Subsea Imaging Solution

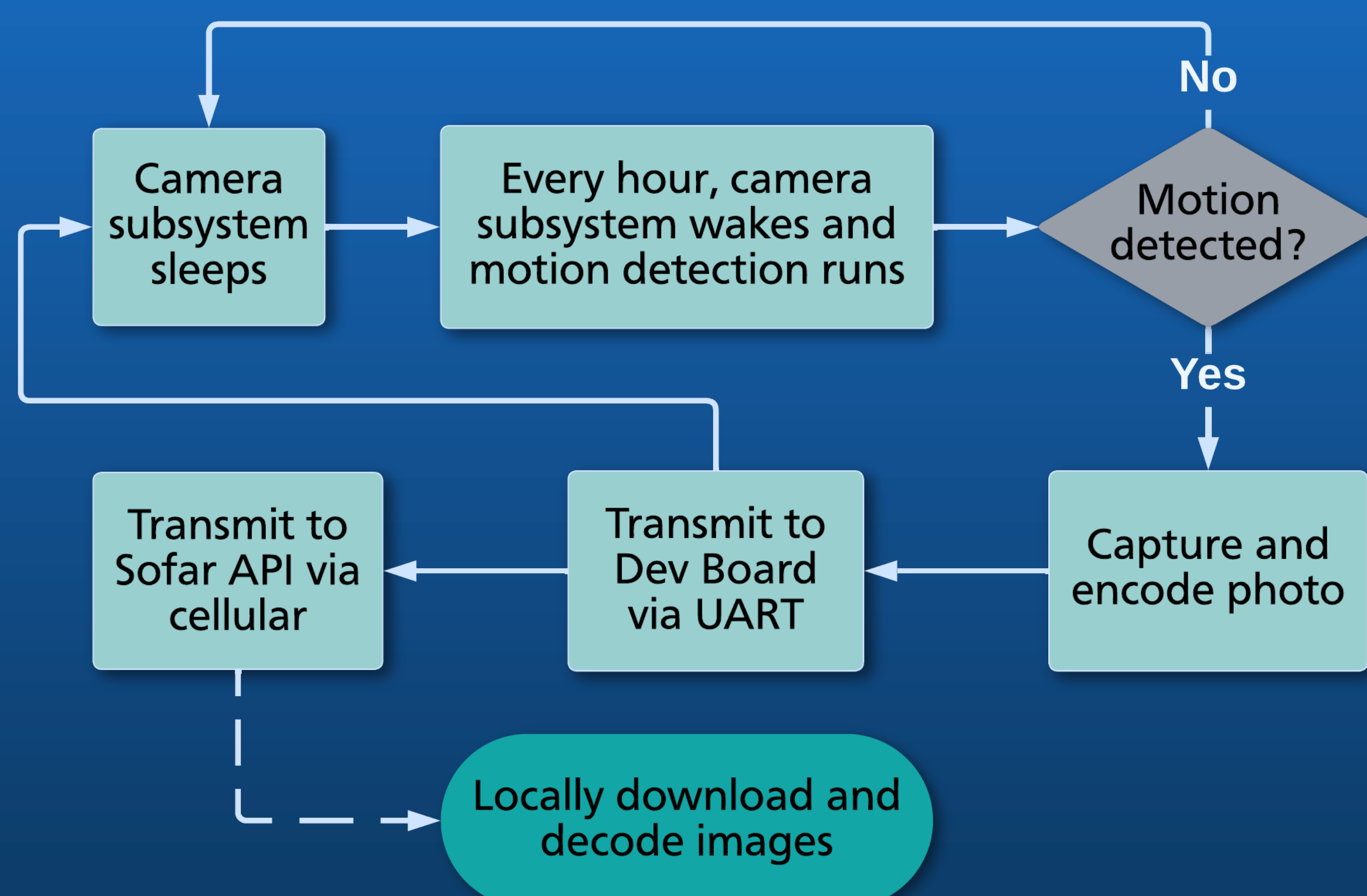Joshua Chang | Huaimao Liu | Brian Shubat | Ellie Peauroi | Kaitlyn Yau

REMORA

Background

Current advancements in marine research are limited by a lack of standardization in connection protocols.. In response, Remora aims to expand on the Bristlemouth platform, an open standard plug-and-play system for marine hardware, to become a scalable and affordable solution for collecting marine data. Remora can capture and wirelessly transmit live image data while using motion detection to verify objects of interest, allowing users to focus on making breakthroughs in research.

Overview / Design Specs

- **Raspberry Pi 4B microcontroller:** Operates camera, processes data, and runs motion detection.
- **Bluerobotics Low-Light HD USB Camera**: Connects to Raspberry Pi, delivers 800x600p images to the system.
- **PiSugar and battery**: Powers the Raspberry Pi and automates sleep and wake cycles to save power.
- **Development Board and Spotter**: The Spotter is equipped with solar panels, enables cellular access, and is the basis of the system.
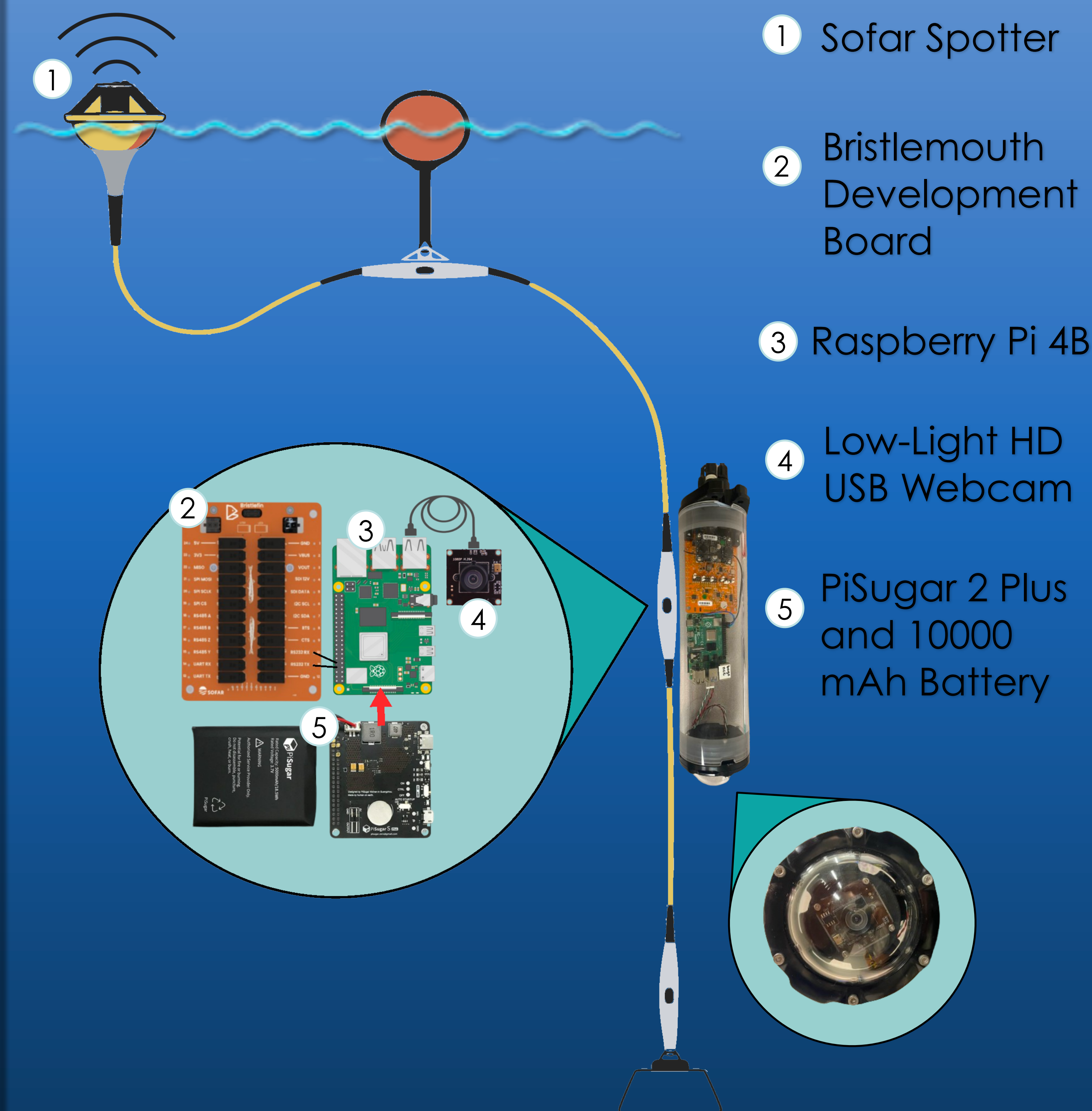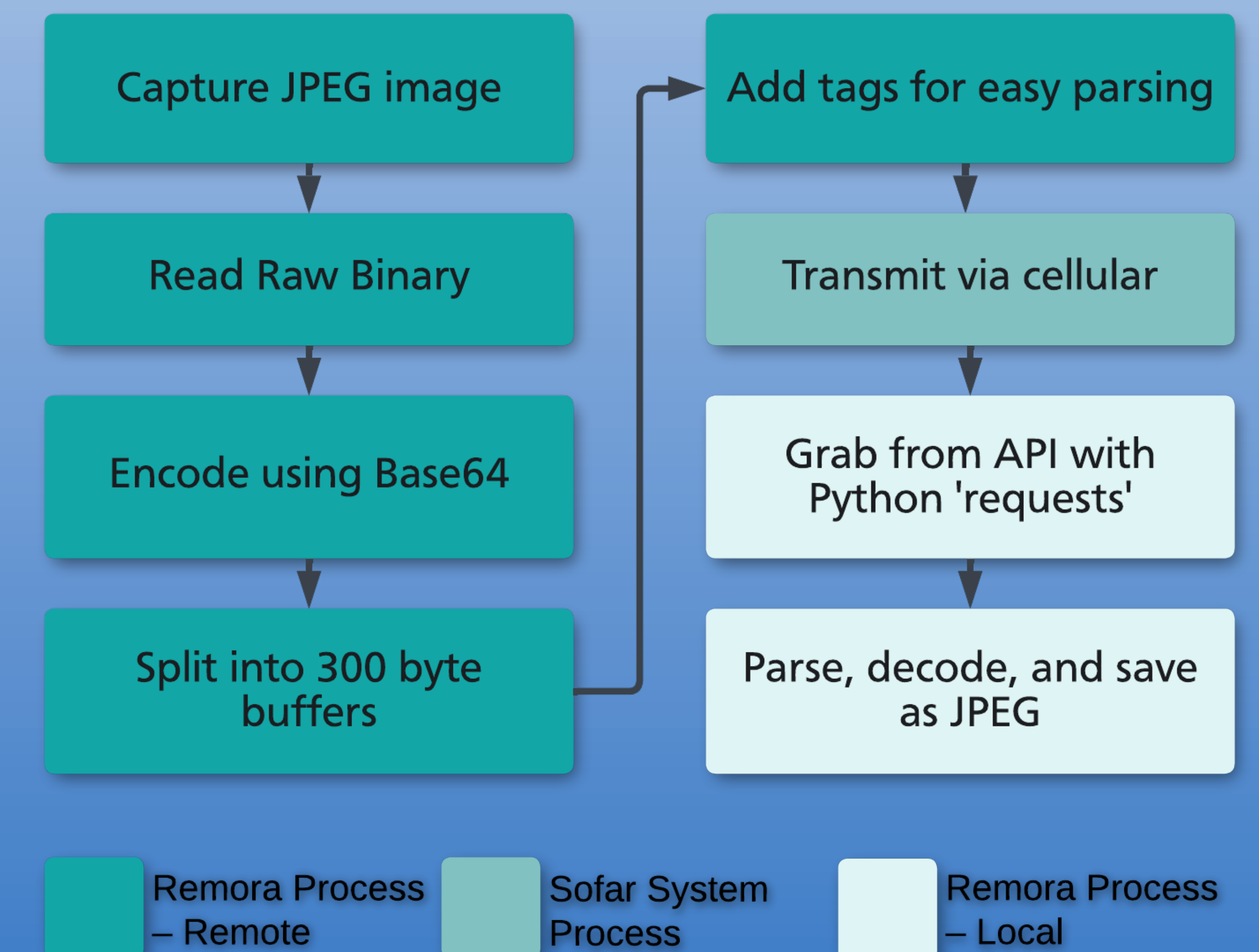
Functional Flow Diagram

Final Design

Key Components

1. Sofar Spotter
2. Bristlemouth Development Board
3. Raspberry Pi 4B
4. Low-Light HD USB Webcam
5. PiSugar 2 Plus and 10000 mAh Battery

Image Flow Process

The system is constrained by data transmission sizes and types so to address this issue, the system utilizes base-64 encoding and feeds buffers through the system.

- Capture JPEG image
- Read Raw Binary
- Encode using Base64
- Split into 300 byte buffers
- Add tags for easy parsing
- Transmit via cellular
- Grab from API with Python 'requests'
- Parse, decode, and save as JPEG

Remora Process – Remote
Sofar System Process
Remora Process – Local

Key Results

Deployment Environment

Captured Image

	latitude	longitude	timestamp	sensorPosi	bristlemou	units	value	unit_type	data_type_name
1									
2	34.41462	-119.848	2023-10-24T23:04:01	0x234daea	hex		48656c6c6	binary	binary_hex_encoded
3	34.41463	-119.848	2023-10-24T23:05:01	0x234daea	hex		48656c6c6	binary	binary_hex_encoded

Sofar API Data

REMORA_Local

REMORA_RPi

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