



# Research Presentation

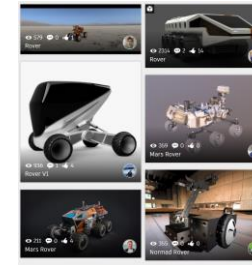
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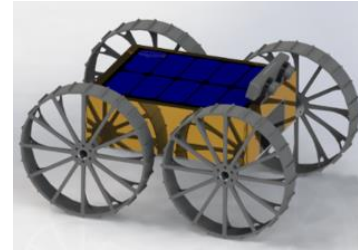
# Project: AI-assisted Knowledge Graph Design

- **Directed by:**   **AUTODESK**
- **My role:** Built a knowledge graph-based software system to assist inexperienced engineers in decision making by learning best practices from existing Computer-aided Designs (CADs).
- **Challenges:**
  - **Complicated designs** → represent them → knowledge representation
  - **Convolutd features** → encode them → knowledge extraction
  - **Multi-modal data sources** → learn from them → knowledge reasoning
- **Methodology:**
  - Represent CADs as Graphs
  - Extract and encode features using TechNet and MVCNN
  - Learning representations through GNN
- **Conclusion:**
  - I learned from this project that it is essential to establish a connection between theoretical methods and application scenarios, in order to create technologies that can truly be applicable.

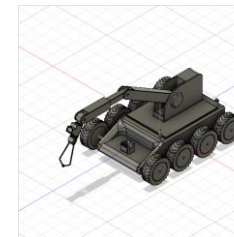
Existing designs (database)



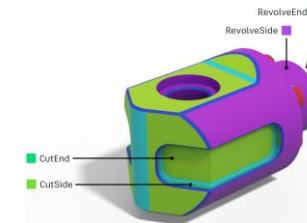
New design



Complicated Designs



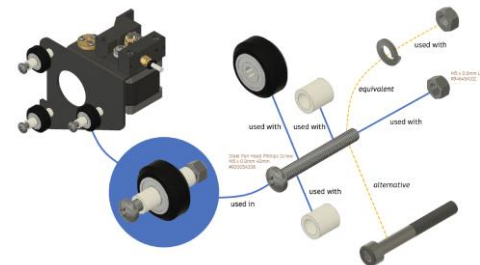
Convolutd features



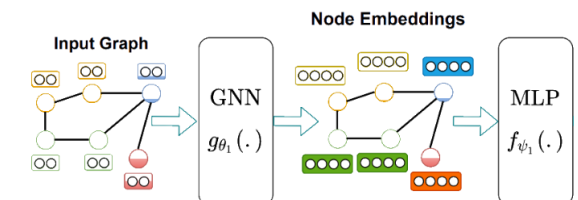
Multi-modal data



Graphical Representation



Graph Learning Framework



# Project: The Smart Connected Worker



- **Directed by:**
- **Sponsor:** U.S. Office of Energy Efficiency and Renewable Energy (EERE).
- **Goal:** Integrate machine learning with advanced manufacturing.
- **My role:** Built a machine learning-based automated system for real-time workplace monitoring to reduce the cost of human labor.

- **Challenges:**

- **Large and complicated system** → divide-and-conquer
- **Multi-media data input** → extract and learn from them
- **How to integrate** → graphical user interface, time-series

- **Methodologies:**

- Machine monitoring: using YOLO and a novel filtering algorithm
- Human-machine interaction monitoring: using CRAFT text recognition and a novel color-identification algorithm

- **Current Work:**

- First-author publication: [Journal of Manufacturing Systems](#) (SCI indexed)
- First-author publication: [International Conference on Computational Science](#) (EI indexed)
- My system being deployed at:

