3806ICT - Week 3 Lab

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Question 1

Give definitions of locomotion and manipulation. What are their shared features and differences?

Locomotion is defined as a robot's ability to move itself by exerting force on the environment whereas manipulation is its ability to move objects by exerting force upon them.

Question 2

What are advantages and disadvantages of legged robots?

Easiest format to see this in would be lists:

Advantages

- They can go over more complicated obstacles without getting stuck (slanted ground, steps, et cetera)
- Causes less damage to terrain than wheeled robots

Disadvantages

- Movement speed
- Complexity - actuators and structure are a lot more complicated
- Harder to control - must consider balance and stability
- Less energy efficient due to:
    - Terrain
    - Centre of gravity moves while walking
    - Picking up the legs

Question 3

What is DOF? If a robot can only move forward and backward, how many DOFs does it have? In most cases, how many DOFs does a robot leg has?

DOF stands for **d**egrees **o**f **f**reedom, and its defined by the number of joins in each leg. To have a leg that only moves forwards and backwards, it would have two joints: this is because its limited to doing a lift and swing motion. To move backwards it just swings in the other direction than normal. Most robot legs have three joints.

Question 4

What is a gait of a legged robot? Enumerate all lift and release events of a robot with 4 legs. Give two examples of gaits for such a robot.

Our formula to find how many states there are is $2^k = 2^4 = 16$ states.

1. asdf

Question 5

Formulate the Monkey and Banana Problem in STRIPS:A monkey is at location A in a lab. There is a box in location C. The monkey wants the bananas that are hanging from the ceiling in location B, but it needs to move the box and climb onto it in order to reach them

Question 6

Evaluate the subsumption architecture in terms of: support for modularity, niche targetability, ease of portability to other domains, robustness

Question 7

Describe the Hybrid paradigm in terms of: (a) sensing, acting, and planning, and (b) sensing organization.

Question 8

Look up technical reports on Shakey. Compare Shakey with the Hybrid architectures. Now consider the possible impact of the radical increases in processing power since the 1960's. Do you agree or disagree with the statement that Shakey would be as capable as any Hybrid if it were built today? Justify your answer.