Drones and Autonomous Systems Lab @ UNLV

Transformer Darwin (#001)

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Annotated bibliography

Dawin-OP (Spring/Summer 2017)

Paper one: Humanoid navigation with dynamic footstep plans

Web-link: http://ieeexplore.ieee.org/abstract/document/5979656/

Citation: Garimort, J., Hornung, A. and Bennewitz, M., 2011, May. Humanoid navigation with dynamic footstep plans. In *Robotics and Automation (ICRA), 2011 IEEE International Conference on* (pp. 3982-3987). IEEE. **This paper has been cited 41 times**

Reader Description:

Time to read/comment/highlight the full paper: *3 hours and 35 minutes*

This paper ***describes a navigation method called Lite D* applied to Aldebaran NAO***. The big picture that motivates this paper is ***to develop an optimal footstep planning with an efficient collision detection and obstacle voidance***. The critical gap the paper tries to fill is/are ***account for motion drift and determine the robot's pose in a #D world model***. The approach used is: ***to use the manufacture's walking engine (Inverted Pendulum model) "footstep model"; Elaborate an incremental heuristic search algorithm(an extension of A* method); change the starting states of the D* lite code for a faster re-planner; Using a 2D grip map (Despite the fact that they mentioned 3D at the beginning of the paper)***. This approach's background stems from: ***local planner suggested by Okada[10]; global 2D path suggested buy Elmogy [11][12]; footstep basis using A* argued by Chestnutt[13]; ZMP-based pattern generator suggested by Kanehiro [15]; probabilistic planner [16]*** . The paper presents ***heuristic functions models(D* Lite) (equations very unclear to follow, because my lack of knowledge), computer simulations (software not disclosed), experiments with NAO and a full sized humanoid (Honda's ASISMO; PS: allows step over obstacles)***. The selection ***of (D* Lite) is because such method has been extensively used for robotics navigation stems*** based **on the DARPA Grand Challenge [17]**. The results suggest that ***the humanoid can correct small deviations from the original footstep, therefore quickly re-planning its steps to avoid obstacles***. The paper concludes with ***an efficient way to plan motions for humanoid robots while***

scanning the environment and responding to any barrier that it might encounter. The authors ***mentioned to extend their planning method to a 3D environments for the future studies***.

Time to complete the description above: *1 hour and 23 minutes*

Reader's commentaries:

The paper is very well written, but the math and the equations are very hard to understand. The paper flows nicely with a clear progressive thoughts (INTRO->RELATED_WORK->METHOD_CHOSEN-.RSULTS->CONCLU). I did not understand this paper from "top to bottom", however I have gathered the main idea of it.

PS: The full reviewed paper is attached at APENDIX-A. Due to copyrights policy such appendix ought to be used exclusively by the reader and the reader's advisor.