Vision Data Link

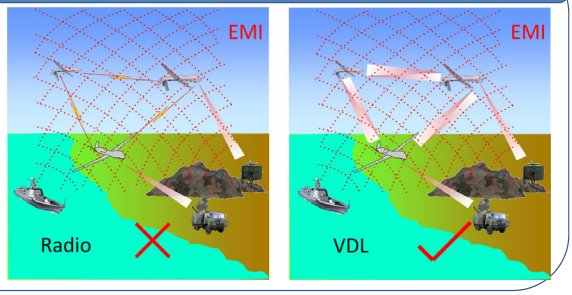
Introduction

Goal and Applications:

- ◆Enhancing the ability of Data Link survivability
- ◆Innovating the way of Data Link interaction
- ◆Expanding the connotation of Data Link concept
- ◆Verifying the exploratory research on Data Link

Problem:

How to implement a new way of free-radio information interaction which is aiming to penetrate electromagnetic interference and deception?

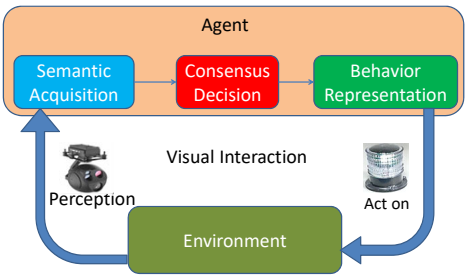


Vision Data Link (VDL) is an intelligent Date Link (DL) based on vision-behavior interactive information, and it is also a free-radio semantic information interaction system for unmanned platform interaction in the electromagnetic denied environment.

Visual Interaction Frame

Vision Data Link (VDL) Features:

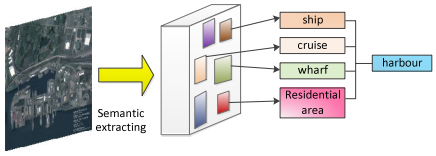
- The belt between interactive agent and environment semantic information interaction
- Machine mutual viewing to reach machine consensus
- Information transmission is realized by vision-behavior in spectral domain



Vision Data Link (VDL) Framework Elements:

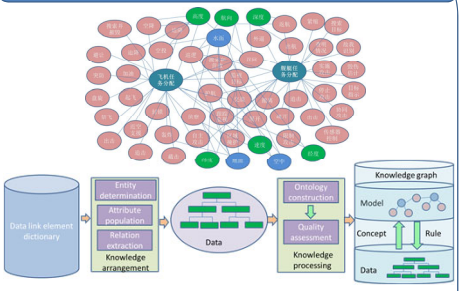
- **Semantic acquisition**: Submit to visual semantic communication using AI technology
- **Consensus decision**: Consensus reasoning using common sense model
- **Behavior representation**: Use LEDs, actions or other markers to express behavioral characteristics

Semantic Acquisition



- **Attribute semantic understanding** is mainly to detect and recognize the target from the perceived visual data, and extract the target individuals one by one from the scene.
- **Object semantic understanding** is mainly to find relevance from lots of extracted targets.
- **Behavior semantic understanding** is mainly to predict future behavior changes from historical laws, understand the current behavior of the target.

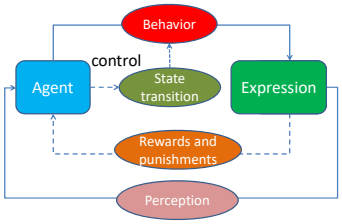
Consensus Decision



The Data Link knowledge graph describes the relationship between message entities. The semantic knowledge database of VDL originates from the message standard of DL. The semantic information of VDL can be mapped to the corresponding data element items of semantic knowledge base.

- Intelligent searching of message elements,
- Intelligent reasoning,
- Intelligent recommendation,
- Intelligent question and answer.

Behavior Representation

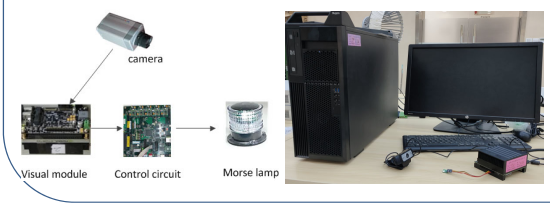


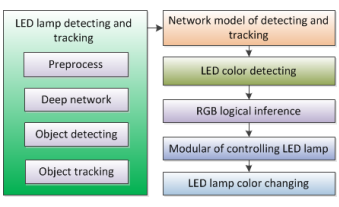
The behavior control model is constructed based on the idea of reinforcement learning, and the interactive agent achieves the best interactive state through adaptive training with the environment.

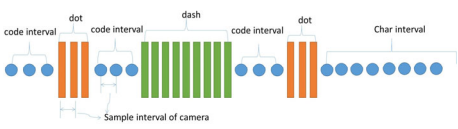
- The interactive agent acts on the environment through behavior,
- The environment return reward or punishment,
- The interactive agent changes the interactive state, updates the behavior output, act to environment again,
- Above processes are repeated until the best interaction state is obtained.

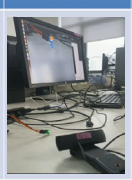
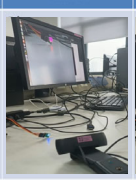
Preliminary Experiment

A Vision-LED communication automation process architecture communication self feedback control technology is studied, and the vision-LED wireless communication simulation test environment is constructed to verify the Vision-LED information transmission ability.







ITEM	Frame I	Frame II	Frame III
Testing			
RGB-Detecting	Blue	Red	Green
LED-Controlling	Green	Blue	Red