

# PhD Project Plan

Thomas Gorry

Agent Location Discovery in Distributed Networks  
with reference to Agent Patrolling and Agent Rendezvous

Primary Supervisor: Dr. Russell Martin  
Secondary Supervisor: Prof. Laszek Gąsieniec

Advisors: Dr. Martin Gairing, Dr. Igor Potapov and Dr. Prudence Wong

Department of Computer Science, University of Liverpool, UK

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## 1 Project Outline

The topic of study is in the field of Algorithms with a focus on Distributed Computing. The project aims to carry out research surrounding agents in networks. Mainly this work has emphasis on Agent Location Discovery. We have already has some success with avenues of research in this area with respect to location discovery on the ring using a randomised procedural approach and work has already been started on location discovery on the line or segment. Future directions for this work include looking at deterministic approaches to the problem mentioned above and comparison with our current randomised approach. We will also be looking at more topologies and geometric shapes and we have already briefly looked at tree structures. Our current work has been motivated on aiming towards Agent Patrolling however there will also likely be some migration later in the project to looking at combining this work with Agent Rendezvous in networks. It should also be mentioned that there has been some work we have carried out on Social Network Analysis and there may be some area of research that we may be able to link in with the current plan for the PhD.

## 2 Introductory Reading List

- Leszek Gąsieniec, Andrzej Pelc, Tomasz Radzik and Xiaohui Zhang, Tree exploration with logarithmic memory, Proc. 18th Annual ACM-SIAM Symposium on Discrete Algorithms pp. 585-594, 2007
- J. Czyzowicz, L. Gąsieniec, A. Kosowski, and E. Kranakis, Boundary Patrolling by Mobile Agents with Distinct Maximal Speeds, Proc. 19th Annual European Symposium on Algorithms (ESA 2011), pp. 701-712.
- Michael Mitzenmacher and Eli Upfal, Probability and Computing: Randomized Algorithms and Probabilistic Analysis, Cambridge University Press, 2005.

## 3 Time Plan

### 3.1 First Year

#### October - December:

1. Focus initially on improving understanding of probability and different techniques used in probabilistic analysis.
2. Add finishing touches to research paper on randomised procedures for agent discovery when on the ring.
3. Attend First Year Skills Workshop (15<sup>th</sup> – 16<sup>th</sup> November), Topic: Energy.
4. Attend initial meetings with Dollywagon about possible collaboration on Social Network Analysis project.
5. Start looking at randomised procedures for agent discovery on the line.

#### January - March:

1. Complete PhD Project Plan (15<sup>th</sup> January).
2. Continue research and software development into Dollywagon Social Network Analysis Project.
3. Research trip to Bordeaux University to discuss possible collaboration and present current research.

4. Conduct research into agent location discovery using deterministic procedures. Starting initially with discovery on the line or segment and looking at the implications of the results of this research in relation to our paper on location discovery on the ring using a randomised approach.
5. Formalise research done on agent location discovery on the line ready for integration with our paper on agent location discovery on the ring.

#### **April - July:**

1. Attend the Postgraduate Workshop.
2. Attend Search and Rendezvous conference at the Lorentz Center, Leiden, Netherlands.
3. Further plans for my research will, at this point, involve looking at different topologies and seeing if we can adapt our deterministic and/or randomised approaches to solve the agent paroling problem in these settings.
4. Complete First Year Progress Report (end of May).
5. Complete Annual Faculty Progress Report.

### **3.2 Second Year**

#### **October - December:**

1. Complete one of the Careers Skills Development options.
2. Look into linking my research to areas such as Agent Rendezvous.

#### **January - March:**

1. Prepare and present a poster about my research at the university Poster Day.
2. Anticipate preparation of at least one paper presenting results of research.
3. Possibility of further research visits to other universities or institutions.

#### **April - July:**

1. Speak about my research at the Postgraduate Workshop.
2. Complete the Second Year Progress Report.
3. Attend the Second Year Progress Interview.
4. Complete the Annual Faculty Progress Report.

### **3.3 Third Year**

#### **October - July:**

1. Possibility of further research visits to other universities or institutions.
2. Anticipate preparation of at least one paper presenting results of research.
3. Give a technical presentation about the project to a specialist audience.
4. Assist with preparations for Fundamentals of Computation Theory 2013.
5. Begin thesis preparation.
6. Third Year Progress Interview.
7. Complete Annual Faculty Progress Report.
8. Submit an Intent to Submit Form.

## **4 Taught courses that will be attended**

#### **2011/12 First Semester -**

- COMP329: Robotics and Autonomous Systems, Prof MJ Wooldridge, Department of Computer Science.

#### **Further Semesters -**

There may be other modules that are attended in the future, however none have been arranged as of yet.