

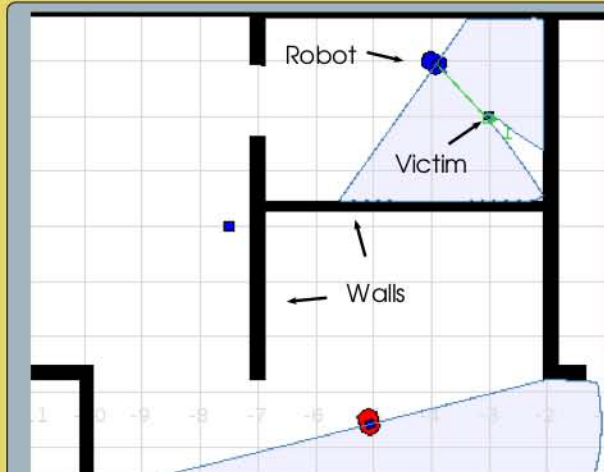
# Trade-off between searching and communication in a search task

Sion Scone, s.p.scone@lboro.ac.uk, Iain Phillips, Jim Armstrong

## Introduction

When searching in unknown environments, if there are no global communications then when a victim is found, rescuers have to decide whether to continue searching or return to communicate findings.

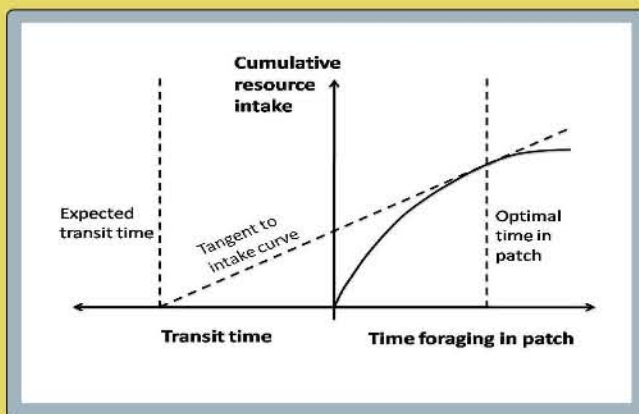
The application of an ecological foraging strategy called the Marginal Value Theorem could help to optimise the search and could provide an effective trade-off.



Simulation of robots searching for a victim

## Marginal Value Theorem

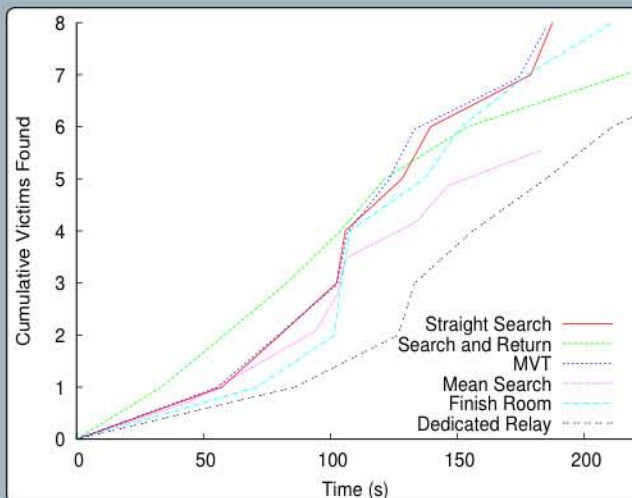
A group of cooperating robots will be deployed in an unknown building. They can only communicate by line-of-sight links, and will split the search space between them.



By analysing search results, it is possible to generate a rate-of-gain curve which indicates when victims will be found. By plotting a tangent to this curve, the optimal room search time can be found. After this time, a robot will move to the next room.

## Results

Simulation results indicate that application of MVT to a search task results in faster overall search times for the entire environment, while finding 99.5% of all victims. This method was compared to others such as search-and-return and finish searching room before returning.



## Conclusion

Results show that MVT gives the lowest time to find all victims. However, other methods were capable of finding some victims faster. Hybrid approaches may therefore be more suitable, and are an area for future work.

Different environments will also need to be tested to see whether any general conclusions can be reached that could be applied to unknown environments.