Homework Assignment #6
(due Feb.12, 9:30am)

First Version of First Main Project Paper

For details on the main project paper see the backside of this assignment. The first main project paper should include **the title, the "introduction/background", the "model/method" and the "references"**, which are cited in these parts of the paper. Note, that this is not yet the complete paper, sections like the abstract, results, and conclusions are **not** yet in this first paper. For the revising of each of these sections use my comments to your latest versions of model/bibliography and introduction/background. For you this "first version of the first paper" should not be the "first version" but aim for your final version. By handing in an already complete and well written paper (instead of a preliminary version), you will profit of getting from me most useful comments which will help you for the revisions for your "final version." For the paper use a more formal writing style than you will use in your oral presentation. **Use latex for writing your paper.** Please note that your revised introduction/background section will be graded.

At the beginning of next class, Tuesday, Feb. 12, hand in:

- hardcopy of your "first version" of your first paper (via latex)

- hardcopy of your previous model/bibliography & introduction/background sections with my comments

- electronic copy of your first paper as pdf-file in your `~/share.dir/` (please give read-permission).

Paper

Use the following description of a scientific paper as guideline for the two papers of your main project. The **first paper** should include the title, the "introduction/background", the "model/method" and the "references", which are cited in these parts of the paper. In the second and final paper you will write the complete paper (revisit the sections of the first paper for changes.) For both papers use a more formal writing style than you will use in your oral presentation.

Audience: Your audience will be physics juniors and seniors who most likely do not have your background. Include therefore all information which is necessary to understand your project.

Examples:

- D. Chowdhury, L. Santen and A. Schadschneider, "Vehicular Traffic: A System of Interacting particles Driven Far From Equilibrium," Curr. Sci. India **77**, 411 (1999).

- all scientific papers you have read for your project.

Contents:

- Title

- Author(s), Address

- Abstract: An abstract is a summary of what you did and your results. The abstract is for a reader who might not have time to read the rest of your paper or who decides depending on your abstract if she or he reads the whole paper. The abstract should be understandable without the rest of the paper and should contain: the system you study, the model, the method and the results.

- Text: The following text should be understandable by itself. Reference any information which you used from other sources or which includes details necessary for the reader's understanding.

  - **Introduction/Background**[6]:
    This section might give some historical background and/or necessary background information. You might talk about other models than the one you use. The Introduction also serves as a motivation for why your project is of specific interest and importance. The main purpose of the introduction is to put your project into context: What has been done in previous work? Which models have been used? Which experiments have been done? Which theory has been done? Which simulations have been done? What were the results? Which of the models are you using, or if you build your own model, what are the reasons for altering the previously used models? Read the introductions of the papers you have so far found. Those are the best examples for the content and style of the introduction/background section of your project. As part of the introduction you might give a general description of your project. You might end your introduction with an outline of the rest of the paper.
    Please note my comments on your bibliography/model papers for a more specific description of this section for your project.

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[6]Sometimes this is split into two sections

– **Model:**
In this section you describe your model exactly. This includes for example the dimension of your system, whether you use a lattice and all applied rules (as e.g. the steps in the Nagel-Schreckenberg traffic flow model). In principle, after reading your description any reader should be able to write the program for exactly the same model as yours. For a more specific description what this section should contain for your projects, use my comments to your bibliography/model.

– **Theory:**
You may not need this section. This is a section one uses if there are analytical calculations possible. For theoreticians this is the main section. [7]

– Simulation:[8]
This section includes the **method** you use. For some papers there is a separate method section, e.g. on the integration technique. Include this section in your first paper. [9] For the second paper you will include in this section a specification of all parameters used in your simulation. Your description needs to specify all details which are necessary to reproduce your simulation results, for example for the traffic flow model you specify the initial configuration (how do you put on cars and which velocities do you give them), the number of time steps, the lattice size, and the boundary conditions (what happens at the ends of the road).

– Results:
This section describes the results of your project. It can include tables, formulae and figures. Tables and figures should have captions. Figure captions should have text which describes what the figure shows. All formulae should be numbered.

– Conclusions/Discussion:
In this section you draw conclusions of your results and you might include what one could do in future work.

– References:
This is the bibliography of all references to which you refer in the text.

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[7]JJ: You might describe some mean-field approximation results.

[8]This section is often combined with the section "Model."

[9]For Andrew, Coby, Jeanine, Jake: this includes the integration algorithm, i.e. the Euler step and for Coby the Velocity Verlet algorithm. For Grant: this means a section about what a neural network means, and which function(s) you use, and also the genetic algorithm. For JJ: if you will use the Monte Carlo metropolis algorithm, then include in the model or method section this algorithm.