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Proposing Goal Refinement for Multi-Agent with Agent UML Tool for the Control of Explosive Terror Threats

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Introduction



□ Aim of Approach

□ Agents and Multi-agent

□ Terrorism and its Types

□ Terror Scenario & Agent based analysis

□ Agent UML Tool

□ Future work



Aim of Approach



- This presentation is not to create fear of terror
- Identify types of terrorism
- Identify computational capability that can identify chemical means of terror attacks and prevention
- To analyse a multi-agent approach to Chemical weapon detection using Agent UML tool.





Terrorism and Types



Terrorism

The purpose of terrorism:

- To instil or create fear.
- To intimidate people or organisations or government to do what ordinarily they would not do.

Definition

- Terrorism is the illegitimate or extranormal use of violence against non-combatants to achieve political ends (Gerwehr & Hubbard, 2006; Laqueur, 1987).
- In Gerwehr & Hubbard (2006) terrorism form of social influence that employs the acts of violence (instead of leaflets or loudspeakers, for example) to influence a target population's emotions, motives, objective reasoning, perceptions, and ultimately their behaviour.
- Terrorism is the deliberate use of violence, or threat of its use, against innocent people, with the aim of intimidating them, or other people, into a course of action they otherwise would not take (Primoratz, 1990). The act of terrorism instils fear.





Terrorism & its Types



Types of Terrorism

Individual terrorism:

This is a lone individual sponsored terror attacks against group of people or other individuals.

• Sect terrorism:

A group (religious or ethnic) sponsored terror against individuals, groups or a nation.

• State terrorism:

This is a state or nation sponsored terrorism against another nation.





Examples of the aftermath of terror attack







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Agents and Agent UML



An **agent** is a *autonomous* computer system (software or hardware) that is situated in an environment and can observe and act in that environment according to design objectives (Woodridge, 2009).

A **multi-agent** is a group of agent that socialise and work together to realise the overall common goal of a system.

Agent UML or AOSE

- a design support notation tool for agent- oriented systems development.
- used for representing agents, their behaviour and interaction



Agent Design Model

Example of an Agent Design Model



Simple Reflex Agent Model (Russell & Norvig, 2010)

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Agent UML Methodologies & Tools

Agent Methodologies

- Agent software engineering process e.g.
 - Gaia (Wooldridge et al. 2000),
 - Tropos (Bresciani et al. 2004),
 - **PASSI** (Cossentino, 2005; Cossentino, & Potts, 2002),
 - MaSE (DeLoach et al. 2001), Prometheus.

Tools

Are graphical editor for specifying the design process of intelligent agents, e.g.

- Gaia e.g. Gaia4E (Cernuzzi & Zambonelli, 2009)
- Tropos e.g. Taom4E (Morandini et al. 2011)
- Prometheus: **PDT**, called the Prometheus design tool
- This design analysis is based on the PDT



A scenario for intelligence analysis and detection



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The PDT (Prometheus Design Tool) for analysing the detection of chemical explosives

Having known the problem scenario, we can

- Identify the number of agents
- Identify actors i.e. humans
- Assign functions and roles to agents and actors, respectively
- Identify data & substance repositories for intelligent learning
- Determine interaction protocol and messages between the various entities i.e. agents, humans, repositories, devices
- Build the phases of design





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System Specification Phase





Architectural Design Phase: System overview diagram





AUML interaction protocol

- This the sequential interaction between the entities in the design using the AUML command.
- The Figure below is a protocol analysis of detection, alert and rescue process





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Challenges and Solution to Intelligent Approach in Developing Nations

Future Challenges

- □ Energy supply: There could be lack of adequate energy sources to power devices where intelligent agents are situated.
- **Funding**: Developing nations may not be willing to spend money on the technology.
- **Expertise**: Indigenous expertise to implement such technologies.

□ Implementation platform: JackTM, Cougaar

□ Solution

Knowledge and research collaborative between the developed and developing nations. This where the United Nations becomes relevant. Like the **Dr John Quinn United Nations Global Pulse** in East Africa.



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Future work



Simulation:

Simulate the process for testing

Implementation:

Real world implementation

The End









Thanks for listening

Question and answer please

