

# INDEX<sup>1</sup>

## A

Additive manufacturing, 16, 98–104, 119, 145  
Architecture, Engineering, Construction, And Operations (AECO), 84, 86, 88, 89, 139  
Artificial intelligence (AI), 42, 46, 47, 56, 70, 72, 73, 90, 146  
Augmented reality (AR), 90, 91

## B

Big area additive manufacturing (BAAM), 100  
Big Data, 16, 64, 70–78  
Blockchain, 42, 43, 145, 164–168  
Building information modelling (BIM), 12, 15, 28, 29, 40–47, 59, 63, 64, 72–75, 77, 78, 124, 144

Building Management Systems (BMS), 77  
Building performance simulation (BPS), 15, 54–64, 78  
Building simulation (BS), 54, 56–64

## C

CleanTech, 8  
Climate change, 2, 8–11, 78  
ClimateTech, 8  
Cloud service provider (CSP), 32  
Cobots, vii  
Co<sub>2</sub> emissions, 73, 99, 100, 104  
Crowdfunding, 17, 155, 159–165, 165n7, 167, 168  
Cyber-physical systems, 43, 145  
Cybersecurity, 17, 33, 40, 136–147, 161

<sup>1</sup>Note: Page numbers followed by ‘n’ refer to notes.

**D**

Decision support systems  
(DSS), 44, 56  
 Deep learning (DL), 72, 88, 89  
 Deep renovation, 2–17, 24, 31–33,  
41, 43–47, 60, 64, 70–78, 84–92,  
99–101, 136–147, 155–159  
 Denial of service, 137  
 Descriptive analytics, 71  
 Diagnostic analytics, 71  
 Digital twin, 16, 25, 28, 43,  
84–92, 124  
 Digital twinning, 91, 164, 166  
 District heating systems, 4

**E**

Embedded sensors, 15, 24–33  
 Energy monitoring, 27, 55  
 Energy Performance Building  
Directive, 4  
 Energy performance certification, 2  
 Energy performance contracting  
(EPC), 164–166, 168  
 Energy Service Agreements  
(ESAs), 156  
 European Green Deal, 2  
 Exoskeletons, 114, 122, 145

**F**

Fintech, 17, 155, 159

**G**

General Data Protection Regulation  
(GDPR), 32  
 Green mortgages, 157

**H**

Heating, Ventilation And Air  
Conditioning (HVAC), 3, 11, 30,  
31, 47, 57, 59, 73, 78, 145

**I**

Identity theft, 137  
 Information and communications  
technology (ICT), 3  
 Intelligent equipment and robots  
(IER), 16, 17, 113–119,  
122, 124–128  
 Internet Of Things (IoT), 13, 24,  
27–31, 42, 70, 90, 137,  
146, 164n4

**L**

Leasing, 157  
 Loans, 158, 162, 163

**M**

Machine learning (ML), 16, 46, 47,  
70–73, 84, 146

**N**

Near Zero Energy Building  
(nZEB), 24  
 Neural network, 72, 74, 88

**P**

Passive House Standard, 12  
 Phishing, 137  
 Photovoltaic panels (PV panels), 3,  
120, 121  
 Predictive analytics, 71  
 Preventive monitoring, 29  
 Principal component analysis  
(PCA), 87  
 Programmable Construction Machines  
(PCM), 116

**R**

Random sample consensus  
(RANSAC), 87

Ransomware, 137  
Renewable energy sources  
(RES), 3, 78

**S**

Security Token Offering (STO),  
166, 168  
Smart buildings (SB), 15, 24, 26–27,  
30–32, 84, 145  
Smart contract, 165–168  
Smart homes, 15, 26–27, 33

**T**

3D printing, 16, 99, 100, 102–104  
3D scanning, 16

Tokenisation, 17, 165, 166, 168

**U**

Unmanned aerial vehicle (UAV), 119,  
120, 124, 145

**V**

Virtual reality (VR), 55, 90, 91  
Visual analytics, 74

**W**

Waste management, 72  
Wire arc additive manufacturing  
(WAAM), 100