

LAAS CNRS

RSS Workshop on Social Robot Navigation
Event to be held in conjunction with Robotics: Science and Systems 2021 (RSS 2021)

Simulating Intelligent Human Agents for Intricate Social Robot Navigation

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Laboratoire conventionné avec l'Université Fédérale de Toulouse Midi-Pyrénées

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Why human simulation ?

> Simulating autonomous human behaviors is challenging

Crowd simulators are commonly used

Real human experiments

Physically or controlling an avatar in real time

> We are lacking autonomous individual intelligent human agent in simulation

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Two different systems

> Combination of two current works :

InHuS

CoHAN

Combined system

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Two different systems - InHuS

InHuS
"Intelligent Human Simulator"

> Some unique features :

- Navigation Conflict Manager
- Attitudes
- Visually computes navigation data
- Boss : repeated and long-term scenarios

MORSE/Stage simulator

Navigation Conflict Manager

Harass Attitude

Graphs produced by InHuS

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Two different systems - CoHAN

CoHAN
"Cooperative Human Aware Navigation"

> Enhances the Ros Navigation Stack (MoveBase)

> Main components :

- Human Aware Timed Elastic Band (HATEB)
- Human Path Prediction

Proactive navigation

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Benefits of combining

InHuS

CoHAN

Combined system

- High level decision about global navigation
- Attitudes
- Records navigation and interaction data
- Boss
- Predict and anticipate trajectories (Rich local navigation)
- Highly tunable

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Experiments

Wide corridor scenario

> Enhanced the human agent navigation

InHuS R: SMB

InHuS R: CoHAN

Combined R: CoHAN

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Experiments

Pillar corridor scenario

Cooperative

Non-Cooperative & StopAndLook

> Two different human behaviors :

- Cooperative human
- Non-cooperative with StopAndLook attitude on

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Summary

InHuS

CoHAN

Autonomous, reactive and rational simulated human agent

Human-Aware proactive robot geometric planner

Combined system

Stage simulator

Environment to debug, experiment and tune social robot navigation systems

git

Currently working on a publicly available version of the system

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