Embed system

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Video 1.

Arduino opta

arduino opta is a plc (programmable logic controller)
It is easy to code
has std inputs and outputs
& can do simple tasks

It is mostly used in industrial section to control machineries

Video 2.

Using various transistor to amp audio

Darlington and mosfet transistors were used to see which amps sound better
although using mosfet gave the loudest sound darlington had the most accurate output sound

Video 3.

I3c

i3c is faster
more power efficient
dynamic addressing
common command codes
Hot join
In band interrupt
but it's complicated

i2c is enough for haptic drivers & micro-controllers though it's an older version

Video 4.

Surge protection

TVS / MOV / GDT

TVS is small, easy to add & cheap
MOV can handle more energy and its graph is quite like a bidirectional tvs
GDT uses inert gas & only used for higher voltages and energy

Video 5.

Motor encoder

Rotary encoder / Magnetic encoder

Rotary encoder conductive and nonconductive plates create specific signals for clockwise & counter-clockwise using A,B

magnetic encoder as it's name uses a magnet. It can tell garbage value if there are stray magnetic field around

Motor encoders are used for precise positioning or synchronization. Simply using stepper motor might be a solution. But it is costly.

Video 6.

How ground protects us

Earth is a big chunk of 0 volt. Usually the ground wire is connected to the electronics metal chassis & when it meets with live wire, it creates a short circuit saving us from possible electrocution

Video 7.

Power inductor

Mostly talks about 3 types of inductors. Colour ring / copper wire coil / SMD version
Colour ring inductor works in low power applications. It's core is worse off than others. It's saturation value also decreases with heat
Nonetheless it's cheap & perfect for projects for students.

Video 8.

PFC(Power Factor Correction)

Passive PFC= power grid+ inductor + capacitor
PFC works to equalize reactive & apparent power, minimizes reactive power
It converts AC to Dc to do this

Video 9.
Resettable Fuse/Multifuse/polyfuse/polyswitch

Resettable fuses are cheap & as it name applies resettable. It works on medium V,I. So for a student to protect their circuit Resettable fuse is the best option

Video 10.

Latch Circuit

Latch circuit is a cheap & electronic way of making a switch. It uses 2 NOR gates.

Video 11.

Dual rail power supplies

It provides both positive and negative DC voltages, unlike typical power supplies that only offer a positive voltage.

It is used in audio amplifiers, sensors, operational amplifiers, ADCs, DACs, and LCDs.

Video 12.

Digital Potentiometer

Digital Potentiometer is like a circuit with Ics. It has only 100 different positions. It can also use microcontroller to control voltage & dimming of lights.

Video 13.

TL431

It is a 3-terminal parallel zener diode. It acts like a comparator. It's stable, programmable.
It regulates voltage by creating a stable reference voltage.

Video 14.

Oscilloscope

4 channel scope is enough. There are various types of scopes. A simple one is enough. It makes many electrical measurements easier.

Video 15.

eFuse

It gives protection from overvoltage, undervoltage, overcurrent & reverse voltage. This can also stop current if the temp rises too much

This efuse ic helps protect a circuit