Jetbot "Robot Launcher" OS

This is the main operating system layer for your NVIDIA Jetson-based pet robot. It handles process management, crash recovery, inter-process communication, and hardware interfacing.

📂 Directory Structure

Create a folder named `jetbot_os` on your Jetson and arrange the files as follows:

```
/home/jetson/jetbot_os/
├── main_launcher.py        # Entry point (Systemd targets this)
├── config.json             # API keys, settings, timeouts
├── core/
│   ├── __init__.py
│   └── event_bus.py        # Shared memory IPC
├── modules/
│   ├── __init__.py
│   ├── face_display.py     # Pygame UI
│   ├── web_api.py          # FastAPI for Android App
│   ├── llm_voice.py        # Voice & Intelligence
│   ├── navigation.py       # ROS Bridge & Motor Safety
│   └── camera_stream.py    # Camera handling
└── setup/
    └── robot-launcher.service
```

🚀 Installation & Setup

1. Dependencies

Install the required system and Python libraries on the Jetson:

```
sudo apt-get update
sudo apt-get install python3-pip python3-pygame libatlas-base-dev portaudio19-dev

# Python requirements
pip3 install fastapi uvicorn[standard] requests pyserial numpy
# If using OpenAI for LLM:
pip3 install openai
# For Voice (example libraries):
pip3 install speechrecognition pyttsx3
```

2. ROS Setup

Ensure your standard Jetbot ROS workspace is sourced in your `.bashrc`. The `navigation.py` module assumes you have a launch file (e.g., `roslaunch jetbot_ros nav.launch`) available.

3. Autostart Configuration (Systemd)

To make the robot start automatically on boot:

1. Copy the service file: `sudo cp setup/robot-launcher.service /etc/systemd/system/`
2. Reload daemon: `sudo systemctl daemon-reload`
3. Enable and Start: `sudo systemctl enable robot-launcher.service  sudo systemctl start robot-launcher.service`

🕹️ Usage

Manual Control: Currently exposed via the Web API. You can send HTTP POST requests to: `http://<JETSON_IP>:8000/control/move` with payload `{"x": 1.0, "y": 0.0}`.

Switching Modes: Send POST to `http://<JETSON_IP>:8000/system/mode` with `{"mode": "auto"}` or `{"mode": "manual"}`.

Logs: Logs are stored in `system.log`. To view live logs: `tail -f system.log`