Hes·so VALAIS WALLIS

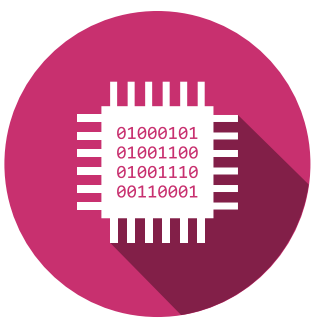
School of Engineering

Digital Design (DiD)

Video Graphics Array

VGA

Systems Engineering program
Energy and Environmental Engineering program
Information and Communication Systems program



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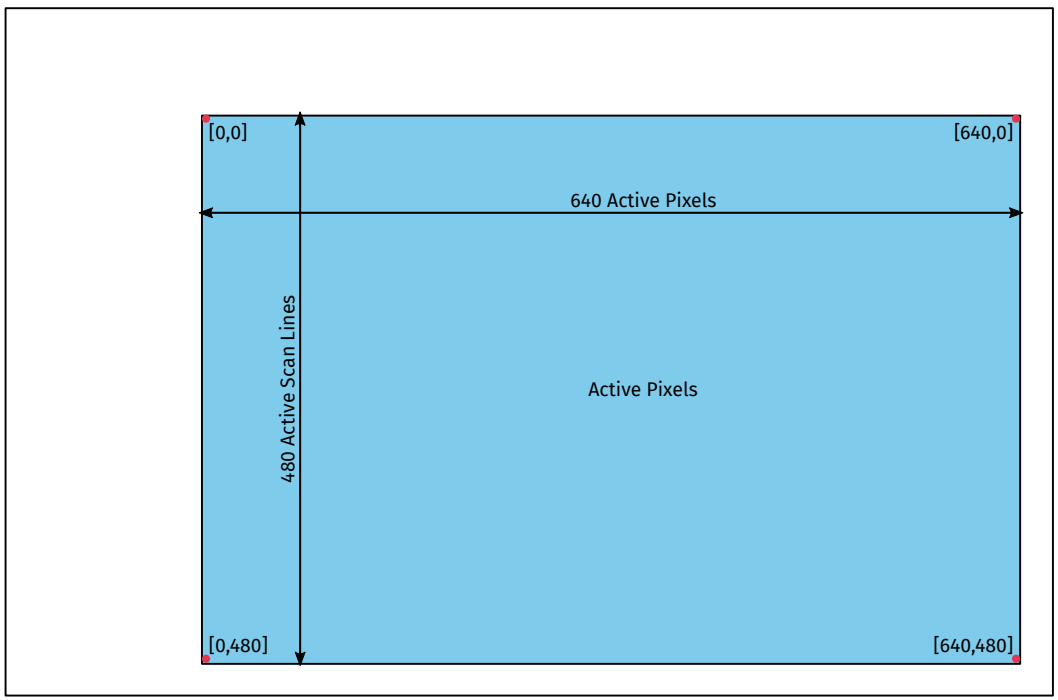
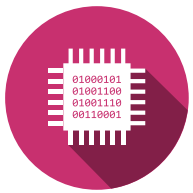
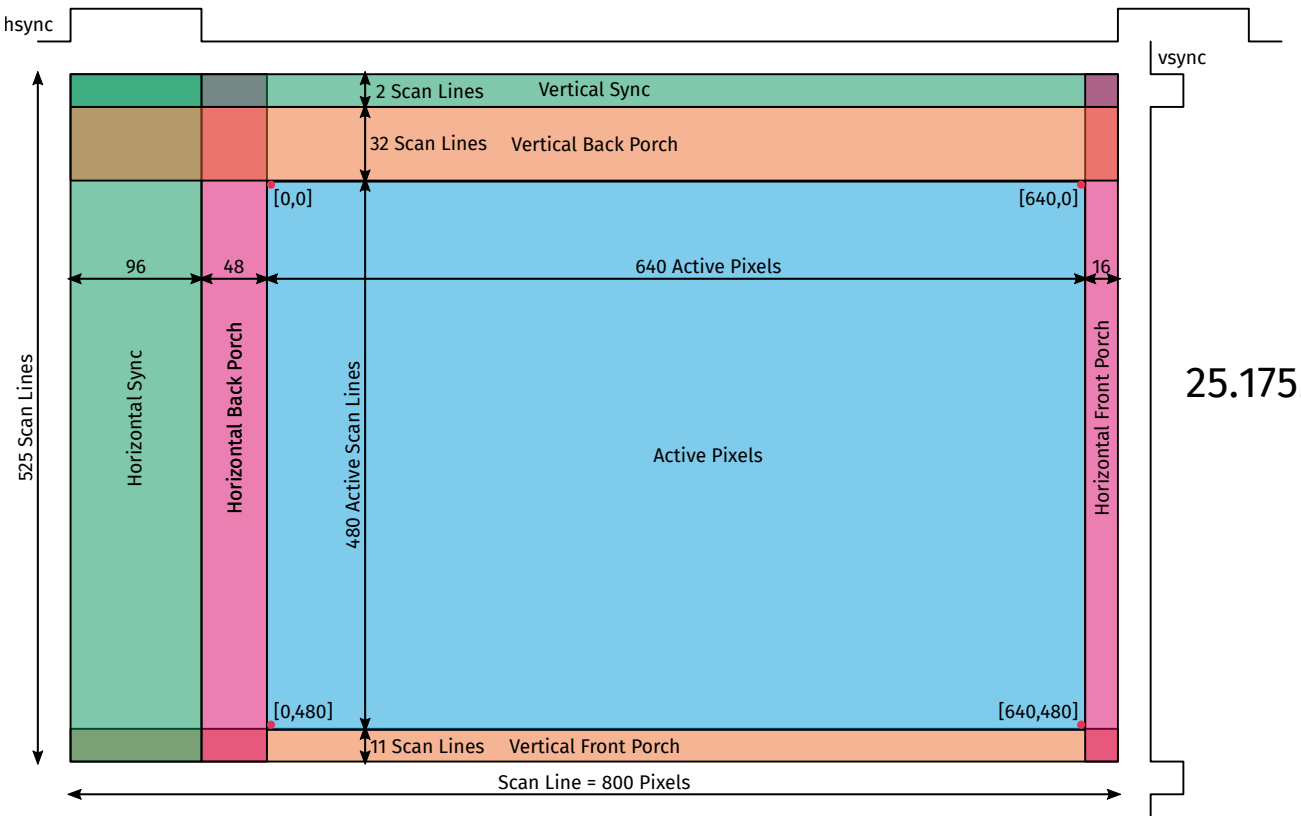
VGA Example 640px x 480px



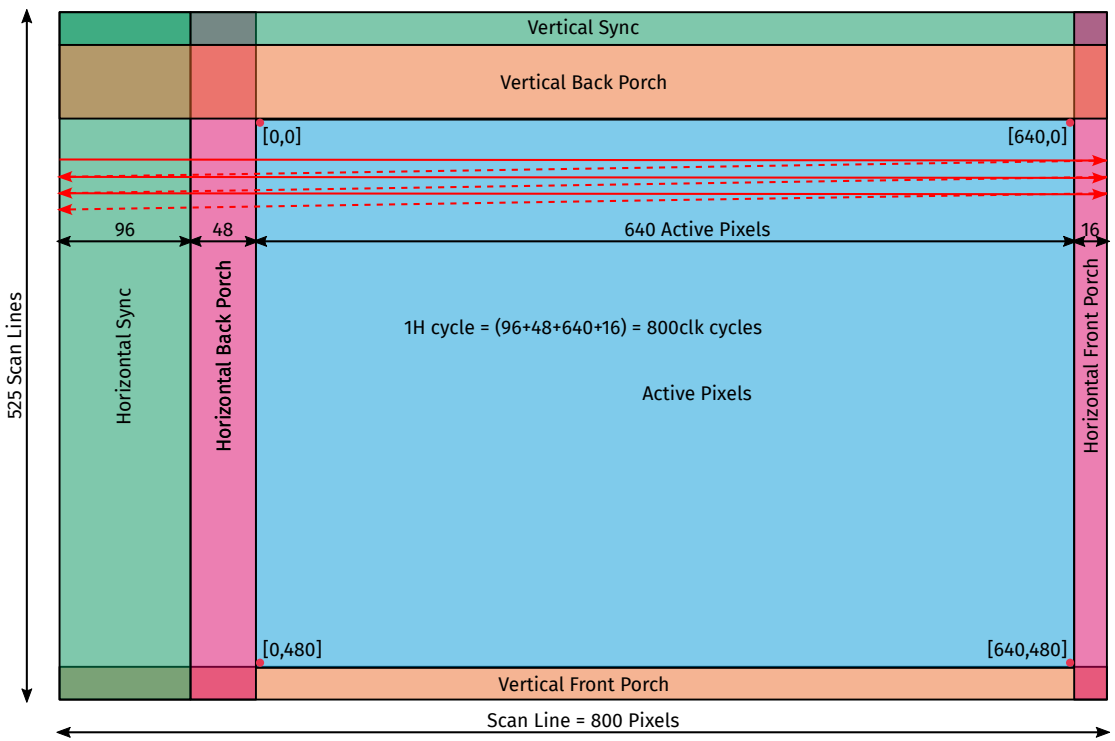
VGA Example 640px x 480px



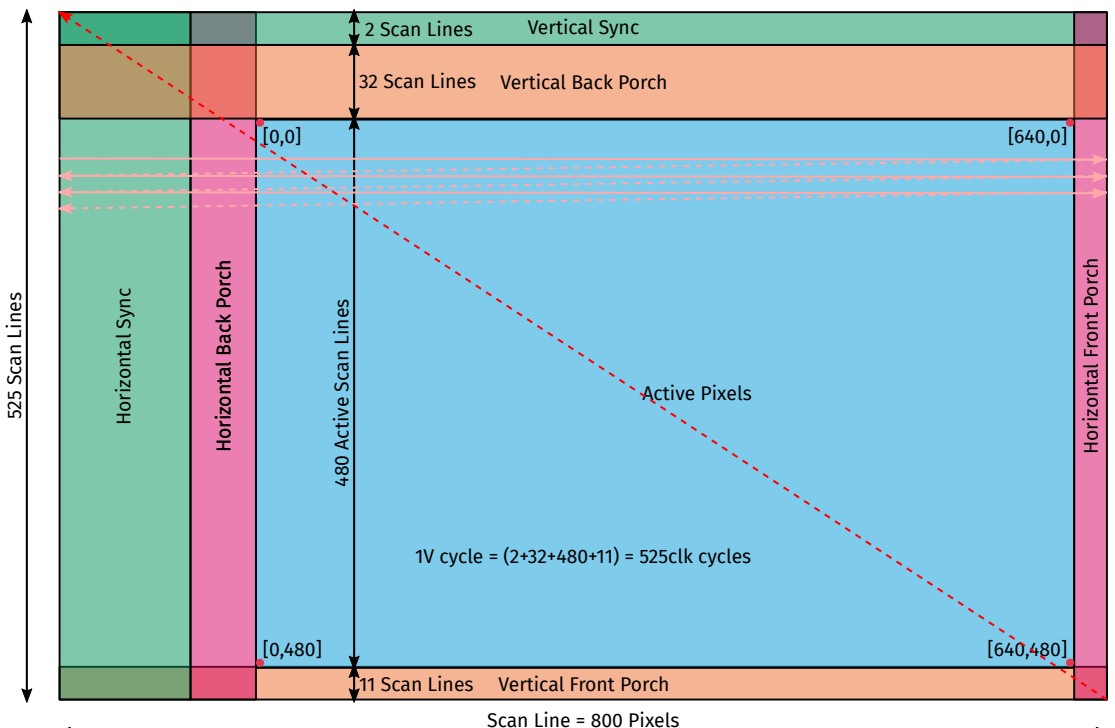


25.175MHz Clock Rate

VGA Example 640px x 480px

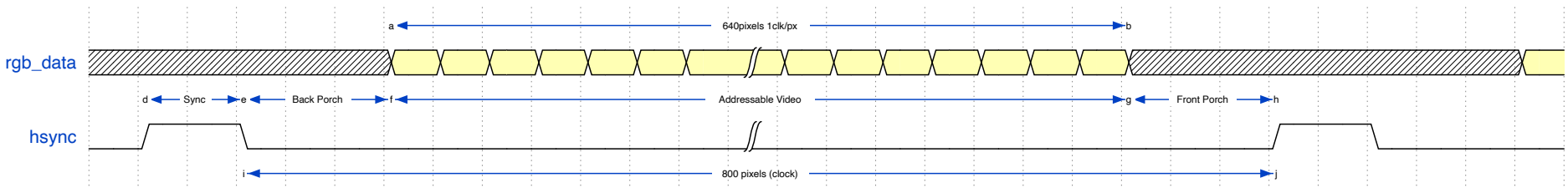


VGA Example 640px x 480px



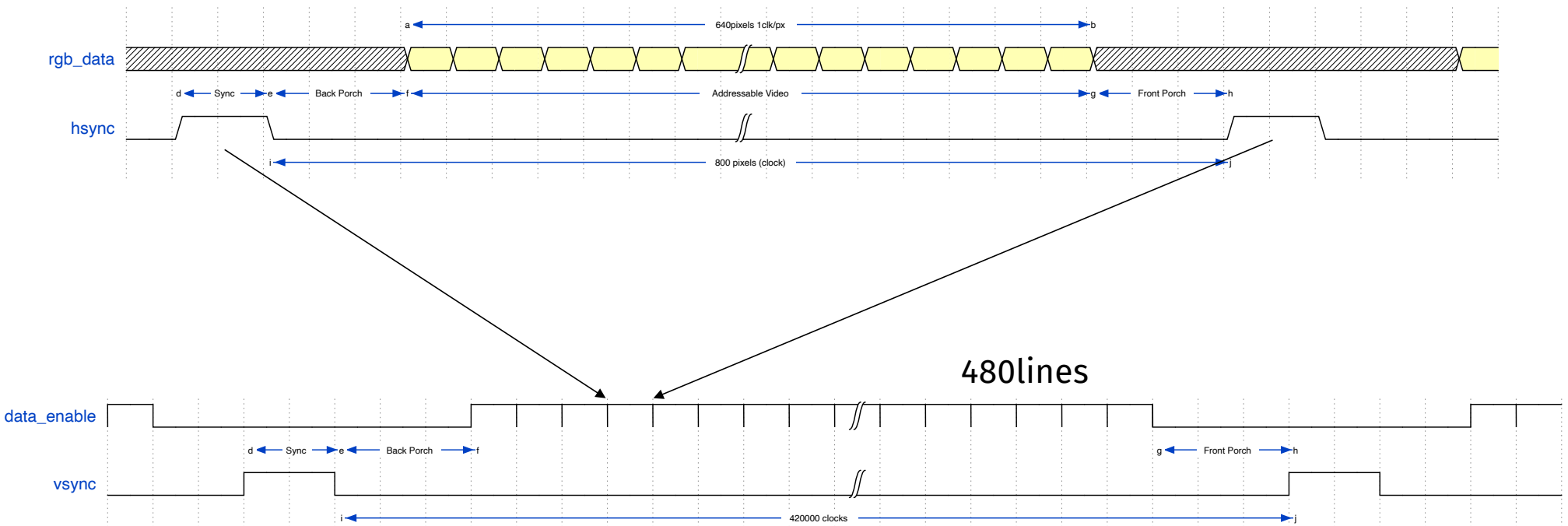
VGA Timing 640px x 480px

Horizontal



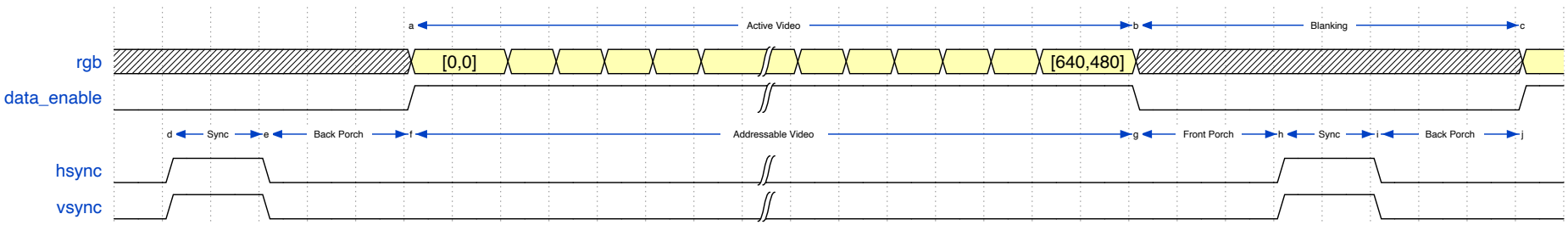
VGA Timing 640px x 480px

Vertical



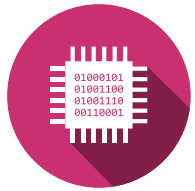
VGA Timing 640px x 480px

Simplified waveform



VGA Timing 640px x 480px

Refreshrate

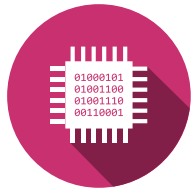


$$800\frac{clocks}{line\ (H)} * 525\frac{lines\ (H)}{frame\ (V)} * \frac{1}{25.175E6\frac{clocks}{sec}} = 0.0166\frac{sec}{refresh}$$

$$59.94Hz\ refresh\ rate$$

VGA Timing

Common Timings



http://www.tinyvga.com/vga-timing

VGA 640x480p60

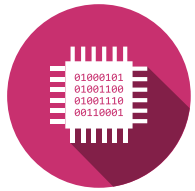
Aspect Ratio	4:3	
Active Pixels	307,200	
Pixel Clock	25.175	MHz
Pixel Time	39.7	ns ±0.5%
Horizontal Freq.	31.469	kHz
Line Time	31.8	µs
Vertical Freq.	59.940	Hz
Frame Time	16.7	ms
Horizontal Timings		
Active Pixels	640	
Front Porch	16	
Sync Width	96	
Back Porch	48	
Total Pixels	800	
Vertical Timings		
Active Lines	480	
Front Porch	10	
Sync Width	2	
Back Porch	33	
Total Lines	525	

SVGA 800x600p60

Aspect Ratio	4:3	
Active Pixels	480,000	
Pixel Clock	40.000	MHz
Pixel Time	25.0	ns ±0.5%
Horizontal Freq.	37.897	kHz
Line Time	26.4	µs
Vertical Freq.	60.317	Hz
Frame Time	16.6	ms
Horizontal Timings		
Active Pixels	800	
Front Porch	40	
Sync Width	128	
Back Porch	88	
Total Pixels	1056	
Vertical Timings		
Active Lines	600	
Front Porch	1	
Sync Width	4	
Back Porch	23	
Total Lines	628	

VGA Timing

Common Timings



http://www.tinyvga.com/vga-timing

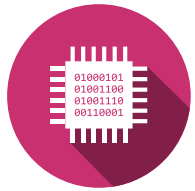
HD 1280x720p60

Aspect Ratio	16:9	
Active Pixels	921,600	
Pixel Clock	74.250	MHz
Pixel Time	13.5	ns ±0.5%
Horizontal Freq.	45.000	kHz
Line Time	22.2	µs
Vertical Freq.	60.000	Hz
Frame Time	16.7	ms
Horizontal Timings		
Active Pixels	1280	
Front Porch	110	
Sync Width	40	
Back Porch	220	
Total Pixels	1650	
Vertical Timings		
Active Lines	720	
Front Porch	5	
Sync Width	5	
Back Porch	20	
Total Lines	750	

FHD 1920x1080p60

Aspect Ratio	16:9	
Active Pixels	2,073,600	
Pixel Clock	148.5	MHz
Pixel Time	6.7	ns ±0.5%
Horizontal Freq.	67.500	kHz
Line Time	14.8	µs
Vertical Freq.	60.000	Hz
Frame Time	16.7	ms
Horizontal Timings		
Active Pixels	1920	
Front Porch	88	
Sync Width	44	
Back Porch	148	
Total Pixels	2200	
Vertical Timings		
Active Lines	1080	
Front Porch	4	
Sync Width	5	
Back Porch	36	
Total Lines	1125	

References

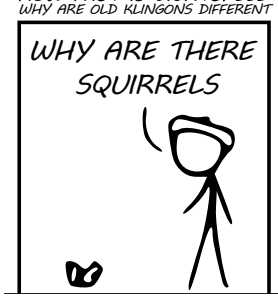


- [ee3921] (English) VGA Basics
  https://faculty-web.msoe.edu/johnsontimoj/EE3921/files3921/vga_basics.pdf
- [vesa] (English) VESA and Industry Standards and Guidelines for Computer Display Monitor Timing (DMT)
  https://glenwing.github.io/docs/VESA-DMT-1.13.pdf

QUESTIONS

CAN BE ASKED BY ANYONE ANYTIME

WHY ARE THERE MIRRORS ABOVE BEDS
WHY DO I SAY UH
WHY IS SEA SALT BETTER
WHY ARE THERE TREES IN THE MIDDLE OF FIELDS
WHY IS THERE NOT A POKEMON MMO
WHY IS THERE LAUGHING IN TV SHOWS
WHY ARE THERE DOORS ON THE FREEWAY
WHY ARE THERE SO MANY SVCHOST·EXE RUNNING
WHY AREN'T ANY COUNTRIES IN ANTARCTICA
WHY ARE THERE SCARY SOUNDS IN MINECRAFT
WHY IS THERE KICKING IN MY STOMACH
WHY ARE THERE TWO SLASHES AFTER HTTP
WHY ARE THERE CELEBRITIES
WHY DO SNAKES EXIST
WHY DO OYSTERS HAVE PEARLS
WHY ARE DUCKS CALLED DUCKS
WHY DO THEY CALL IT THE CLAP
WHY ARE KYLE AND CARTMAN FRIENDS
WHY IS THERE AN ARROW ON AANG'S HEAD
WHY ARE TEXT MESSAGES BLUE
WHY ARE THERE MUSTACHES ON CLOTHES
WHY WUBA LUBBA DUB DUB MEANING
WHY IS THERE A WHALE AND A POT FALLING
WHY ARE THERE SO MANY BIRDS IN SWISS
WHY IS THERE SO LITTLE RAIN IN WALLIS
WHY IS WALLIS WEATHER FORECAST ALWAYS WRONG
WHY ARE THERE MALE AND FEMALE BIKES
WHY ARE THERE BRIDESMAIDS
WHY DO DYING PEOPLE REACH UP
HOW FAST IS LIGHTSPEED
WHY ARE OLD KLINGONS DIFFERENT



WHY ARE THERE DINOSAUR GHOSTS
WHY IS THERE HELL IF

WHY DO IGUANAS DIE
WHY IS THERE CAFFEINE IN MY SHAMPOO
WHY HAVE DINOSAURS NO FUR
WHY ARE THERE TINY SPIDERS IN MY HOUSE
WHY DO SPIDERS COME INSIDE
WHY ARE THERE HUGE SPIDERS IN MY HOUSE
WHY ARE THERE LOTS OF SPIDERS IN MY HOUSE
WHY ARE THERE SPIDERS IN MY ROOM
WHY ARE THERE SO MANY SPIDERS IN MY ROOM
WHY DO SPYDER BITES ITCH
WHY IS DYING SO SCARY
WHY IS THERE NO GPS IN LAPTOPS
WHY DO KNEES CLICK

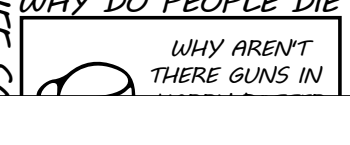
WHY DO TWINS HAVE DIFFERENT FINGERPRINTS
WHY ARE SWISS AFRAID OF DRAGONS
WHY ARE THERE FEMALE

WHY AREN'T ECONOMISTS RICH
WHY DO AMERICANS CALL IT SOCCER
WHY ARE MY EARS RINGING
WHY IS 42 THE ANSWER TO EVERYTHING
WHY CAN'T NOBODY ELSE LIFT THORS HAMMER
WHY IS MARVIN ALWAYS SO SAD
WHY ARE THERE ANTS IN MY LAPTOP
WHY IS EARTH TILTED
WHY IS SPACE BLACK
WHY IS OUTER SPACE SO COLD
WHY ARE THERE PYRAMIDS ON THE MOON
WHY IS NASA SHUTTING DOWN

WHY IS THERE LAVA
WHY IS THERE A SWARM OF ANTS
WHY IS THERE PILEGRIM
WHY IS THERE AN OWL IN MY BACKYARD
WHY IS THERE AN OWL OUTSIDE MY WINDOW
WHY IS THERE AN OWL ON THE DOLLAR BILL
WHY DO OWLS ATTACK PEOPLE
WHY ARE FPGA's EVERYWHERE
WHY ARE THERE HELICOPTERS CIRCLING MY HOUSE
WHY ARE THERE GODS
WHY ARE THERE TWO SPOCKS
WHAT IS https://xkcd.com/1256/
WHY DO THEY SAY T-MINUS
WHY ARE THERE OBELISKS
WHY ARE WRESTLERS ALWAYS WET

WHY IS HTTPS CROSSED OUT IN RED
WHY IS THERE A LINE THROUGH HTTPS
WHY IS THERE A RED LINE THROUGH HTTPS ON TWITTER
WHY IS HTTPS IMPORTANT
WHY IS YKK ON ALL ZIPPERS

WHY ARE THERE SO MANY CROWS IN ROCHESTER
WHY IS TO BE OR NOT TO BE FUNNY
WHY DO CHILDREN GET CANCER
WHY IS POSEIDON ANGRY WITH ODYSSEUS
WHY IS THERE ICE IN SPACE
WHY IS THERE AN OWL ON MY LAPTOP
WHY ARE MY BOOBS ITCHY
WHY ARE CIGARETTES LEGAL
WHY ARE THERE DUCKS IN MY POOL
WHY IS JESUS WHITE
WHY IS THERE LIQUID IN MY EAR
WHY DO Q TIPS FEEL GOOD
WHY DO PEOPLE DIE



WHY IS LIFE SO

WHY ARE THERE WEEKS
WHY DO I FEEL DIZZY
WHY ARE DOGS AFRAID OF FIR
WHY IS THERE NO KING IN E

Hes·so VALAIS WALLIS

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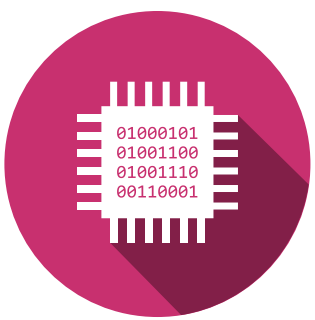
Hochschule für Ingenieurwissenschaften



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