Co-Processing Architecture

High-level Processing

Raspberry Pi 3
Main Controller

Time-critical Tasks

ESP32/STM32
Co-Processor

High-Speed Serial
Processed Data

System Initialization

User Interface

Data Logging

Actuator Control

Coordination

Image Pre-Processing

Object Tracking

Timing Calculations

Ejection Scheduling

Signal Conditioning

UART/SPI/I²C
Communication

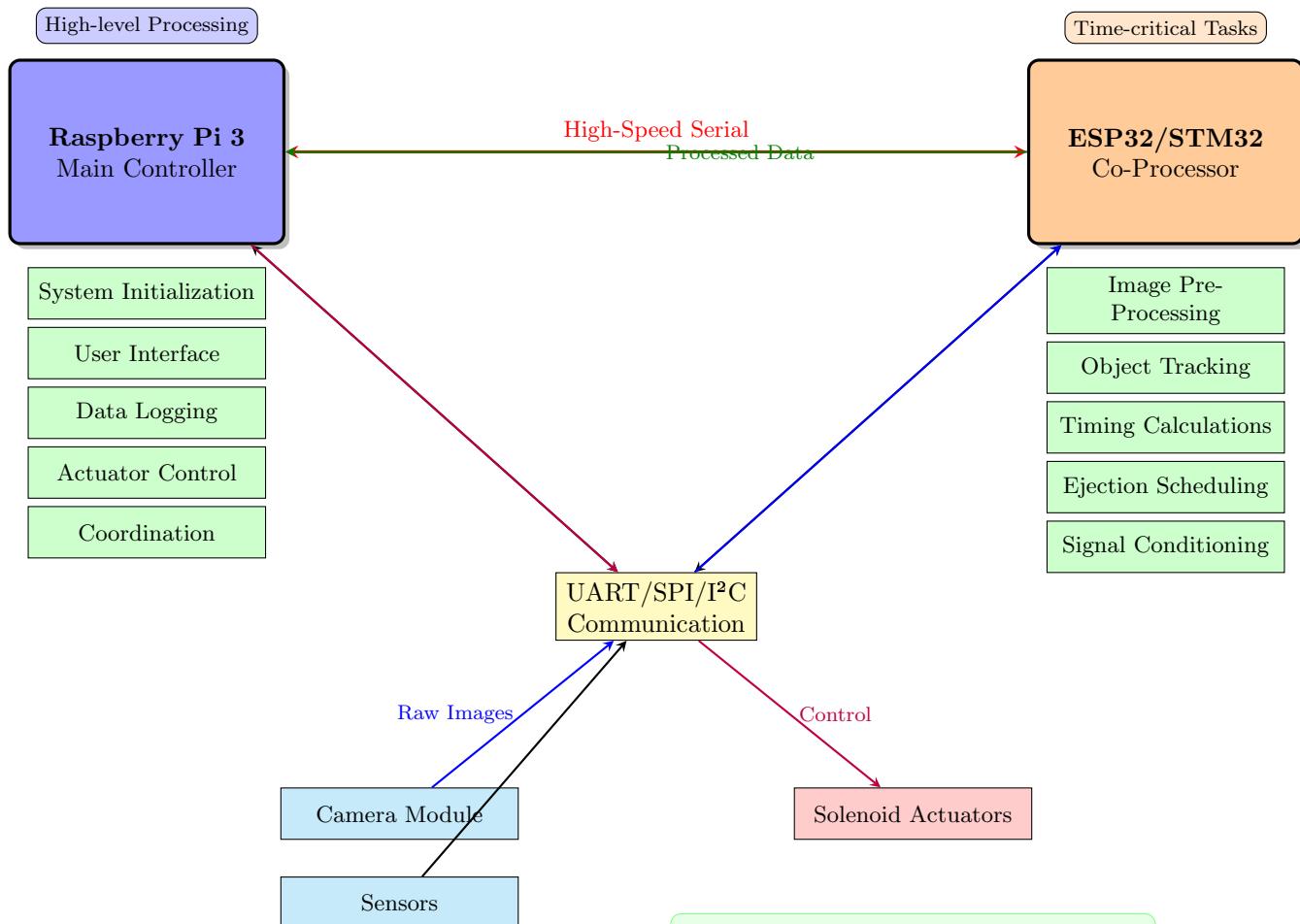Raw Images

Control

Camera Module

Sensors

Solenoid Actuators

Benefits:
- Reduced latency
- Increased throughput
- Better real-time performance
- Parallel processing capability