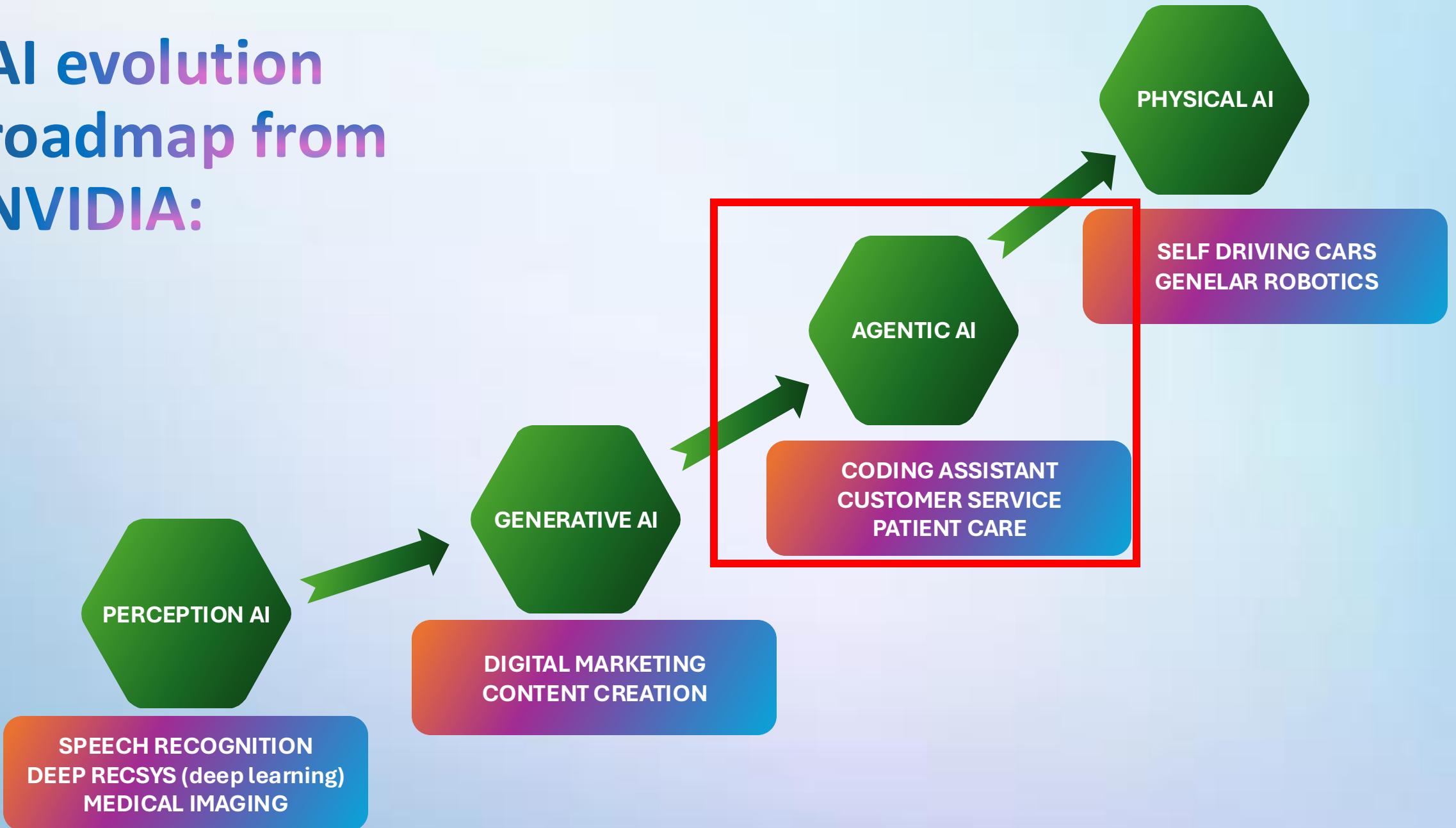


# Simple AI tools usage

*<Implement your simple console AI Agent>*



# AI evolution roadmap from NVIDIA:



# AI Agent with tools:

An agent is an AI system designed to autonomously achieve goals through planning, reasoning, and taking actions. It can interact with its environment, make decisions, use tools, and learn from experience.





# Request with tools

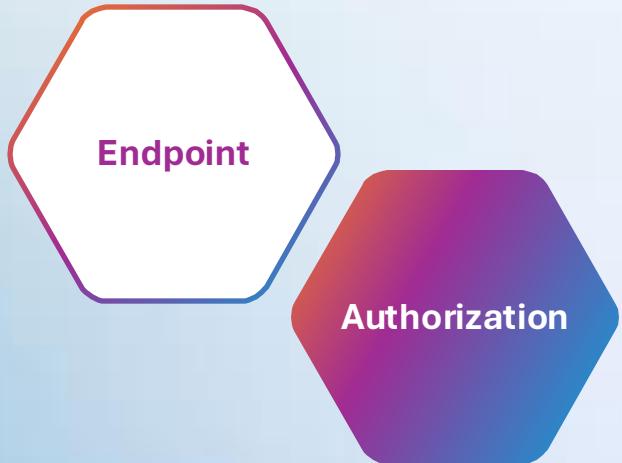
*<Request and its params>*

# Request:



**<https://api.openai.com/v1/chat/completions>**

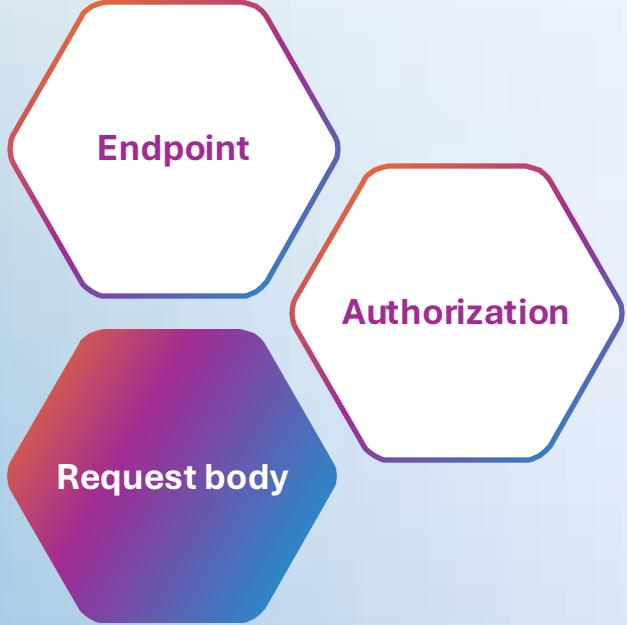
# Request:



**Authorization: Bearer {YOUR\_API\_KEY}**

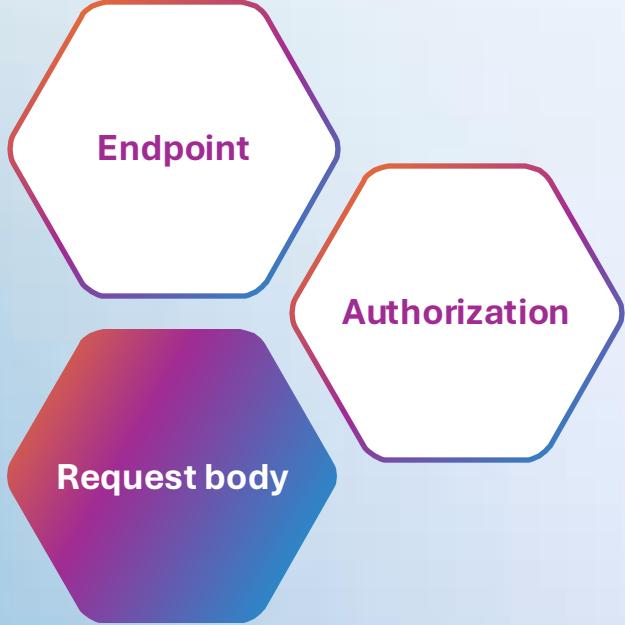
<https://platform.openai.com/settings/organization/api-keys>

# Request:



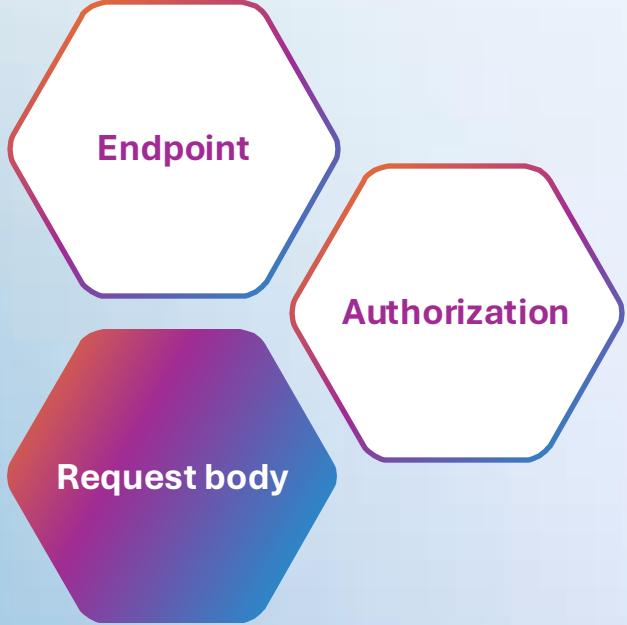
```
{  
  "model": "gpt-4o",  
  "messages": [...],  
  "tools": [  
    {  
      "function": {  
        "name": "<func_name_registered_in_app>",  
        "description": "Helps LLM to understand where to use such tool",  
        "parameters": {  
          "type": "object",  
          "properties": {  
            "sol": {  
              "type": "integer",  
              "description": "Sol of Mars."  
            }  
          },  
          "required": ["sol"],  
          "additionalProperties": false  
        },  
        "strict": true  
      }  
    ]  
  ]  
}
```

# Request:



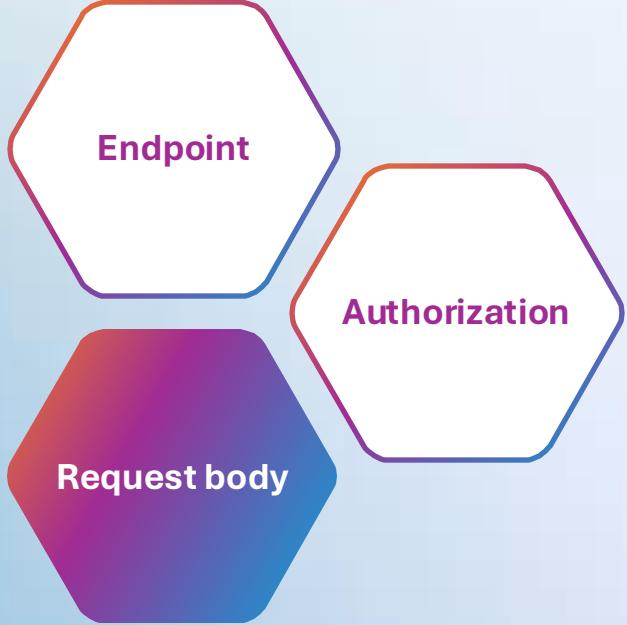
```
{  
  "model": "gpt-4o",  
  "messages": [...],  
  "tools": [  
    {  
      "function": {  
        "name": "<func_name_registered_in_app>",  
        "description": "Helps LLM to understand where to use such tool",  
        "parameters": {  
          "type": "object",  
          "properties": {  
            "sol": {  
              "type": "integer",  
              "description": "Sol of Mars."  
            }  
          },  
          "required": ["sol"],  
          "additionalProperties": false  
        },  
        "strict": true  
      }  
    ]  
  ]  
}
```

# Request:



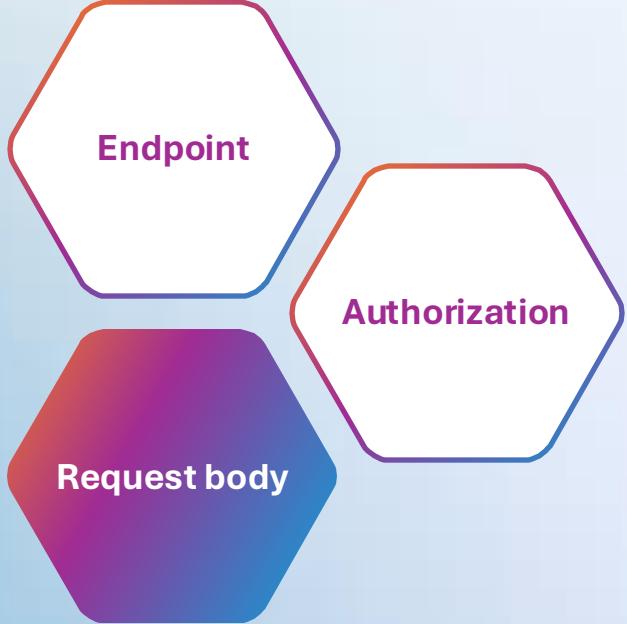
```
{  
  "model": "gpt-4o",  
  "messages": [...],  
  "tools": [  
    {  
      "function": {  
        "name": "<func_name_registered_in_app>",  
        "description": "Helps LLM to understand where to use such tool",  
        "parameters": {  
          "type": "object",  
          "properties": {  
            "sol": {  
              "type": "integer",  
              "description": "Sol of Mars."  
            }  
          },  
          "required": ["sol"],  
          "additionalProperties": false  
        },  
        "strict": true  
      }  
    }  
  ]  
}
```

# Request:



```
{  
  "model": "gpt-4o",  
  "messages": [...],  
  "tools": [  
    {  
      "function": {  
        "name": "<func_name_registered_in_app>",  
        "description": "Helps LLM to understand where to use such tool",  
        "parameters": {  
          "type": "object",  
          "properties": {  
            "sol": {  
              "type": "integer",  
              "description": "Sol of Mars."  
            }  
          },  
          "required": ["sol"],  
          "additionalProperties": false  
        },  
        "strict": true  
      }  
    }  
  ]  
}
```

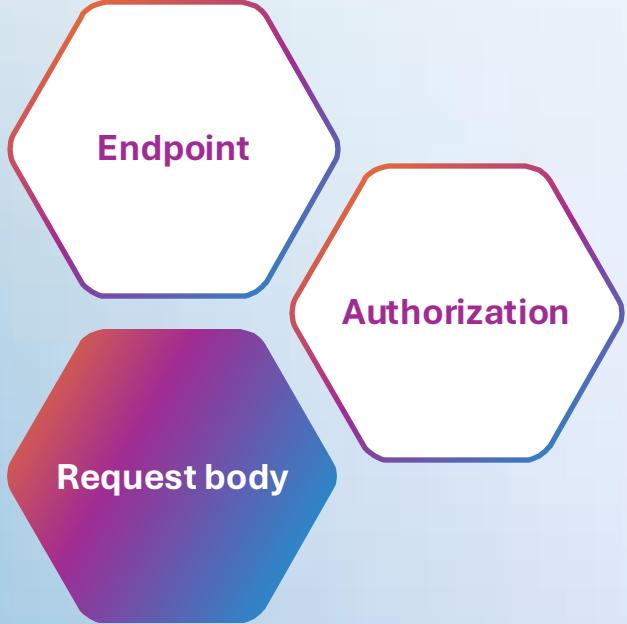
# Request:



A 'name' is unique identifier of tool in your system, that you will use to call the tool

```
{  
  "model": "gpt-4o",  
  "messages": [...],  
  "tools": [  
    {  
      "function": {  
        "name": "<func_name_registered_in_app>",  
        "description": "Helps LLM to understand where to use such tool",  
        "parameters": {  
          "type": "object",  
          "properties": {  
            "sol": {  
              "type": "integer",  
              "description": "Sol of Mars."  
            }  
          },  
          "required": ["sol"],  
          "additionalProperties": false  
        },  
        "strict": true  
      }  
    }  
  ]  
}
```

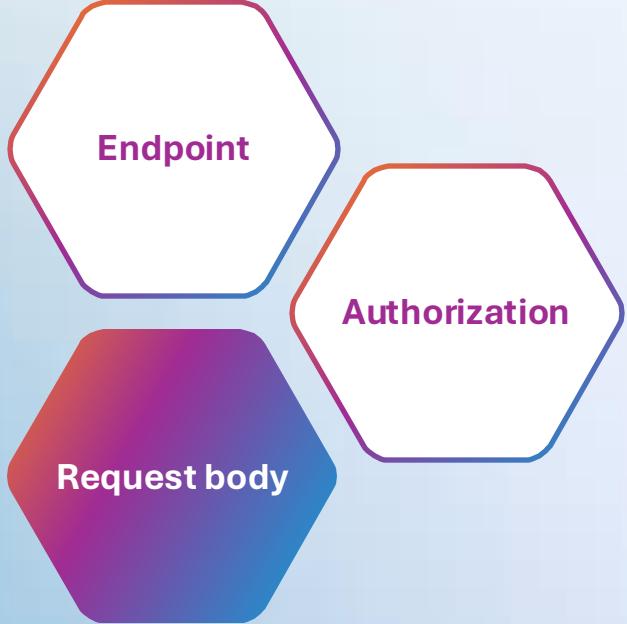
# Request:



By 'description' LLM will  
be able to understand  
where such tool can be  
used

```
{  
  "model": "gpt-4o",  
  "messages": [...],  
  "tools": [  
    {  
      "function": {  
        "name": "<func name registered in app>".  
        "description": "Helps LLM to understand where to use such tool",  
        "parameters": {  
          "type": "object",  
          "properties": {  
            "sol": {  
              "type": "integer",  
              "description": "Sol of Mars."  
            }  
          },  
          "required": ["sol"],  
          "additionalProperties": false  
        },  
        "strict": true  
      }  
    }  
  ]  
}
```

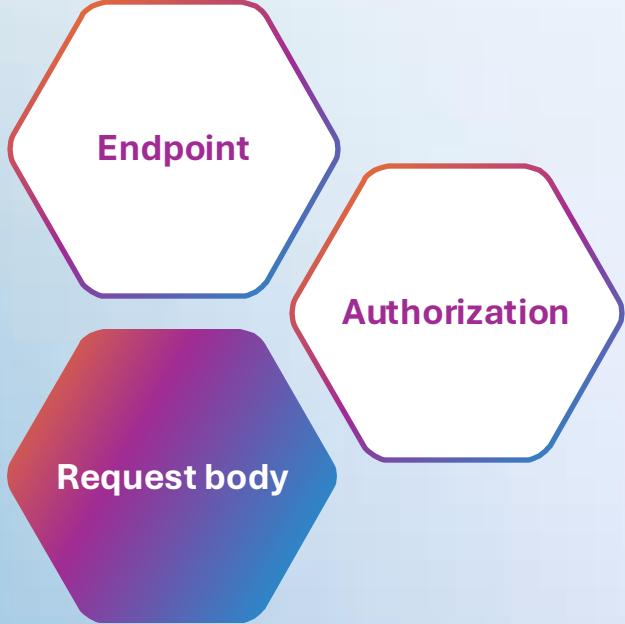
# Request:



'parameters' is the description of the Input that your tool/function applies

```
{  
  "model": "gpt-4o",  
  "messages": [...],  
  "tools": [  
    {  
      "function": {  
        "name": "<func_name_registered_in_app>",  
        "description": "Helps LLM to understand where to use such tool",  
        "parameters": {  
          "type": "object",  
          "properties": {  
            "sol": {  
              "type": "integer",  
              "description": "Sol of Mars."  
            }  
          },  
          "required": ["sol"],  
          "additionalProperties": false  
        },  
        "strict": true  
      }  
    }  
  ]  
}
```

# Request:



**'strict'** indicates to LLM that when it call the tool it should strictly follow the JSON Schema with tool description

```
{  
  "model": "gpt-4o",  
  "messages": [...],  
  "tools": [  
    {  
      "function": {  
        "name": "<func_name_registered_in_app>",  
        "description": "Helps LLM to understand where to use such tool",  
        "parameters": {  
          "type": "object",  
          "properties": {  
            "sol": {  
              "type": "integer",  
              "description": "Sol of Mars."  
            }  
          },  
          "required": ["sol"],  
          "additionalProperties": false  
        },  
        "strict": true  
      }  
    }  
  ]  
}
```



# AI Response with tools

*<Response and its handling>*

# Response:

```
{  
  ...  
  "model" : "gpt-4o-2024-08-06",  
  "choices" : [ {  
    "index" : 0,  
    "message" : {  
      "role" : "assistant",  
      "content" : null,  
      "tool_calls" : [  
        {  
          "id" : "call_8Ob1TsUgcTNAcJVssQb674Wq",  
          "type" : "function",  
          "function" : {  
            "name" : "nasa_image_stealer",  
            "arguments" : "{\"sol\": 401}"  
          }  
        },  
        {  
          "id" : "call_EvRjSO3UzymUzu3JTDoDAKo0",  
          "type" : "function",  
          "function" : {  
            "name" : "nasa_image_stealer",  
            "arguments" : "{\"sol\": 402}"  
          }  
        }  
      ],  
      "refusal" : null  
    },  
    "finish_reason" : "tool_calls"  
  ]},  
  ...  
}
```

# Response:

**'choices'** contains array with messages where you can choose the most appropriate message for you.

Amount of choices can be set up with '**n**' parameter in request. By default it is 1

**'finish\_reason'** explains us the reason of generation finish

```
{  
...  
"model" : "gpt-4o-2024-08-06"  
"choices" : [ {  
"index" : 0,  
"message" : {  
"role" : "assistant",  
"content" : null,  
"tool_calls" : [  
{  
"id" : "call_8Ob1TsUgcTNAcJVssQb674Wq",  
"type" : "function",  
"function" : {  
"name" : "nasa_image_stealer",  
"arguments" : "{\"sol\": 401}"  
}  
},  
{  
"id" : "call_EvRjSO3UzymUzu3JTDoDAKo0",  
"type" : "function",  
"function" : {  
"name" : "nasa_image_stealer",  
"arguments" : "{\"sol\": 402}"  
}  
}  
],  
"refusal" : null  
},  
"finish_reason" : "tool_calls"  
}],  
...  
}
```

# Response:

Choice contains 'message' that consist of:

```
{  
...  
"model" : "gpt-4o-2024-08-06",  
"choices" : [ {  
"index" : 0,  
"message" : {  
"role" : "assistant",  
"content" : null,  
"tool_calls" : [  
{  
"id" : "call_8Ob1TsUgcTNAcJVssQb674Wq",  
"type" : "function",  
"function" : {  
"name" : "nasa_image_stealer",  
"arguments" : "{\"sol\": 401}"  
}  
},  
{  
"id" : "call_EvRjSO3UzymUzu3JTDoDAKo0",  
"type" : "function",  
"function" : {  
"name" : "nasa_image_stealer",  
"arguments" : "{\"sol\": 402}"  
}  
}  
],  
"refusal" : null  
},  
"finish_reason" : "tool_calls"  
]  
...  
}
```

# Response:

Choice contains 'message' that consist of:  
- role

```
{  
...  
"model" : "gpt-4o-2024-08-06",  
"choices" : [ {  
"index" : 0,  
"message" : {  
"role" : "assistant",  
"content" : null,  
"tool_calls" : [  
{  
"id" : "call_8Ob1TsUgcTNAcJVssQb674Wq",  
"type" : "function",  
"function" : {  
"name" : "nasa_image_stealer",  
"arguments" : "{\"sol\": 401}"  
}  
},  
{  
"id" : "call_EvRjSO3UzymUzu3JTDoDAKo0",  
"type" : "function",  
"function" : {  
"name" : "nasa_image_stealer",  
"arguments" : "{\"sol\": 402}"  
}  
}  
],  
"refusal" : null  
},  
"finish_reason" : "tool_calls"  
} ],  
...  
}
```

# Response:

Choice contains 'message' that consist of:  
- role  
- content

```
{  
...  
"model" : "gpt-4o-2024-08-06",  
"choices" : [ {  
"index" : 0,  
"message" : {  
"role" : "assistant",  
"content" : null,  
"tool_calls" : [  
{  
"id" : "call_8Ob1TsUgcTNAcJVssQb674Wq",  
"type" : "function",  
"function" : {  
"name" : "nasa_image_stealer",  
"arguments" : "{\"sol\": 401}"  
}  
},  
{  
"id" : "call_EvRjSO3UzymUzu3JTDoDAKo0",  
"type" : "function",  
"function" : {  
"name" : "nasa_image_stealer",  
"arguments" : "{\"sol\": 402}"  
}  
}  
],  
"refusal" : null  
},  
"finish_reason" : "tool_calls"  
}],  
...  
}
```

# Response:

Choice contains 'message' that consist of:  
- role  
- content  
- tool\_calls

```
{  
...  
"model" : "gpt-4o-2024-08-06",  
"choices" : [ {  
"index" : 0,  
"message" : {  
"role" : "assistant",  
"content" : null,  
"tool_calls" : [  
{  
"id" : "call_8Ob1TsUgcTNAcJVssQb674Wq",  
"type" : "function",  
"function" : {  
"name" : "nasa_image_stealer",  
"arguments" : "{\"sol\": 401}"  
}  
},  
{  
"id" : "call_EvRjSO3UzymUzu3JTDoDAKo0",  
"type" : "function",  
"function" : {  
"name" : "nasa_image_stealer",  
"arguments" : "{\"sol\": 402}"  
}  
}  
]  
,"refusal" : null  
},  
"finish_reason" : "tool_calls"  
}],  
...  
}
```

# Response:

Tool call 'id' is the special  
identificatory that we  
need to pass with tool  
response to LLM

```
{  
...  
"model" : "gpt-4o-2024-08-06",  
"choices" : [ {  
"index" : 0,  
"message" : {  
"role" : "assistant",  
"content" : null,  
"tool_calls" : [  
{  
"id" : "call_8Ob1TsUgcTNAcJVssQb674Wq",  
"type" : "function",  
"function" : {  
"name" : "nasa_image_stealer",  
"arguments" : "{\"sol\": 401}"  
}  
},  
{  
"id" : "call_EvRjSO3UzymUzu3JTDoDAKo0",  
"type" : "function",  
"function" : {  
"name" : "nasa_image_stealer",  
"arguments" : "{\"sol\": 402}"  
}  
}  
],  
"refusal" : null  
},  
"finish_reason" : "tool_calls"  
}],  
...  
}
```

# Response:

**'function'** contains the function/tool '**'name'** and '**'arguments'** dict that should be passed to function

```
{  
...  
"model" : "gpt-4o-2024-08-06",  
"choices" : [ {  
    "index" : 0,  
    "message" : {  
        "role" : "assistant",  
        "content" : null,  
        "tool_calls" : [  
            {  
                "id" : "call_8Ob1TsUgcTNAcJVssQb674Wq",  
                "type" : "function",  
                "function" : {  
                    "name" : "nasa_image_stealer",  
                    "arguments" : "{\"sol\": 401}"  
                }  
            },  
            {  
                "id" : "call_EvRjSO3UzymUzu3JTDoDAKo0",  
                "type" : "function",  
                "function" : {  
                    "name" : "nasa_image_stealer",  
                    "arguments" : "{\"sol\": 402}"  
                }  
            }  
        ],  
        "refusal" : null  
    },  
    "finish_reason" : "tool_calls"  
}],  
...  
}
```

# Response:

**Choice contains 'message' that consist of:**

- role
- content
- tool\_calls
- refusal explains the reason of why LLM cannot give the response (policy, etc...)

```
{  
...  
"model" : "gpt-4o-2024-08-06",  
"choices" : [ {  
"index" : 0,  
"message" : {  
"role" : "assistant",  
"content" : null,  
"tool_calls" : [  
{  
"id" : "call_8Ob1TsUgcTNAcJVssQb674Wq",  
"type" : "function",  
"function" : {  
"name" : "nasa_image_stealer",  
"arguments" : "{\"sol\": 401}"  
}  
},  
{  
"id" : "call_EvRjSO3UzymUzu3JTDoDAKo0",  
"type" : "function",  
"function" : {  
"name" : "nasa_image_stealer",  
"arguments" : "{\"sol\": 402}"  
}  
}  
],  
"refusal" : {}  
},  
"finish_reason" : "tool_calls"  
}],  
...  
}
```



# Request with tool execution results

*<Request and its params>*

# Request with tool response:

## History

```
{  
  "model" : "gpt-4o",  
  "messages" : [ {  
    "role" : "system",  
    "content" : "You are an advanced AI agent equipped with tools that will help you to provide NASA pictures description and do simple math calculations. Use this tools in your work."  
  }, {  
    "role" : "user",  
    "content" : "Find descriptions of largest NASA pictures for sol 401, 402 and 452 and tell me idf they have smth similar?"  
  }, {  
    "role" : "assistant",  
    "content" :  
      "{\"id\": \"call_9I3muE6KzCataJPaTJ4uRfxz\", \"type\": \"function\", \"function\": {\"name\": \"nasa_image_stealer\", \"arguments\": \"{{\\\"sol\\\": 401}}\"}}"  
  }, {  
    "role" : "assistant",  
    "content" :  
      "{\"id\": \"call_HYIpjUgl6zGsrvvJxk7k0ODr\", \"type\": \"function\", \"function\": {\"name\": \"nasa_image_stealer\", \"arguments\": \"{{\\\"sol\\\": 452}}\"}}"  
  }, {  
    "role" : "function",  
    "name" : "nasa_image_stealer",  
    "content" : "The image shows a close-up view of a rocky surface, likely from a planetary...",  
    "tool_call_id" : "call_9I3muE6KzCataJPaTJ4uRfxz"  
  }, {  
    "role" : "function",  
    "name" : "nasa_image_stealer",  
    "content" : "No images found",  
    "tool_call_id" : "call_HYIpjUgl6zGsrvvJxk7k0ODr"  
  } ],  
  "tools" : [...]  
}
```

# Request with tool response:

Function/tool responses

```
{  
  "model" : "gpt-4o",  
  "messages" : [ {  
    "role" : "system",  
    "content" : "You are an advanced AI agent equipped with tools that will help you to provide NASA pictures description and do simple math calculations. Use this tools in your work."  
  }, {  
    "role" : "user",  
    "content" : "Find descriptions of largest NASA pictures for sol 401, 402 and 452 and tell me idf they have smth similar?"  
  }, {  
    "role" : "assistant",  
    "content" :  
      "{\"id\":\"call_9I3muE6KzCataJPaTJ4uRfxz\",\"type\":\"function\",\"function\":{\"name\":\"nasa_image_stealer\"},\"arguments\":{\"sol\":401}}"  
  }, {  
    "role" : "assistant",  
    "content" :  
      "{\"id\":\"call_HYIpjUgl6zGsrvvJxk7k0ODr\",\"type\":\"function\",\"function\":{\"name\":\"nasa_image_stealer\"},\"arguments\":{\"sol\":452}}"  
  }, {  
    "role" : "function",  
    "name" : "nasa_image_stealer",  
    "content" : "The image shows a close-up view of a rocky surface, likely from a planetary...",  
    "tool_call_id" : "call_9I3muE6KzCataJPaTJ4uRfxz"  
  }, {  
    "role" : "function",  
    "name" : "nasa_image_stealer",  
    "content" : "No images found",  
    "tool_call_id" : "call_HYIpjUgl6zGsrvvJxk7k0ODr"  
  } ],  
  "tools" : [...]  
}
```

# Request with tool response:

Called function name

```
{  
  "model" : "gpt-4o",  
  "messages" : [ {  
    "role" : "system",  
    "content" : "You are an advanced AI agent equipped with tools that will help you to provide NASA pictures description and do simple math calculations. Use this tools in your work."  
  }, {  
    "role" : "user",  
    "content" : "Find descriptions of largest NASA pictures for sol 401, 402 and 452 and tell me idf they have smth similar?"  
  }, {  
    "role" : "assistant",  
    "content" :  
      "{\"id\": \"call_9I3muE6KzCataJPaTJ4uRfxz\", \"type\": \"function\", \"function\": {\"name\": \"nasa_image_stealer\", \"arguments\": \"{\\\"sol\\\": 401}\"}}"  
  }, {  
    "role" : "assistant",  
    "content" :  
      "{\"id\": \"call_HYIpjUgl6zGsrvvJxk7k0ODr\", \"type\": \"function\", \"function\": {\"name\": \"nasa_image_stealer\", \"arguments\": \"{\\\"sol\\\": 452}\"}}"  
  }, {  
    "role" : "function",  
    "name" : "nasa_image_stealer",  
    "content" : "The image shows a close-up view of a rocky surface, likely from a planetary...",  
    "tool_call_id" : "call_9I3muE6KzCataJPaTJ4uRfxz"  
  }, {  
    "role" : "function",  
    "name" : "nasa_image_stealer",  
    "content" : "No images found",  
    "tool_call_id" : "call_HYIpjUgl6zGsrvvJxk7k0ODr"  
  }]  
  "tools" : [...]  
}
```

# Request with tool response:

Called function result

```
{  
  "model" : "gpt-4o",  
  "messages" : [ {  
    "role" : "system",  
    "content" : "You are an advanced AI agent equipped with tools that will help you to provide NASA pictures description and do simple math calculations. Use this tools in your work."  
  }, {  
    "role" : "user",  
    "content" : "Find descriptions of largest NASA pictures for sol 401, 402 and 452 and tell me idf they have smth similar?"  
  }, {  
    "role" : "assistant",  
    "content" :  
      "{\"id\": \"call_9I3muE6KzCataJPaTJ4uRfxz\", \"type\": \"function\", \"function\": {\"name\": \"nasa_image_stealer\", \"arguments\": \"{\\\"sol\\\": 401}\"}}"  
  }, {  
    "role" : "assistant",  
    "content" :  
      "{\"id\": \"call_HYIpjUgl6zGsrvvJxk7k0ODr\", \"type\": \"function\", \"function\": {\"name\": \"nasa_image_stealer\", \"arguments\": \"{\\\"sol\\\": 452}\"}}"  
  }, {  
    "role" : "function",  
    "name" : "nasa_image_stealer",  
    "content" : "The image shows a close-up view of a rocky surface, likely from a planetary...",  
    "tool_call_id" : "call_9I3muE6KzCataJPaTJ4uRfxz"  
  }, {  
    "role" : "function",  
    "name" : "nasa_image_stealer",  
    "content" : "No images found",  
    "tool_call_id" : "call_HYIpjUgl6zGsrvvJxk7k0ODr"  
  } ],  
  "tools" : [...]  
}
```

# Request with tool response:

In OpenAI's API, the `tool_call_id` is used to associate a function/tool call with its corresponding result. If you do not pass this ID or provide an incorrect one, the LLM will return an error indicating an unrecognized tool call.

Additionally, if any required tool call IDs are missing in the request, the API will return an error specifying which tool calls are absent."

```
{  
  "model" : "gpt-4o",  
  "messages" : [ {  
    "role" : "system",  
    "content" : "You are an advanced AI agent equipped with tools that will help you to provide NASA pictures description and do simple math calculations. Use this tools in your work."  
  }, {  
    "role" : "user",  
    "content" : "Find descriptions of largest NASA pictures for sol 401, 402 and 452 and tell me idf they have smth similar?"  
  }, {  
    "role" : "assistant",  
    "content" :  
      "{\"id\":\"call_9I3muE6KzCataJPaTJ4uRfxz\", \"type\":\"function\", \"function\":{\\\"name\\\":\\\"nasa_image_stealer\\\", \\\"arguments\\\":{\\\"sol\\\": 401}}}"  
  }, {  
    "role" : "assistant",  
    "content" :  
      "{\"id\":\"call_HYIpjUgl6zGsrvvJxk7k0ODr\", \"type\":\"function\", \"function\":{\\\"name\\\":\\\"nasa_image_stealer\\\", \\\"arguments\\\":{\\\"sol\\\": 452}}}"  
  }, {  
    "role" : "function",  
    "name" : "nasa_image_stealer",  
    "content" : "The image shows a close-up view of a rocky surface, likely from a planetary...",  
    "tool_call_id" : "call_9I3muE6KzCataJPaTJ4uRfxz"  
  }, {  
    "role" : "function",  
    "name" : "nasa_image_stealer",  
    "content" : "No images found",  
    "tool_call_id" : "call_HYIpjUgl6zGsrvvJxk7k0ODr"  
  } ],  
  "tools" : [...]  
}
```

# Request with tool response:

Don't forget to put tools to all requests to LLM

```
{  
  "model" : "gpt-4o",  
  "messages" : [ {  
    "role" : "system",  
    "content" : "You are an advanced AI agent equipped with tools that will help you to provide NASA pictures description and do simple math calculations. Use this tools in your work."  
  }, {  
    "role" : "user",  
    "content" : "Find descriptions of largest NASA pictures for sol 401, 402 and 452 and tell me idf they have smth similar?"  
  }, {  
    "role" : "assistant",  
    "content" :  
      "{\"id\":\"call_9I3muE6KzCataJPaTJ4uRfxz\",\"type\":\"function\",\"function\":{\"name\":\"nasa_image_stealer\"},\"arguments\":{\"sol\":401}}"  
  }, {  
    "role" : "assistant",  
    "content" :  
      "{\"id\":\"call_HYIpjUgl6zGsrvvJxk7k0ODr\",\"type\":\"function\",\"function\":{\"name\":\"nasa_image_stealer\"},\"arguments\":{\"sol\":452}}"  
  }, {  
    "role" : "function",  
    "name" : "nasa_image_stealer",  
    "content" : "The image shows a close-up view of a rocky surface, likely from a planetary...",  
    "tool_call_id" : "call_9I3muE6KzCataJPaTJ4uRfxz"  
  }, {  
    "role" : "function",  
    "name" : "nasa_image_stealer",  
    "content" : "No images found",  
    "tool_call_id" : "call_HYIpjUgl6zGsrvvJxk7k0ODr"  
  }]  
  "tools" : [...]  
}
```



# Final Response

*<Response and its handling>*

# Final Response:

```
{  
  "id" : "chatcmpl-AwwZ1uE2V80JfXkSYUfAlgW3gJiwa",  
  "object" : "chat.completion",  
  "created" : 1738611507,  
  "model" : "gpt-4o-2024-08-06",  
  "choices" : [ {  
    "index" : 0,  
    "message" : {  
      "role" : "assistant",  
      "content" : "I found the descriptions for the largest NASA images for sols 401 and 402, but there doesn't seem to be any image available for sol 452.\n\n- **Sol 401**: The image depicts a close-up view of a rocky surface with coarse particles and small rocks, displaying a dusty environment with shades of brown and gray, typical of Martian terrain.\n- **Sol 402**: This image also features a rocky and sandy Martian landscape with a variety of textures, smooth areas, and scattered rocks. It shows a slope or incline in the landscape with a reddish or tan soil backdrop.\n\n**Similarities**: Both images showcase rocky surfaces with a variety of textures, common in Martian landscapes.\n- The color palettes in both images are characterized by shades of brown, gray, reddish, or tan, consistent with typical Martian terrain.\n- They both focus on geological features useful for studying Mars' surface composition.\n\nHowever, there is no image available for Sol 452 to compare with these descriptions.",  
      "refusal" : null  
    },  
    "logprobs" : null,  
    "finish_reason" : "stop"  
  } ],  
  "usage" : {...},  
  "service_tier" : "default",  
  "system_fingerprint" : "fp_50cad350e4"  
}
```

# Thank you

- Author: Pavlo Khshanovskyi
- My LinkedIn: [Link to your LI](#)
- Date: February 2025
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