

Paper

Use the hand-out “On Preparing A Manuscript for Publication” and 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.) Use a more formal writing style than you will use in your oral presentation.

Audience: Your audience will be 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 not necessary for the reader’s understanding.
 - Introduction/Background¹:
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 and to give a general description of your project. For a more specific description of this section for your project, see my comments to your bibliographies. You might end your introduction with an outline of the rest of the paper.

¹Sometimes 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 with exactly the same model as yours.
- 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. ²
- Simulation:³
This section includes the method you use. 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 game of life you specify the initial configuration, the number of time steps, the lattice size, and the boundary conditions. ⁴
- Results:
This section describes the results of your project. It can include tables, formulae and figures. Tables and figures should have captions and 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.

²Ze, Austin, and Nga, in your cases you should describe the main theoretical approaches/approximations and main results thereof. Jason you might have to include here some of the conformal mapping technique, which Ben will explain to you. Matt, you might want to include in this section the potential to force derivation.

³This section is often combined with the section “Model.”

⁴Rob and Sarah, in your case this means a description of the Euler step or Runge Kutta step. Matt, in your case this means the Velocity Verlet algorithm (molecular dynamics simulations in general). Jason, you should include here the method of relaxation, the Euler step and any further techniques to solve the singularity problem. Ze, you need to find out and describe here how you solve the Faraday equation numerically. Cragin, in your case this is a major section to describe the genetic algorithm.