**RPPR: Trainee Progress Report**

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| **Reporting Period:** | 2015 October 01 – 2016 June 30 |
| **Trainee Name:** Arjun Chandrasekhar |  |
| **Advisor:** Saket Navlakha |  |

**A. SUMMARY OF TRAINING AND RESEARCH**

My current research project is titled “A distributed algorithm for network repair in turtle ant colonies”. In this project we seek to derive an algorithm for how turtle ant colonies build and maintain robust foraging networks without centralized control. Turtle ants live and forage in extremely tangled forest canopies; despite no knowledge of the global terrain and no central authority directing movement, turtle ants manage to navigate the canopy well enough to communicate and forage. Each individual ant can only perform simple tasks, but these local interactions yield complex emergent properties that allow the colony to navigate the environment effectively. We are interested in how individual ants make decisions in such a way for the colony as a whole to collectively solve tasks.

Currently we are most interested in how ants solve network repair; if a branch in the canopy breaks or decays, how do the ants modify their foraging trails in response to fix the break in the path? For this work we collaborate with ant biologists. We use data of observations made on real turtle ant colonies, and attempt to derive a distributed algorithm to explain the choices we observe the ants make. We then run simulations of ants using our derived algorithm to solve the problem of fixing a break in a path. We hope that by deriving an algorithm that both explains real turtle ant behavior well and performs well ins solving network repair in a simulated manner, we hope to better understand turtle and biology, and the general phenomenon of complex behaviors emerging from simple local interaction rules in natural and engineered systems.

**B. PUBLICATIONS:**

Currently I do not have any publications. We are tentatively preparing a paper titled “A distributed algorithm for network repair in turtle ant colonies” by Arjun Chandrasekhar, Deborah Gordon, and Saket Navlakha.

**C. FELLOWSHIPS/AWARDS:** N/A

**D. EARLY TERMINATION:** *Not Applicable*

**E. POST-AWARD INFORMATION** Needed only if you plan to complete in next 12 mos.

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| Name of Organization: |  |
| Position / Title:: |  |
| City and State: |  |
| **Your Contact Info:** | |
| Mailing Address: |  |
| Tel No: |  |
| Email: |  |