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L-CAS

# Lindsey the Tour Guide Robot

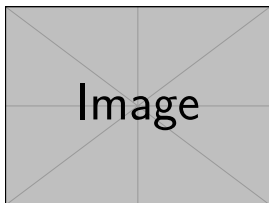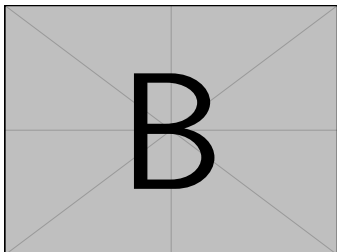## Name Surname

✉ nsurname@lincoln.ac.uk

🏛 Lincoln Centre for Autonomous Systems, UoL, UK

# Presentation Content

- Project Overview

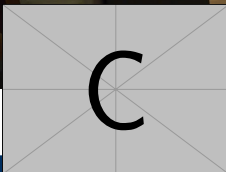- Usage Patterns in Long-Term Deployment

- Current Work & Outlook

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# The project

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Image

## Lindsey the robot

Autonomous robot that gives guided tours and information to the public at The Collection Museum in Lincoln.



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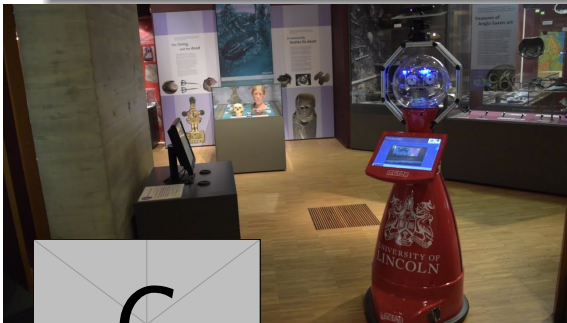
# The project

## Objectives

1. Learn to improve/adapt the robot social capabilities (its behaviors) from real world experience while interacting with museum visitors.

2. Increase the public engagement level when interacting with the robot.

From: *Lindsey the Tour Guide Robot-Usage Patterns in a Museum Long-Term Deployment. F Del Duchetto, P Baxter, M Hanheide. International Conference on Robot & Human Interactive Communication (RO-MAN) 2019*

# Robot Operations

### Guided tours

Lindsey guides the visitors through a sequence of 5/6 exhibits linked by a common theme, describing each of them verbally and with images.

### Go to exhibit and describe

Lindsey guides the visitors to an exhibit chosen from the map and describes its content with two different difficulty level.
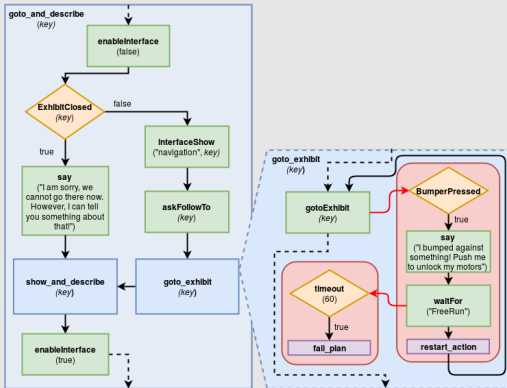
### Describe exhibit

The robot gives a short verbal description of the exhibit requested by the visitor.

# Robot Framework

Behaviors specification

## Petri Net Plans
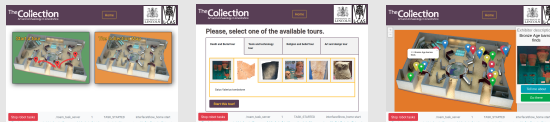


► Conditional plans made of **actions, conditions** and **Execution Rules**.

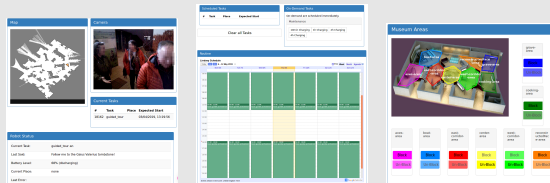► A PNP can be translated into a stochastic policy.

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# Robot Framework

Robot Management

## User interface
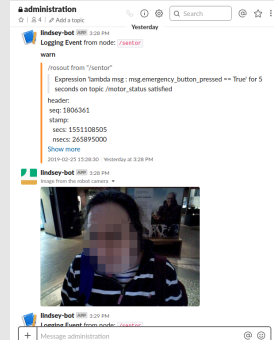


https://github.com/laurencejbelliott/roswebcomponents

## Management interface



## Critical events notifications

# Data Analysis

Table: Long-Term Autonomy metrics.

| Days of operation | 103 days |
|---|---|
| Total distance travelled | 299 km |
| Total tasks completed | 8423 |
| TLS | 26 days, 11 hours |
| A% | 74% |

## How the tasks ends?
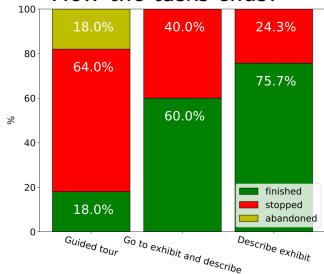


## What's the tours duration?
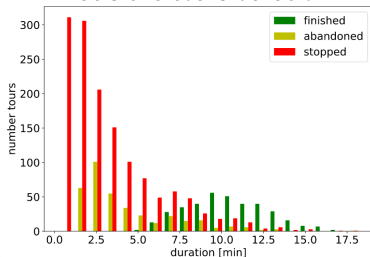


Table: Number of user demanded tasks with

| Task | Tot. demanded | Average duration | Median duration | Shortest | Longest |
|---|---|---|---|---|---|
| Guided tour | 2367 | 4.52 [min] | 3.13 [min] | 11 [sec] | 22.15 [min] |
| Go to exhibit and describe | 2379 | 1.87 [min] | 1.84 [min] | 8 [sec] | 30.79 [min] |
| Describe exhibit | 486 | 26.73 [sec] | 20.03 [sec] | 7.31 [sec] | 5.78 [min] |

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# Discussion

## Engaged by the robot?

Engagement is easily started with Lindsey, but it is typically lost after 2 minutes.

## How does a tour guide engage the public?

From: Katie Best. Making museum tours better: Understanding what a guided tour really is and what a tour guide really does.

▶ tours should not resemble monolithic lectures but they must be **interactive**;

▶ guides should facilitate **audience contribution** through questions and answers;

▶ guides should seek to secure audience attention to inform and entertain them, encouraging them to **orient to the feature under consideration**;

▶ the audience should not be considerate as a whole but the guide must take into account features of the single people, **personalizing the experience**;

▶ technologists need to create non-human guides that have a similar level of **sensitivity to the audience** built-in.

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# Learning from engagement level

Nunc sed pede. Praesent vitae lectus. Praesent neque justo, vehicula eget, interdum id, facilisis et, nibh. Phasellus at purus et libero lacinia dictum. Fusce aliquet. Nulla eu ante placerat leo semper dictum. Mauris metus. Curabitur lobortis. Curabitur sollicitudin hendrerit nunc. Donec ultrices lacus id ipsum.
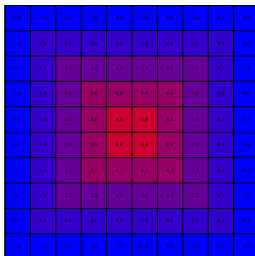
# Engagement model

## Annotations

Video not found, or use Okular

- ▶ 3 Annotators
- ▶ Continuous value for each frame in [0,1]
- ▶ Inter-rater Spearman correlation $\rho$: 0.82

# Engagement model

## Golden ratio

(Original size: 32.361×200 bp)

## Model predictions

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# Engagement model

## Annotations

Video not found, or use Okular

## Model predictions

Video not found, or use Okular

# Thank you for your attention!

Video not found, or use Okular