

## INTRODUCTION

A great amount of work has gone into research surrounding sensor networks in recent years, and the explosion in popularity of the internet of things (IoT) means there is a great deal of support from both academia and industry for development in the field.

The use of quadcopters (and drones in general) has also increased in both the civilian and military sectors. By combining the power of distributed sensor networks with the manoeuvrability of unmanned drones it is possible to quickly survey and map properties over a large area.

## MATERIALS & METHODS

The following materials were required to complete the research:

- Curabitur pellentesque dignissim
- Eu facilisis est tempus quis
- Duis porta consequat lorem
- Eu facilisis est tempus quis

The following equations were used for statistical analysis:

$$\cos^3 \theta = \frac{1}{4} \cos \theta + \frac{3}{4} \cos 3\theta \quad (3)$$

$$E = mc^2 \quad (4)$$

Phasellus imperdiet, tortor vitae congue bibendum, felis enim sagittis lorem, et volutpat ante orci sagittis mi. Morbi rutrum laoreet semper. Morbi accumsan enim nec tortor consectetur non commodo nisi sollicitudin. Proin sollicitudin. Pellentesque eget orci eros. Fusce ultricies, tellus et pellentesque fringilla, ante massa luctus libero, quis tristique purus urna nec nibh.

## EXISTING LITERATURE

Integer sed lectus vel mauris euismod suscipit. Praesent a est a est ultricies pellentesque. Donec tincidunt, nunc in feugiat varius, lectus lectus auctor lorem, egestas molestie risus erat ut nibh.

## OBJECTIVES

This project focuses on methods by which such networks can be controlled and tasked. We are working to create a framework by which autonomous flying vehicles can be tasked remotely to map sensor properties over predefined areas. This encompasses:

1. Routing of drones through shared airspace
2. Routing of communications
3. Specification of tasking language
4. Fault tolerance of the network
5. Division and dissemination of instructions

## PHYSICAL ROUTING

Donec faucibus purus at tortor egestas eu fermentum dolor facilisis. Maecenas tempor dui eu neque fringilla rutrum. Mauris lobortis nisl accumsan.

Treatments	Response 1	Response 2
Treatment 1	0.0003262	0.562
Treatment 2	0.0015681	0.910
Treatment 3	0.0009271	0.296

Table 1: Table caption

Nulla ut porttitor enim. Suspendisse venenatis dui eget eros gravida tempor. Mauris feugiat elit et augue placerat ultrices. Morbi accumsan enim nec tortor consectetur non commodo.

Treatments	Response 1	Response 2
Treatment 1	0.0003262	0.562
Treatment 2	0.0015681	0.910
Treatment 3	0.0009271	0.296

Table 2: Table caption

## REFERENCES

- [1] J. Macker. Mobile ad hoc networking (manet): Routing protocol performance issues and evaluation considerations. 1999.
- [2] A.E Abdallah, T. Fevens, and J. Opatrny. Hybrid position-based 3d routing algorithms with partial flooding. In *Electrical and Computer Engineering*, 2006. CCECE'06. Canadian Conference on, pages 227–230. IEEE, 2006.

## COMMUNICATIONS ROUTING

Mobile Ad-hoc Networks (MANETs) have several distinguishing characteristics which must be accounted for when designing and evaluating routing algorithms[1]:

1. Dynamic topologies
2. Bandwidth-constrained, variable capacity links
3. Energy-constrained operation
4. Limited physical security

All electromagnetic signals dissipate as they propagate through space, limiting the range at which communications can be received. Under ideal conditions this can be modelled using the Friis

free space equation:

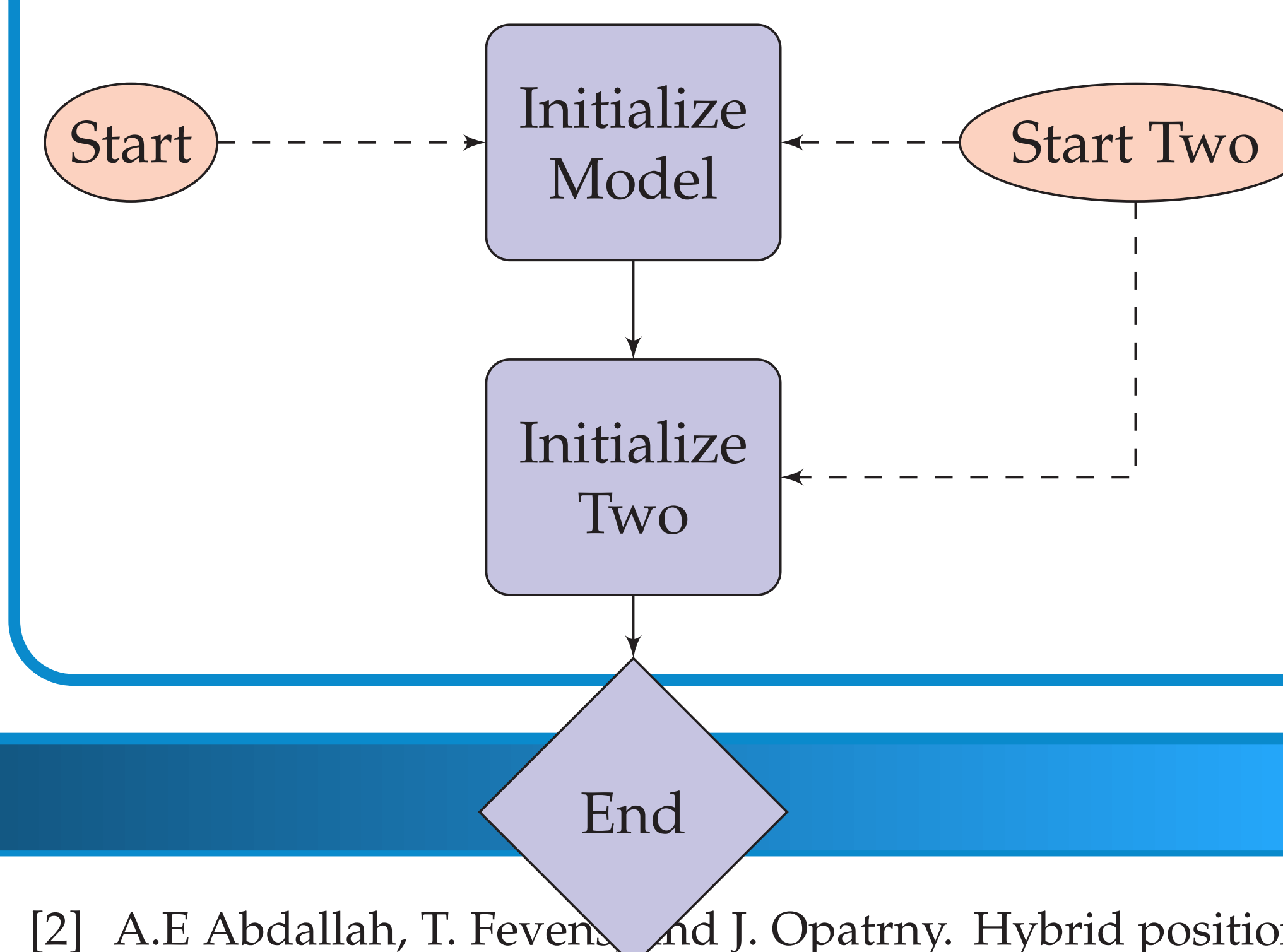
$$P_{rx} = P_{tx} G_{tx} G_{rx} \frac{\lambda^2}{4\pi D} \quad (1)$$

Where  $P$  is the power of the radio signal,  $G$  the gain (or efficiency) of the antenna and  $D$  the distance between them. Under real world conditions additional path loss can be modelled using the log distance path loss model:

$$L = 10n \log_{10} d + C \quad (2)$$

Multiple algorithms exist to route packets within a network, which are usually classified into topological and positional.

## PLANNED WORK



- Pellentesque eget orci eros. Fusce ultricies, tellus et pellentesque fringilla, ante massa luctus libero, quis tristique purus urna nec nibh. Phasellus fermentum rutrum elementum. Nam quis justo lectus.
- Vestibulum sem ante, hendrerit a gravida ac, blandit quis magna.
- Donec sem metus, facilisis at condimentum eget, vehicula ut massa. Morbi consequat, diam sed convallis tincidunt, arcu nunc.

## RESPOSITORY

Web <https://github.com/mgmutty26/effacious-octo-weasel>