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| **9 Mechatronics** |  |  |
| Criteria | Range | Resource identified |
| 9.1 The key components of a mechatronics system. | Mechanical (gears, cams, linkages, levers, pulleys) | <https://technologystudent.com/cams/camdex.htm> |
| <http://dtnmn.weebly.com/types-of-mechanisms.html> |
| <http://wiki.dtonline.org/index.php/Category:Mechanisms> |
| Electrical/electronic (sensors and transducers, microprocessors, microcontrollers, actuators) | <https://www.reac-group.com/en_en/facts/actuators/what-is-an-actuator/> |
| <https://www.electronics-tutorials.ws/io/io_1.html> |
| <https://internetofthingsagenda.techtarget.com/definition/microcontroller> |
| <https://www.eit.edu.au/resources/types-and-applications-of-microcontrollers/> |
| Common drive devices (standard electrical motors, servo motors, stepper motors) | <https://www.automate.org/blogs/types-of-electric-motors> |
| <https://www.rs-online.com/designspark/different-types-of-motors-and-their-use> |
| <https://www.elprocus.com/different-types-of-electric-motors/> |
| 9.2 The operation, function and applications of programmable logic controllers (PLC) in mechatronic systems. | PLC types (unitary, unitary with modular features, modular) | <https://www.electrical4u.com/programmable-logic-controllers/> |
| <https://basicplc.com/different-types-of-plc/> |
| <https://instrumentationtools.com/types-of-plc/> |
| PLC architecture | <https://processsolutions.com/basic-architecture-of-programmable-logic-controller/> |
| <https://www.wisdomjobs.com/e-university/programmable-logic-controllers-tutorial-523/internal-architecture-14628.html> |
| <https://www.youtube.com/watch?v=p-p2IjxGelQ> |
|  | Sensor signal conditioning | <https://www.youtube.com/watch?v=HSHJXXFigz8> |
|  | <https://en.wikipedia.org/wiki/Signal_conditioning> |
|  | <https://dewesoft.com/daq/what-is-signal-conditioning> |

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|  | Programming | <https://www.watelectronics.com/how-to-program-the-programmable-logic-controllers/> |
|  | <https://electrical-engineering-portal.com/resources/plc-programming-training> |
|  | <https://www.learnrobotics.org/blog/plc-programming-languages/> |
|  | <https://instrumentationtools.com/plc-controls-motor/> |
|  | Process blocks | <https://en.wikipedia.org/wiki/Function_block_diagram> |
|  | Motor drives | <https://instrumentationtools.com/plc-controls-motor/> |
|  | <https://www.allaboutcircuits.com/technical-articles/how-to-choose-the-right-motor-driver-ic/> |
|  | Applications - robotic arms | <https://www.youtube.com/watch?v=3lP7fkEMEqE> |
|  | <https://www.youtube.com/watch?v=88xH9ASsXDE> |
|  | <https://www.youtube.com/watch?v=6dev9c79zWE> |
|  | Applications - conveyor belts | <https://www.youtube.com/watch?v=_yG3MwEWv_0> |
|  | <https://www.youtube.com/watch?v=nv17SkwP9vo> |
|  | Applications - packaging | <https://instrumentationtools.com/plc-packaging-process/> |
|  | <https://www.mikroe.com/ebooks/introduction-to-plc-controllers/7-8-automation-of-product-packaging> |
|  | Applications - supervisory control and data acquisition (SCADA) | <https://inductiveautomation.com/resources/article/what-is-scada> |
|  | <https://en.wikipedia.org/wiki/SCADA> |
|  | <https://www.youtube.com/watch?v=nlFM1q9QPJw> |
|  | Applications - remote technical units | <https://en.wikipedia.org/wiki/Remote_terminal_unit> |
|  | <https://electronicscoach.com/remote-terminal-unit.html> |
|  | Applications - animatronics | <https://en.wikipedia.org/wiki/Animatronics> |
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| 9.3 The basic principles of hydraulics and pneumatics. | Transmission of power | <https://en.wikipedia.org/wiki/Fluid_power> |
| <https://www.nfpa.com/home/About-NFPA/What-is-Fluid-Power.htm> |
| Fluid compressibility | <https://www.engineersedge.com/fluid_flow/compressibility.htm> |
| <https://www.youtube.com/watch?v=zlQyckTvSFE> |
| Components (valves, pumps, actuators, cylinders, compressors) | <http://wiki.dtonline.org/index.php/Pneumatic_Components_and_Symbols> |
| <https://www.smcpneumatics.com/Pneumatic-System-Components-Their-Functions_b_71.html> |
| <https://coalhandlingplants.com/hydraulic-system/> |