

INDEX

- A22 ultrasonic sensor, 87, 90, 93
- acoustic, 70
- air pockets, 3
- Arduino, 74, 77
- Bayonet Neill–Concelman *see*
 - BNC
- BNC, 60
- butane gas, 71, 79–80
- camera images, 40
- catastrophic, 1–2, 11, 69
- CNN, 38
- concrete, 11
- convolutional neural networks *see*
 - CNN
- corrosion, 3
- crack detection, 38, 40
 - computer vision, 5, 39
 - design process, 42
 - heat conductivity, 40
 - image processing, 39
 - image-based, 40
 - infrared image, 40
 - laser image analysis, 41
 - ultrasonic imaging, 40
- deep learning, 40
- destructive testing, 55, 57, 59–40
- diffuse pressure, 19
- electrical resistivity
 - tomography, 4, 25–26, 30
- FLEX-INSPECT, 85, 93
- gas
 - leakage, 70–71, 78, 81
 - monitoring, 5
- GPR, 12, 57–58
- gripper mechanism, 76
- ground-penetrating radar *see*
 - GPR
- heat transfer, 15
- heterogeneous, 14
- homogeneous, 14, 29, 32
- hyperparameters, 43
- image processing, 40
- IMU, 87

- inertial measurement unit *see*
IMU
- infrared thermography, 5, 12,
40
- in-pipe inspection robots, 84
- laser-imaging, 41
- lower explosive limit, 71
- microcontroller, 74–76, 81, 87
 - wall thickness, 62
- mild, 47
- moderate, 47
- NDT, 1, 12, 25, 35, 55–56, 58,
66
 - circuit, 59
 - concrete assessment, 57
 - wall thickness, 66
- near-infrared, 15
- non-destructive testing *see* NDT
- non-invasive, 73
- OpenCV, 45, 87
- optical excitation, 17
- oscilloscope, 63–64
- PCB, 59–60
 - design process, 62
- photoacoustic pressure, 20
- photoacoustic tomography,
12–13
- photoacoustic wave, 20
- Pi Cam, 51
- Pipelines, 83–84
- pressure waves, 60
- printed circuit board *see* PCB
- Python, 91, 88
- Raspberry Pi, 44–45, 60, 85,
87, 91, 93
- Rayleigh-waves, 60
- SolidWorks, 89
- structural failure, 2
 - cracks, 3
 - voids, 3
- TEM, 56
- thermoelastic expansion, 20
- time-dependent solver, 18
- transmission echo method *see*
TEM
- ultrasonic sensor modules, 4,
12, 41, 60, 90,
- visual studio code, 42
- wave propagation, 17, 19
 - shear, 60
- X-ray, 58
- YOLOv8, 42