Computing Intro to CHIPS STEM Education for Everyone Project Ideas

August 7, 2023

Discover the keystone of computing education with the 6502 microprocessor! This unsung hero of technology was the driving force behind the computers that ignited the digital revolution. It powered the first machines to offer personal computing, democratizing access to technology and opening up a world of possibilities for education.

The 6502 microprocessor played a crucial role in the formative years of computing, transforming how we learn, innovate, and communicate. It has set the scene for an era of exploration and curiosity, empowering students and teachers alike to delve into the world of computer science.

Today, as we stand on the brink of the future, the 6502 serves as a potent reminder of our journey and a unique learning tool. It offers a direct, tangible connection to our digital heritage, a window into the fundamental principles that underpin modern computing. With the 6502, students aren't just learning about technology - they're experiencing the thrill of understanding and interacting with the bedrock of the digital age.

The 6502 microprocessor isn't just a relic of the past - it's an active vehicle for exploration, learning, and inspiration. It links the pioneering spirit of early computing with the potential of future generations, igniting passion and curiosity in those who dare to delve deeper.

Join us in celebrating the enduring impact of the 6502 microprocessor in education. From the classrooms of the past to the virtual learning environments of the future, the 6502 continues to inspire, educate, and empower. Together, let's keep the spirit of innovation alive and shape a future where everyone can understand and harness the power of technology."

Since 1981, WDC's CMOS microprocessor IP is and has been continuously available under a WDC bilateral NDA and TLA for commercial opportunities. WDC was the first company to create and pioneer the microprocessor IP business and fabless semiconductor business models for microprocessors. WDC's business models eliminated the need for "second sourcing".

Since 2011, The Bill and Dianne Mensch Foundation, Inc. a not-for-profit Arizona corporation's mission is to enrich Computer Science and Engineering (CSE) education. WDC's 6502 Microprocessor systems technology with Chips, Boards and IP is part of that mission in partnering with WDC. WDC's source IP is made available under a WDC bilateral NDA and TLA.

WDC is an Edtech company with WDC 6502 Microprocessor Chips, Boards and IP. WDC's Edtech is available for global learning opportunities at the cross section of technology, interactive hands-on experience and project based personalized learning methodologies.

WDC doesn't provide supervision, assessment or certification of learning accomplishment. We support educators with education partners like Cadence EDA Tools, Arm Artisan Physical IP, and CMC Support and access for computing resources, tools, & fabs. CHIPS for America educators will experience first-hand, teach, supervise, assess and certify learning accomplishments use of WDC's 6502 Edtech.

Our Edtech support provides 6502 systems support and enables solderless breadboard, PCB, FPGA and VLSI Chip design. VLSI Chip design professors and students can either design our individual chips currently in production at TSMC, Verilog RTL equivalent, or combination of modules for FPGA SOC and/or VLSI SOC design projects.

WDC will continue to make available, as requested, information and tours of WDC's 6502 Museum and Archives – **the birthplace of the digital revolution**. WDC supports PreK-6 educational and learning opportunities with the low-cost MENSCH™ Microcomputer and *free* WDCTools platform for using the USPTO Camp Invention entrepreneur and innovation concepts.

"Textbook" or online information and design projects are educators' responsibilities. For educators that teach tape-out design, the professor should prove their design through tapeout services and then make their tapeout chips available for students test and evaluation labs.

The neo-retro computers feature set is strongly related to the early 8-bit computers, see TheMenschFoundation.org (TMF) for more supporting information. Our 8-bit and 8/16-bit edtech features are meant for learning about Sensing, Processing, Communicating and Actuating (SPCA) microcontroller projects.

When VLSI educators' experience their successful tapeout and final chip test and evaluation, the educator will be in a good position to assess and certify their students' success in VLSI Design, tapeout procedures and final chip test and evaluation. This idea reduces the cost of requiring an actual tapeout beyond the educators' tapeout by making available chips to students for test and evaluation.

Suggested CSE SPCA project ideas for educators and self-motivated student independent learners. Suggested sources for educational expansion **modules** are SparkFun, SeeedStudio, and MikroElectronika and our distributors found at WDC65xx Where to Buy and WDC6502Store.

PreK-6 grade level Project Ideas aligned with the USPTO Camp Invention Concept

1) MENSCH™ Microcomputer + Solderless Breadboard + Modules
2) WDCTools for Assembly and C Language student projects

EDU Board Hardware Features for Student Small System Project Ideas

3) I2C Qwiic, Grove and Click connectors for module expansion
4) Click SPI for modules expansion
5) W65C51N UART for communications module expansion
6) W65C22S VIA for parallel interface for module expansion
7) 128x64 OLED I2C bus display

Student Small Systems Project Ideas

8) W65C02SXB + W65C02EDU + Modules
9) W65C816SXB + W65C816EDU + Modules
10) W65C134SXB + custom PCB or solderless breadboard + Modules
11) W65C265SXB + custom PCB or solderless breadboard + Modules

GDSII Chip Design with WDC Retargetable Design Rules + WDC Procedures Project Ideas

12) W65C02S 8-bit DIP40/QFN44 Microprocessor
13) W65C816S 8/16-bit DIP40/QFN44 Microprocessor
14) W65C21S 8-bit DIP40/QFN44 PIA
15) W65C22S 8/16-bit DIP40/QFN44 VIA
16) W65C51N 8-bit DIP40/QFN44 ACIA
17) W65C134S 8-bit QFN80 SOC
18) W65C265S 8/16-bit QFN100 SOC

RTL-to-FPGA Design with Intel MAX10 MyMENSCH™ Rev-C Project Ideas

19) W65C02SOC40 FPGA 8-bit IoT SOC on MyMENSCH™ + W65C02PRO + Modules
20) W65C02i1M08SA FPGA 8-bit SOC on MyMENSCH™ + Modules
21) W65C165i1M08SA FPGA 8-bit IoT SOC on MyMENSCH™ + W65Cx65PRO + Modules
22) W65C816i1M16SA FPGA 8/16-bit SOC 8/16-bit on MyMENSCH™ + Modules

RTL-to-GDSII Chip Design with ARM Libraries Project Ideas

23) W65C02SOC40 DIP40/QFN44 8-bit IOT SOC
24) W65C02SOC100 QFN100 8-bit (W65C165i1M08SA) IOT SOC
25) W65C02R 8-bit DIP40/QFN44 Microprocessor
26) W65C816R 8/16-bit DIP40/QFN44 Microprocessor
27) W65C21R 8-bit DIP40/QFN44 PIA
28) W65C22R 8/16-bit DIP40/QFN44 VIA
29) W65C51R 8-bit DIP40/QFN44 ACIA
30) W65C52R 8-bit DIP40/QFN44 UARTx2, I2C and SPI