
- Kako radi display?

Kako radi naš display?



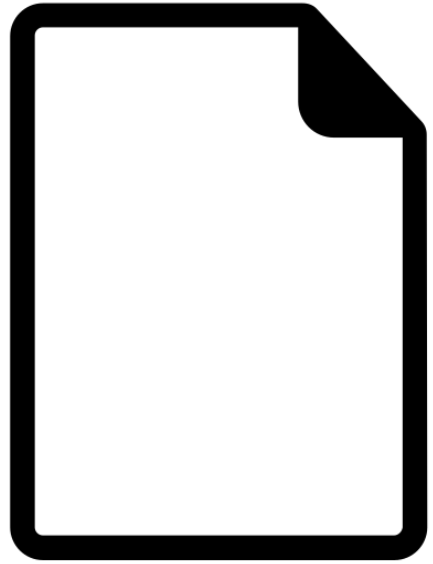






Portable bit map Format (.pbm)

- Zaglavlje:
  - P1
  - Širina x visina
- Podaci:
  - 0 0 0 0 1 1 1 1 0 1 1 1 1 0 1 1 1 1 0 0
  - 0 0 0 0 1 0 0 0 0 1 0 0 0 0 1 0 0 0 1 0
  - 0 0 0 0 1 1 1 1 0 1 1 1 1 0 1 0 0 0 1 0
  - 0 0 0 0 1 0 0 0 0 1 0 0 0 0 1 1 1 1 0 0
  - 0 0 0 0 1 0 0 0 0 1 1 1 1 0 1 0 0 0 1 0



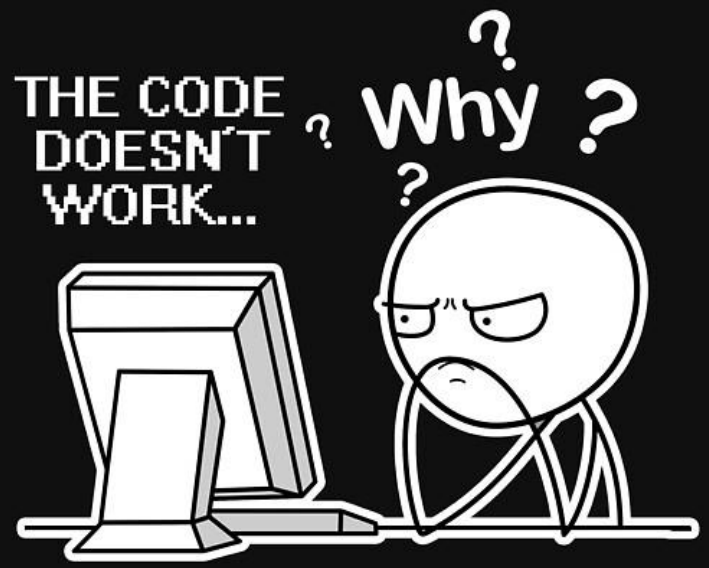
Crtanje?

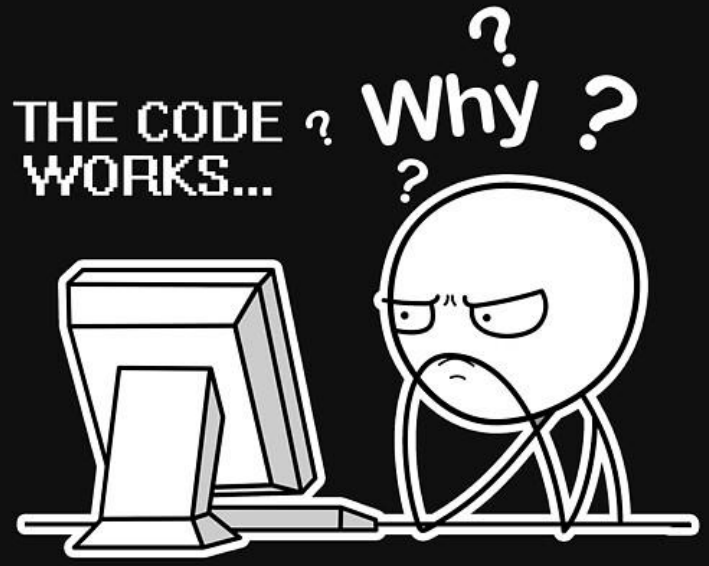
- XPT2046
  - Dokumentacija
  - Primjeri kod drugih programera
- Kako ćemo mi to napraviti?

Pohrana podataka

- SD memorijska kartica
- Napravljeno po uzoru rada s datotekama u C programskom jeziku
- ***SERIJSKA KOMUNIKACIJA***

Programsko rješenje i rezultat





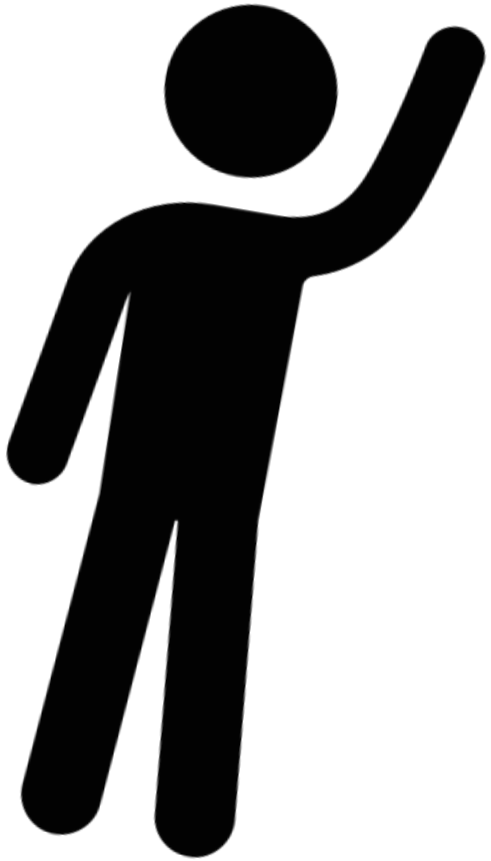
http://bit.ly/3FVJ8px

Nastavak dalje?

- Uključite se u neka natjecanje, projekte i sl.
  - nastavnici uvijek imaju nešto zanimljivo
- Započnite vlastiti hobby projekt

- Ako bude poteškoća?
  - Slobodno mi se obratite

Hvala!



doslicivan03@gmail.com

ivandoslic

ivandoslic

Slike

- noun-hello https://thenounproject.com/icon/hello-1201389/ Adrien Coquet
- noun-confused https://thenounproject.com/icon/confused-staff-2767111/ Gan Khoon Lay
- noun-goal https://thenounproject.com/icon/goal-210092/ Fiona OM
- noun-electronics-globe https://thenounproject.com/icon/electronics-3382176/ monikk
- noun-iot https://thenounproject.com/icon/iot-5368223/ Zulfa Mahendra

- noun-quote https://thenounproject.com/icon/quote-2409468/ Adrien Coquet
- noun-signal https://thenounproject.com/icon/signal-1862733/ Adrien Coquet
- noun-arduino https://thenounproject.com/icon/arduino-34403/ uizin
- noun-microprocessor https://thenounproject.com/icon/microprocessor-2477970/ Med Marki
- noun-academic https://thenounproject.com/icon/academic-2908663/ MRK

- noun-engineer https://thenounproject.com/icon/engineer-5323471/ Danil Polshin
- noun-einstein https://thenounproject.com/icon/einstein-2884542/ Hadi
- noun-encyclopedia https://thenounproject.com/icon/encyclopedia-3807283/ Kmg Design
- noun-binary https://thenounproject.com/icon/binary-2187383/ Kiran Shastry
- noun-math https://thenounproject.com/icon/math-186400/ hunotika

- noun-efficiency https://thenounproject.com/icon/efficiency-5139511/ ToZIcon
- noun-split https://thenounproject.com/icon/split-1942834/ Deemak Daksina
- noun-mechanic https://thenounproject.com/icon/mechanic-workshop-2311182/ Eucalyp
- noun-caution https://thenounproject.com/icon/caution-1919538/ Gan Khoon Lay
- noun-on-fire https://thenounproject.com/icon/on-fire-39807/ Laurent Vanivet

- noun-draw https://thenounproject.com/icon/draw-1288660/ Iconstock
- noun-save https://thenounproject.com/icon/save-1132063/ Devendra Karkar
- noun-display https://thenounproject.com/icon/display-3171234/ Flatart
- tftDisplaySturcture https://en.wikipedia.org/wiki/Thin-film_transistor#/media/File:Color_TFT-LCD_Layout.png
- lightPolarization https://renventura.github.io/light-polarization/images/vertical-polarization.jpg

- rgb https://smallseo.tools/uploads/rbg.png
- rgbOnScreen https://www.quora.com/How-exactly-does-a-computer-create-an-image-on-the-screen?share=1
- noun-file https://thenounproject.com/icon/file-341912/ Viktor Vorobyev
- xptImage https://esphome.io/_images/xpt2046-full.jpg
- codeWorksCodeDoesntWork https://ih1.redbubble.net/image.893783142.1366/raf,750x1000,075,t,101010:01c5ca27c6.jpg

- vsCOdeLogo https://user-images.githubusercontent.com/674621/71187801-14e60a80-2280-11ea-94c9-e56576f76baf.png
- arduinoLogo https://cdn.freebiesupply.com/logos/large/2x/arduino-1-logo-png-transparent.png
- noun-mail https://thenounproject.com/icon/envelope-1555614/ Arafat Uddin
- linkedInLogo https://sguru.org/wp-content/uploads/2018/02/linkedin-png-linkedin-icon-1600.png
- noun-github https://thenounproject.com/icon/github-4289652/ Guillaume Beaulieu

Literatura

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- Razavi, Behzad; *Principles of Data Conversion System Design;* IEEE Press, 1995.
- Baker, R. Jacob, Li, Harry W., Boyce, David E., *CMOS Circuit Design, Layout, and Simulation*, 1st Edition (IEEE Press Series on Microelectronic Systems)
- TFT_eSPI documentation (https://github.com/Bodmer/TFT_eSPI/blob/master/TFT_eSPI.cpp)
- ODROID-GO documentation (https://github.com/VIDI-X/ODROID-GO-Library)