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Universidad de Guanajuato
Colaboración entre robots aéreo y terrestre para la navegación en entornos desconocidos

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Resumen: Se propone utilizar un robot terrestre autónomo del tipo diferencial, equipado con un sensor lidar para la detección de obstáculos, en conjunto con un robot aéreo del tipo cuadricóptero equipado con una cámara monocular. Aplicando técnicas de construcción de mapas de ocupación y visión por computadora, se fusionará la información obtenida por ambos robots para la creación de un mapa compartido de un entorno desconocido. Se probarán métodos de coordinación y colaboración entre ambos robots para maximizar la cantidad de información obtenida e incorporada al mapa en cada instante de tiempo.

Este repositorio contiene una simulación compatible con CoppeliaSim, así como código fuente en Python, donde se lleva a cabo la exploración de un entorno mientras se crea un mapa de rejilla de ocupación. Se emplean un robot terrestre (Pioneer 3DX) y un dron (cuadricóptero) que forman parte del acervo de robots que se incluyen por defecto en CoppeliaSim.

Requisitos:

- Simulador CoppeliaSim v4.10
- Python 3.12

Instrucciones para ejecutar el código:

1. Instalar los paquetes necesarios para Python con la herramienta pip. Se incluye un archivo "requirements.txt" que puede emplearse con el comando

```
pip install -r requirements.txt
```

2. Abrir el escenario llamado "Obstaculos.ttt" en CoppeliaSim.
3. Ejecutar el script con el comando

```
python VI_TerrestreAereo.py
```

Por defecto se verá que el dron intenta mantener el robot terrestre en el centro del campo de visión de su cámara. La simulación se ejecutará durante 120 segundos pero puede detenerse presionando la tecla ****q****.

Si se desea comenzar un mapa completamente nuevo, es necesario asegurar que no exista un archivo "map.txt" en el directorio donde se ejecuta el programa.

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