

CS 350 Task 2: Project Conceptualization and Grounding

This task establishes a guided introductory framework for the primary elements of the quarter project. In real life, you would have to assemble such a list yourself. Based on the high-level context being discussed in class at this point, your job is to perform preliminary background research on each element in this outline. At this inception phase in the top-down development process, your answers will be general.

Briefly discuss what each element means to you so far with respect to your current understanding of the project as toolkit for modeling and simulating heavy construction equipment. Do not just provide a blanket definition. Your interpretations ultimately may not be relevant to our actual solution to the project later, but they must be arguably within its purview. You must address each element separately as structured here and cite its primary source in the format `[@url]`, where *url* is the complete text link to your reference. (Do not make it a dynamic, embedded link.) Use six or more different sources; Wikipedia is acceptable. Put the term in bold. Indicate the word count at the end of the document.

For each term, also address these aspects from a consistent, coherent, practical, computational perspective. Include the head words “data,” etc.

data: what it is; properties that describe its existence
control: what it can do; actions that describe its capabilities
behavior: what it actually does or is done with it; appropriate actions to satisfy a goal

As a structural example, consider this answer for a hypothetical farm simulation:

dog: a dog is a canine animal that was originally useful for herding and scaring away predators, but now they are primarily family pets that annoy the neighbors [[@www.dogsrule.com](http://www.dogsrule.com)]

data: a dog has two eyes, two ears, a nose, four legs, and a mouth
control: a dog can see, hear, smell, walk, and bark
behavior: a dog generally does nothing but sleep all day, but when they see, hear, or smell a threat, they chase after it and bark. You can tell a dog to do something or not to do something, within its limited understanding of commands and actions

A. Address all of the following elements in order:

1. acceleration
2. actuator
3. arm
4. axis, directional
5. axis, lateral
6. axis, longitudinal
7. backlash
8. ball-and-socket joint
9. bearing
10. bellcrank
11. control horn
12. control system, closed loop
13. control system, open loop
14. coordinate, absolute
15. coordinate, Cartesian
16. coordinate, polar
17. coordinate, relative
18. degree of freedom
19. dynamics
20. energy, kinetic
21. energy, potential
22. equations of motion
23. Euler angle
24. failure (mechanical)
25. fatigue
26. force (general)
27. force, compressive

28. force, sheer
29. force, tension
30. friction
31. geometry
32. hydraulic cylinder
33. hydraulic motor
34. hydraulics
35. inertia
36. inertial measurement unit
37. jerk
38. kinematics
39. kinematics, inverse
40. kinetics
41. lever
42. linkage, mechanical
43. mass
44. mechanics (general)
45. mechanics of materials
46. mechanics, applied
47. moment
48. momentum
49. motion, axial
50. motion, hinge
51. motion, linear
52. motion, reciprocating
53. motion, spherical
54. pitch
55. pneumatics
56. power
57. quaternion
58. roll
59. sensor
60. statics
61. strain
62. strain gauge
63. stress
64. torque
65. vector
66. velocity
67. weight
68. work
69. yaw

B. Group the terms (by name only) into a higher-level organization that makes sense to you. For example, *dog*, *cat*, *bird*, and *bee* could be organized as:

ground-dwellers

dog
cat

flying things

bird
bee

Some terms may belong to more than one category.