

# Unified Vector Floorplan Generation via <Markup> Representation



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## 1. Challenge: Floorplan is Difficult to Handle

- Variable numbers:

rooms, doors, and vertices of each room

- Multiple components:

room types, door types, room vertices, and door vertices

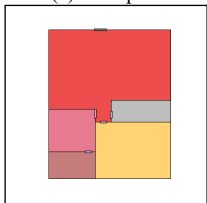
As a result, previous approaches are **not generalized** to different tasks and typically require **multi-stage pipelines**.

Method	Uncond.	Conditional				Compl.
		Boundary	Number	Graph	B & G	
HouseGAN*				✓		
HouseGAN++				✓		
Graph2Plan		✓			✓	
WallPlan		✓		✓	✓	
HouseDiffusion				✓		
Cons2Plan		✓		✓	✓	
GSDiff*		✓		✓		
FMLM (Ours)	✓	✓	✓	✓	✓	✓

Table: Supported Tasks.

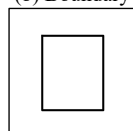
## 2. Our Solution: Floorplan Markup Language (FML)

(a) Floorplan



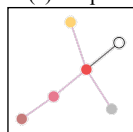
```
Markup Language for a Floorplan
<floorplan>
  <room> <index> 4 </index> <type> 1 </type> <vertex> 13891 34371 34418 37746 37762 32130 32190 14014 </vertex> </room>
  <room> <index> 3 </index> <type> 2 </type> <vertex> 45379 52291 52338 45426 </vertex> </room>
  <room> <index> 2 </index> <type> 3 </type> <vertex> 37746 52338 52414 37822 </vertex> </room>
  <room> <index> 1 </index> <type> 4 </type> <vertex> 32130 37762 37822 32190 </vertex> </room>
  <room> <index> 0 </index> <type> 7 </type> <vertex> 34371 45379 45426 34418 </vertex> </room>
  <door> <connect> 3 0 </connect> <vertex> 45416 45422 </vertex> </door>
  <door> <connect> 4 1 </connect> <vertex> 34946 36738 </vertex> </door>
  <door> <connect> 4 0 </connect> <vertex> 34418 36732 </vertex> </door>
  <door> <connect> 4 2 </connect> <vertex> 37751 37757 </vertex> </door>
  <front door> <connect> 4 </connect> <vertex> 13937 13949 </vertex> </front door>
</floorplan>
```

(b) Boundary

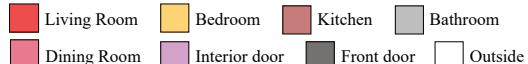


```
Markup Language for a Boundary Condition
<boundary>
  <vertex> 13891 52291 52414 14014 </vertex>
</boundary>
```

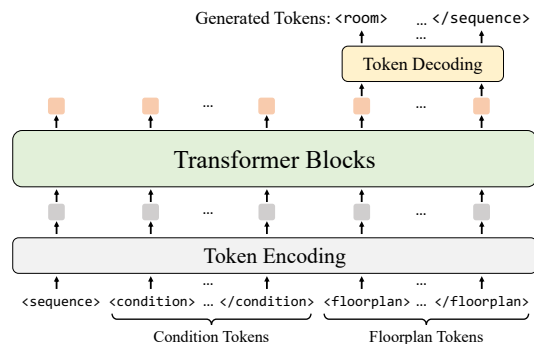
(c) Graph



```
Markup Language for a Graph Condition
<graph>
  <room> <index> 4 </index> <type> 1 </type> </room>
  <room> <index> 3 </index> <type> 2 </type> </room>
  <room> <index> 2 </index> <type> 3 </type> </room>
  <room> <index> 1 </index> <type> 4 </type> </room>
  <room> <index> 0 </index> <type> 7 </type> </room>
  <door> <connect> 3 0 </connect> </door>
  <door> <connect> 4 1 </connect> </door>
  <door> <connect> 4 0 </connect> </door>
  <door> <connect> 4 2 </connect> </door>
  <front door> <connect> 4 </connect> </front door>
</graph>
```



FML is generated by LLM-style Transformer



## 3. Experimental Results

Legend: Living Room (red), Bedroom (yellow), Kitchen (brown), Bathroom (grey), Balcony (light blue), Dining Room (pink), Study Room (orange), Interior door (purple), Front door (dark grey), Outside (white)

