



Nao, The Matador!



— The best project by the Best team —

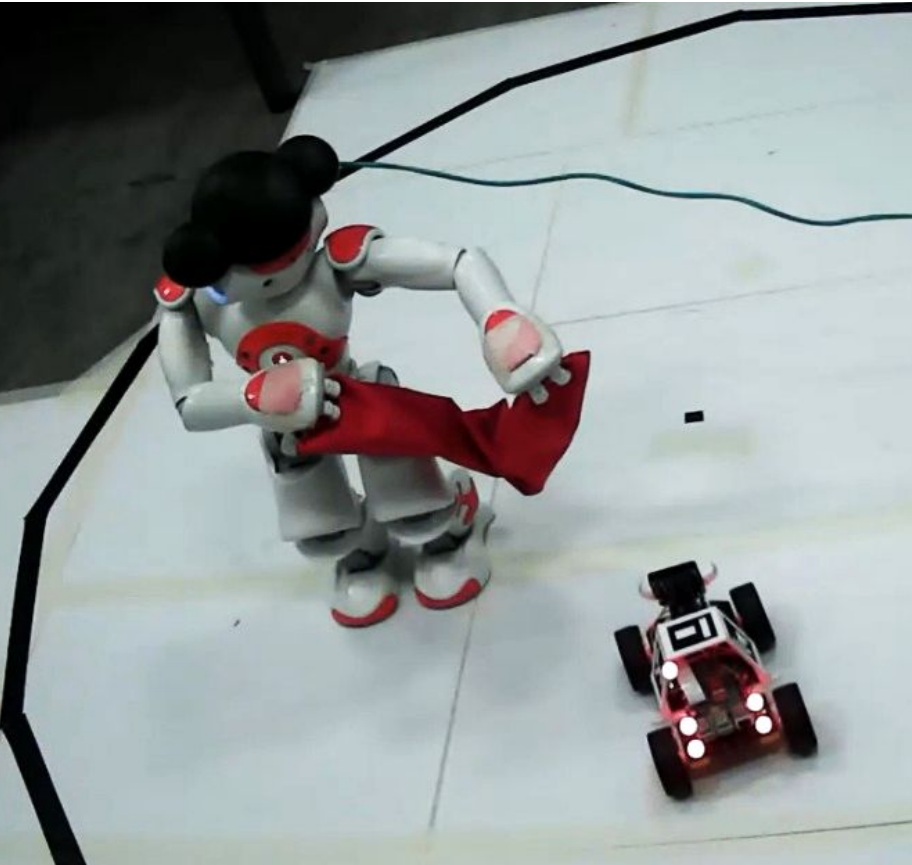
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1. Introduction: What do we do?



- Who are we?
 - Nao, the Matador
 - The Robo-Bull
- What can we do?
 - We see
 - We hear
 - We talk
 - We walk
 - We manipulate
 - We move around
 - **We fight!**

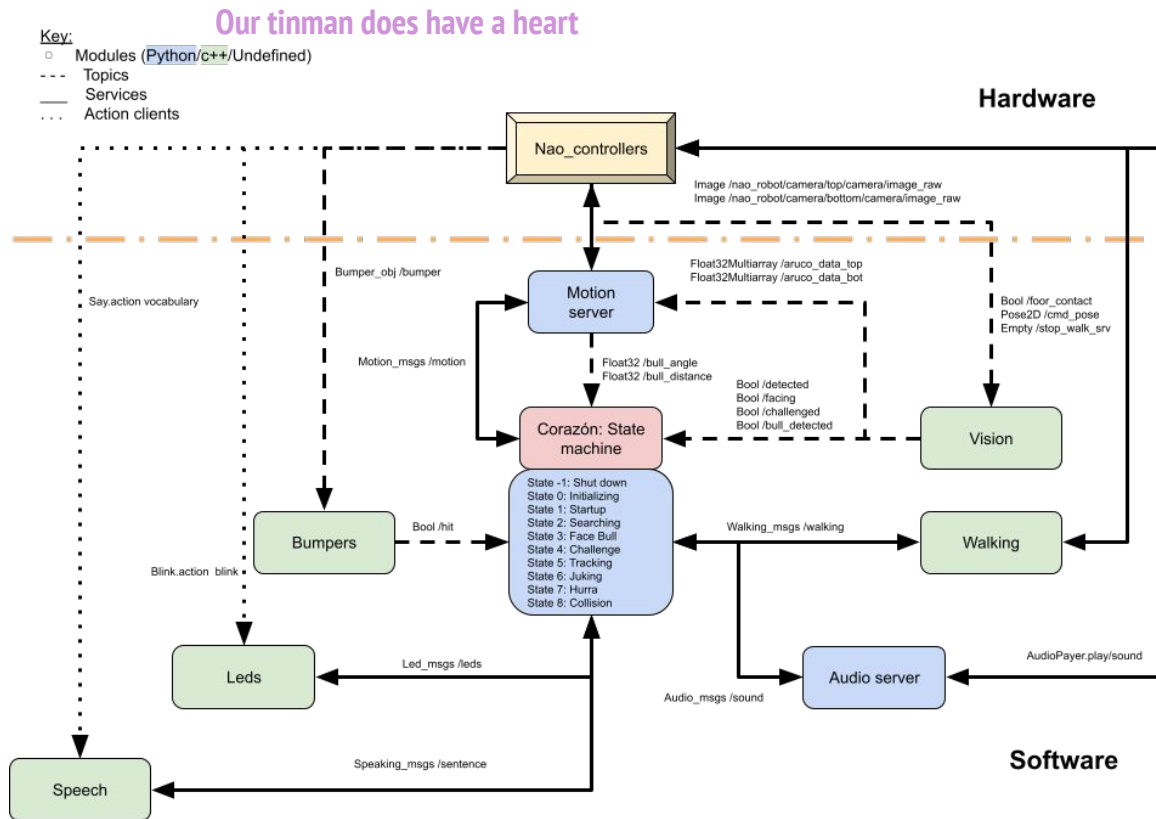
2. The Matador

First robotic bull fighter in the world!

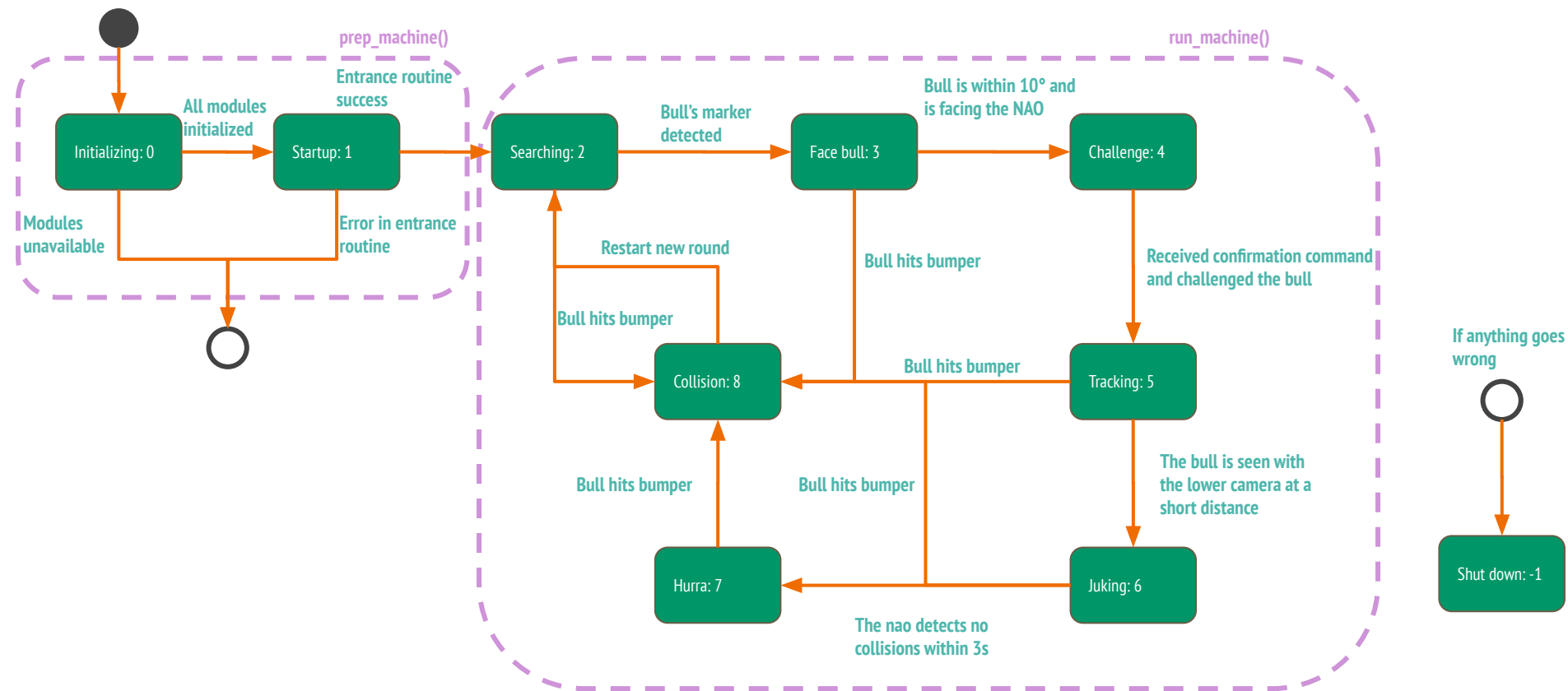


2.1 Nao's system Architecture

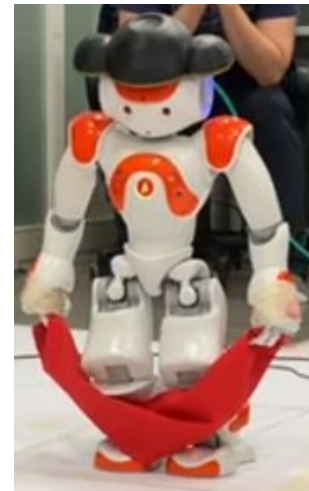
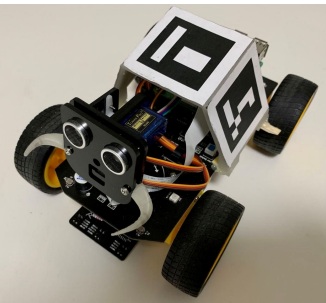
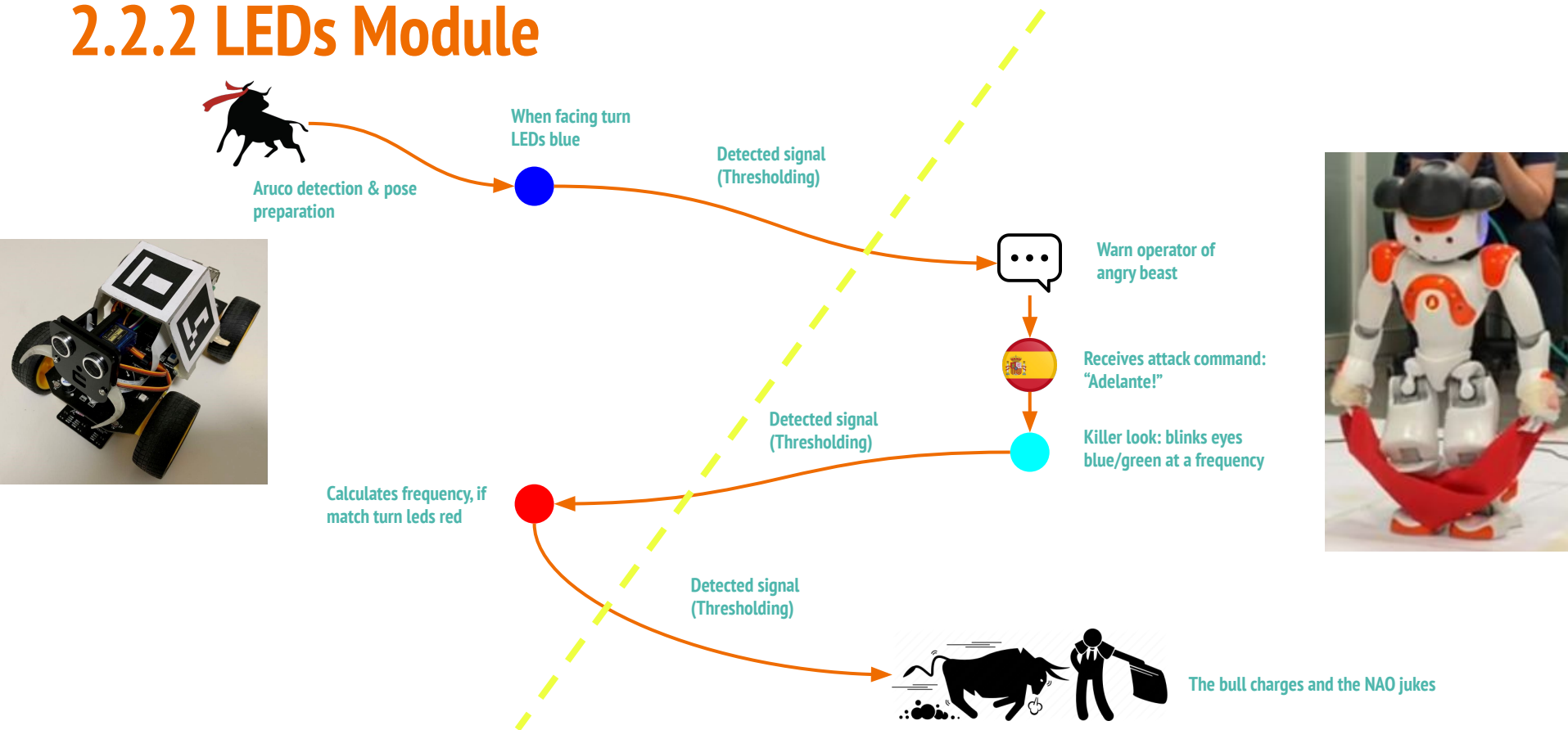
- **Reactive**
 - Callback functions
 - Small msgs
 - Non-locking functions (For the most part)
- **Distributed and emerged**
 - Independent subsystems running parallelly (Modules)
 - Central integrator (Corazón state machine)
- **Elements of task based control**
 - Integrator is a state machine
 - For each state, the modules receive tasks to complete
 - Then task based at the local level



2.2.1 Corazón: State machine

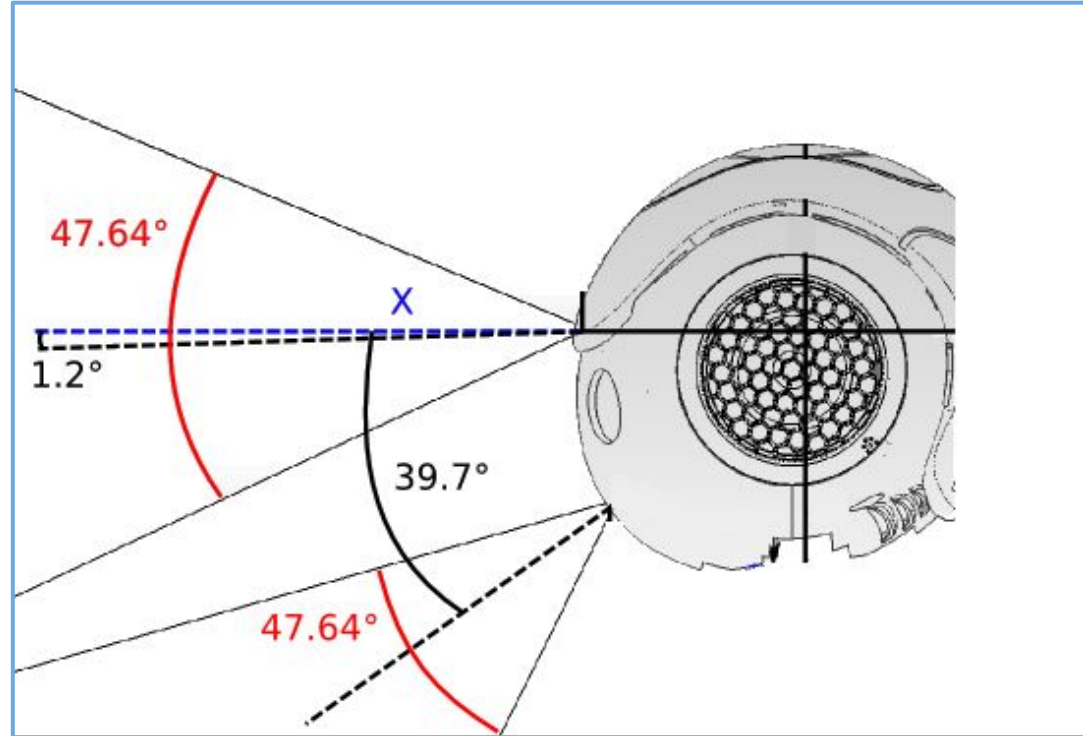


2.2.2 LEDs Module

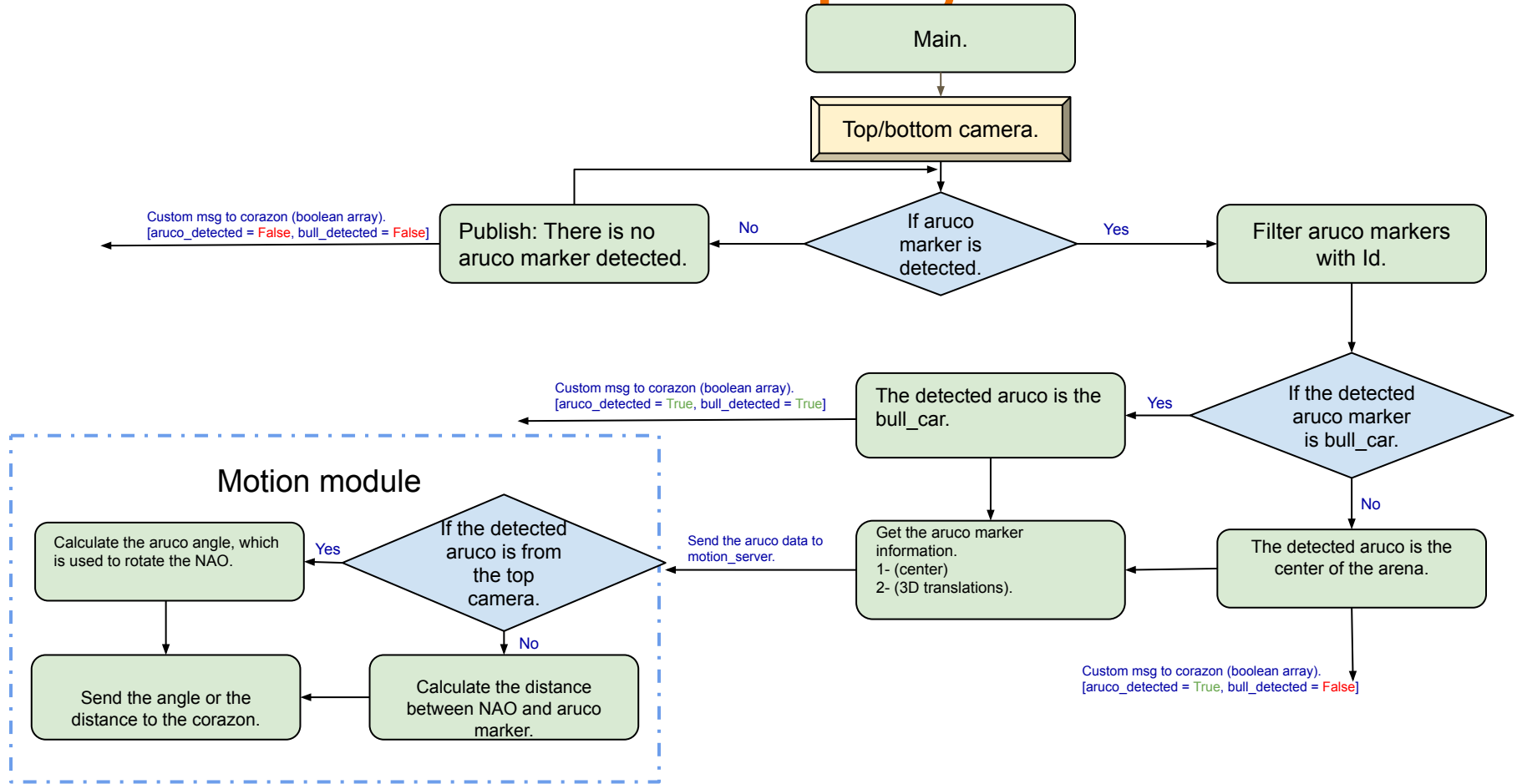


2.2.3 Vision Module

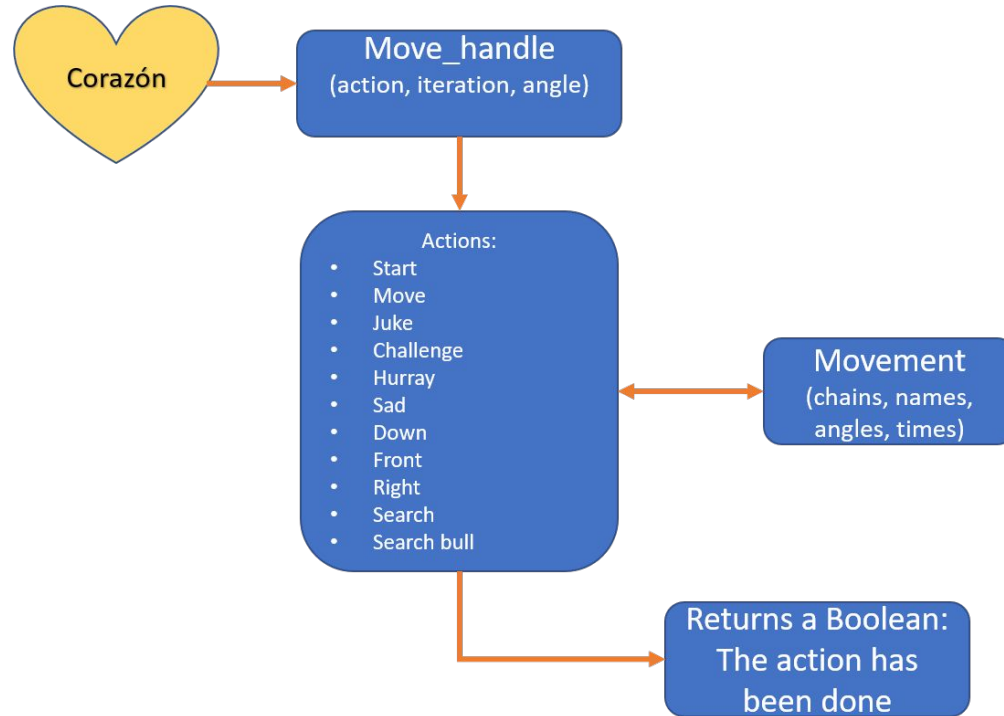
- The first and fifth task from task description are implemented in this module. (Detection of bull_car and the arena center).
- The vision module is subscribed to the top and bottom camera.



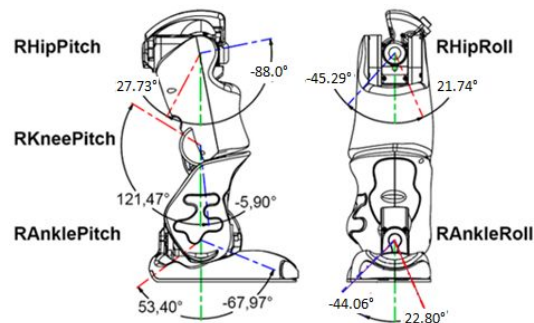
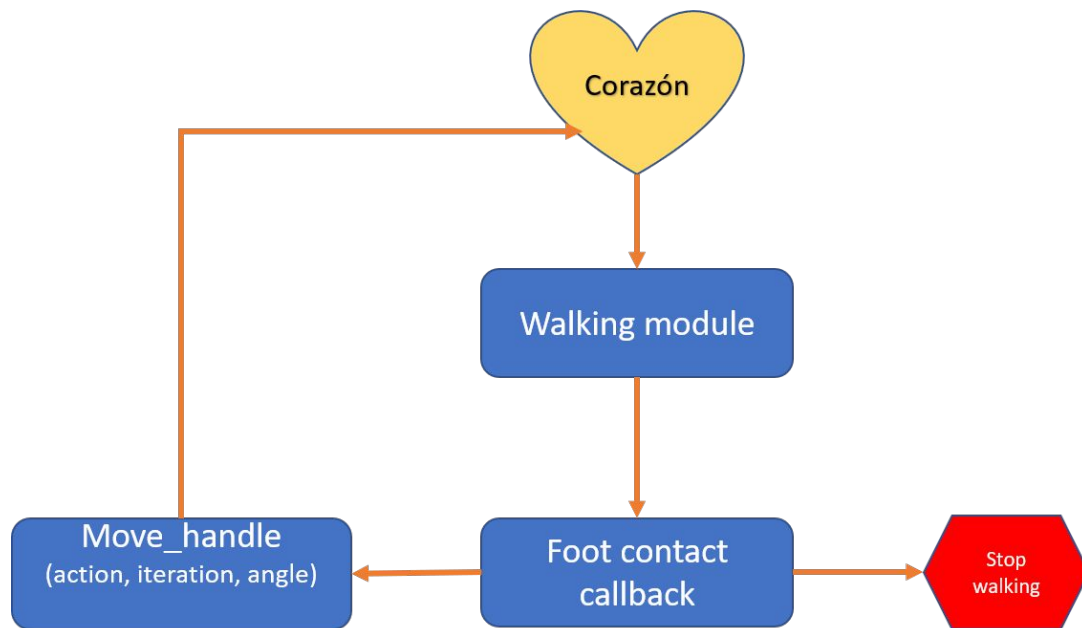
2.2.4 Vision Module & Motion proxy



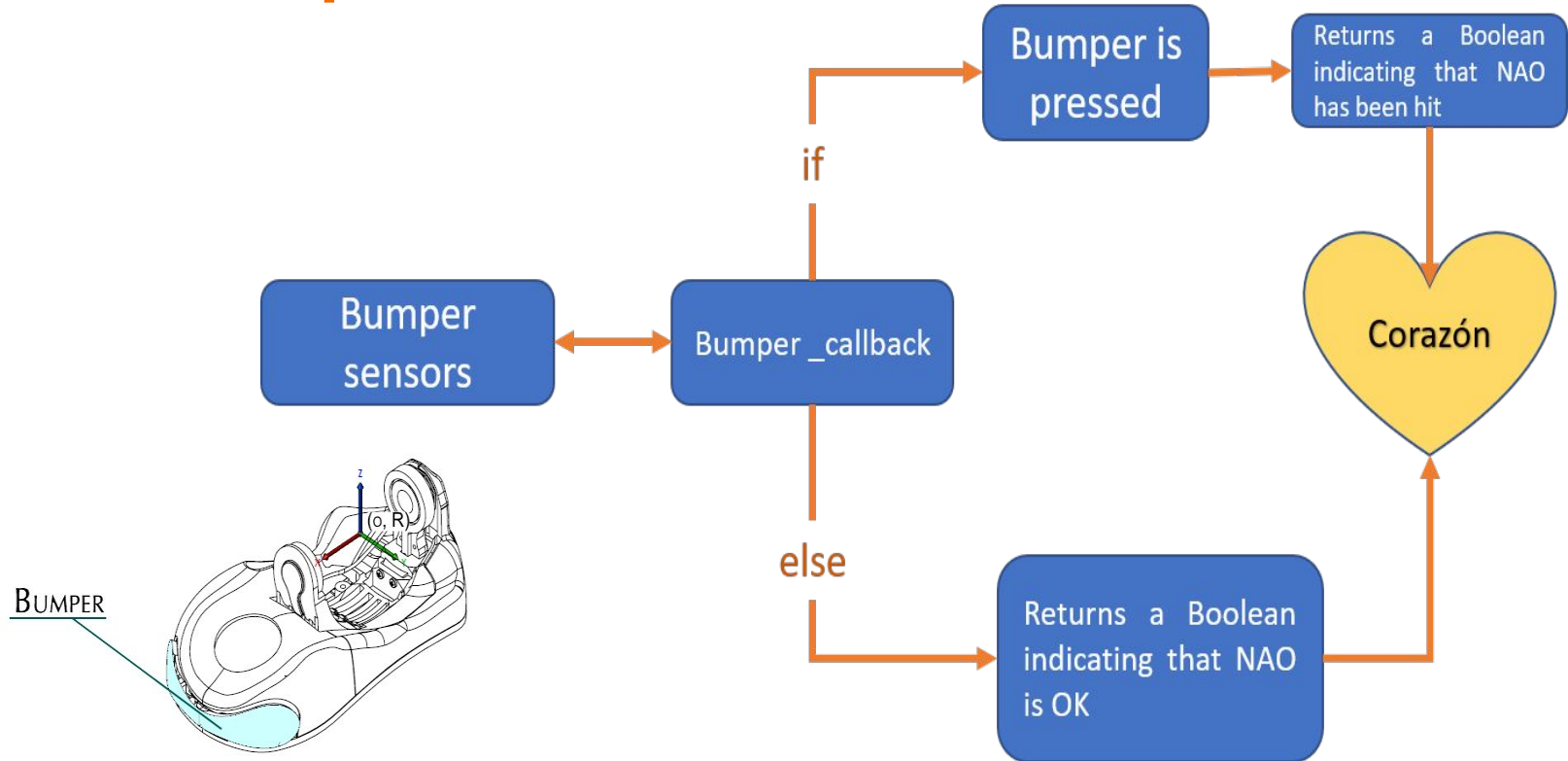
2.2.5 Motion proxy



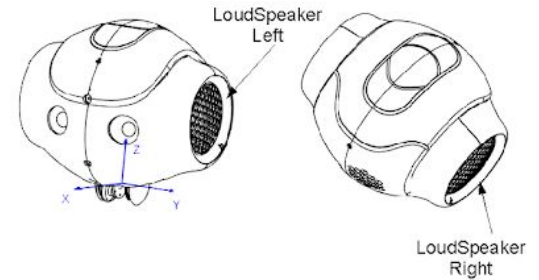
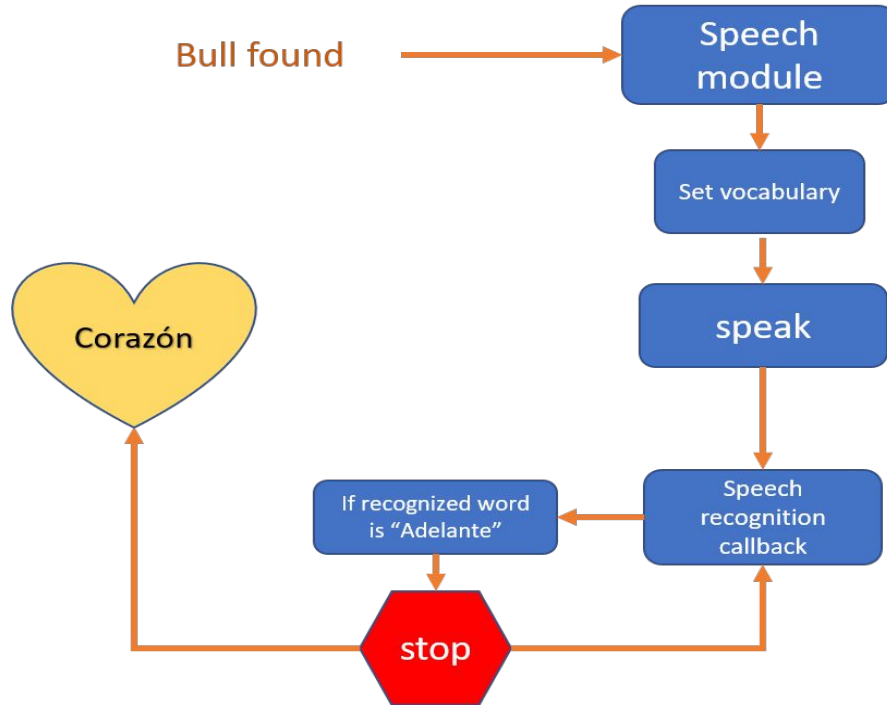
2.2.6 Walking Module



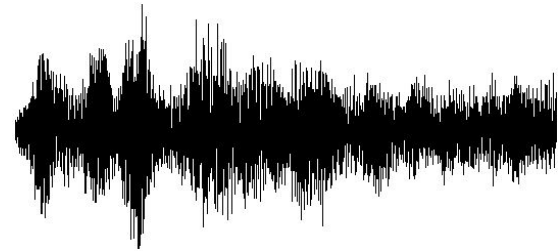
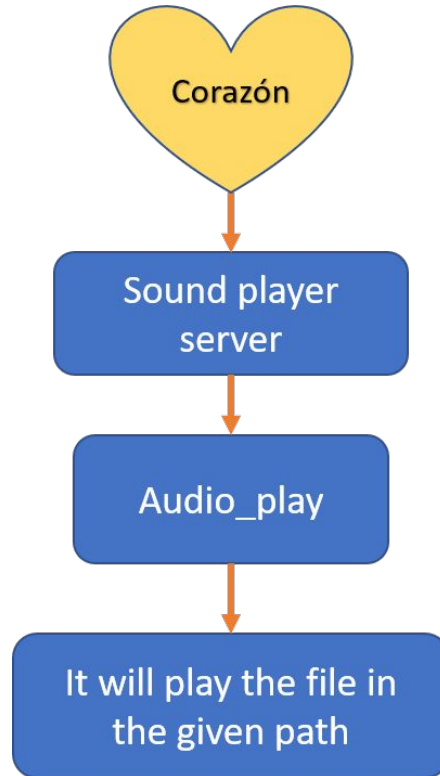
2.2.7 Bumpers Module



2.2.8 Speech Module

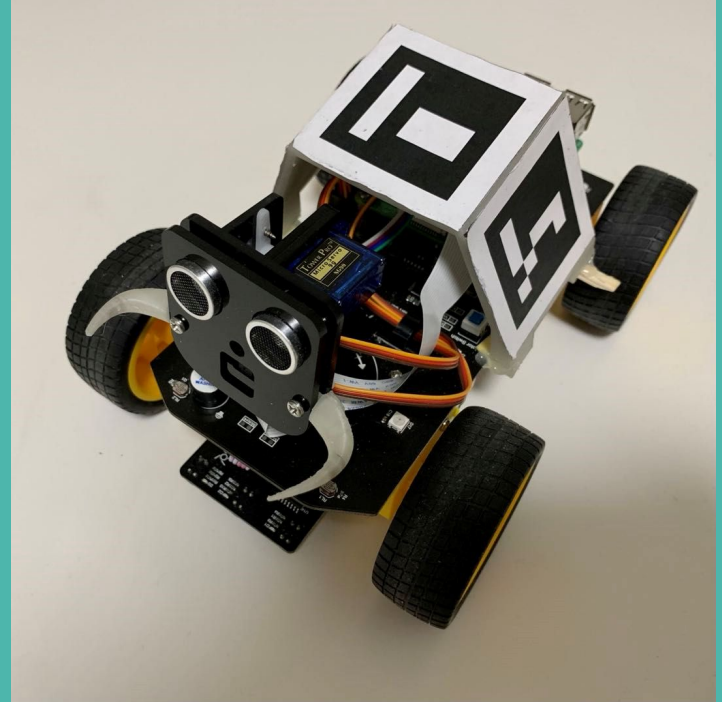


2.2.9 Audio player



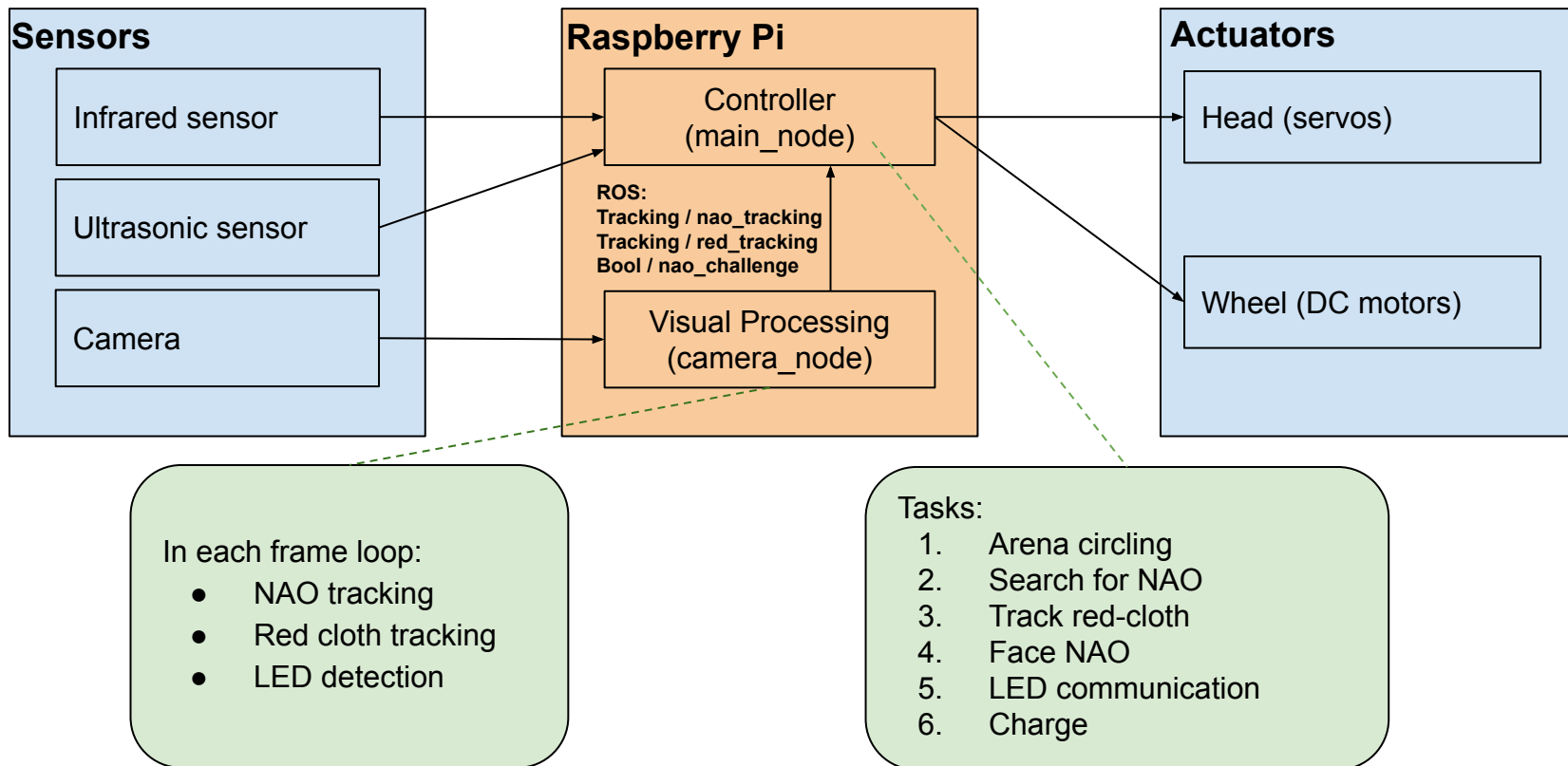
3. The Bull

No matador can stop an
embedded Bull!



3.1 Bull architecture

Task-based Architecture



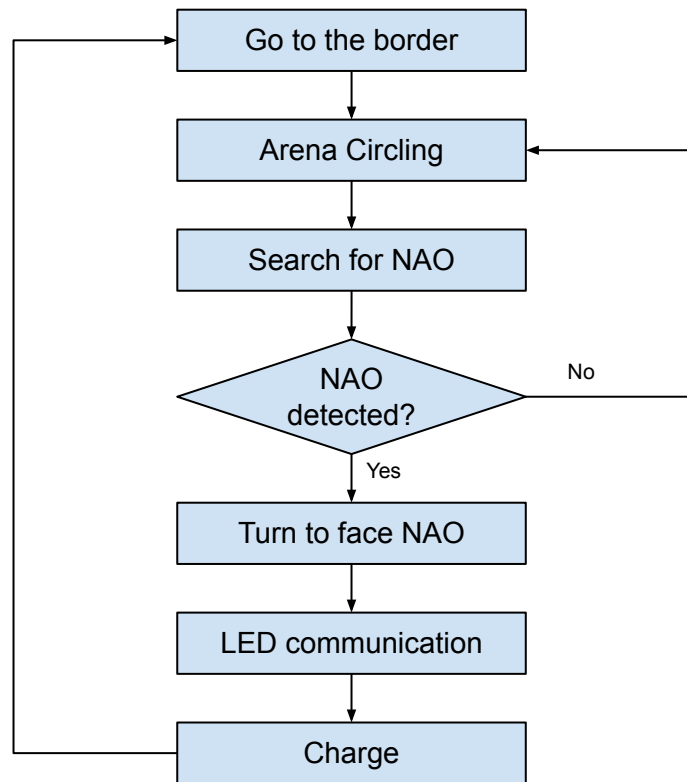
3.2 Main Controller

Sensing:

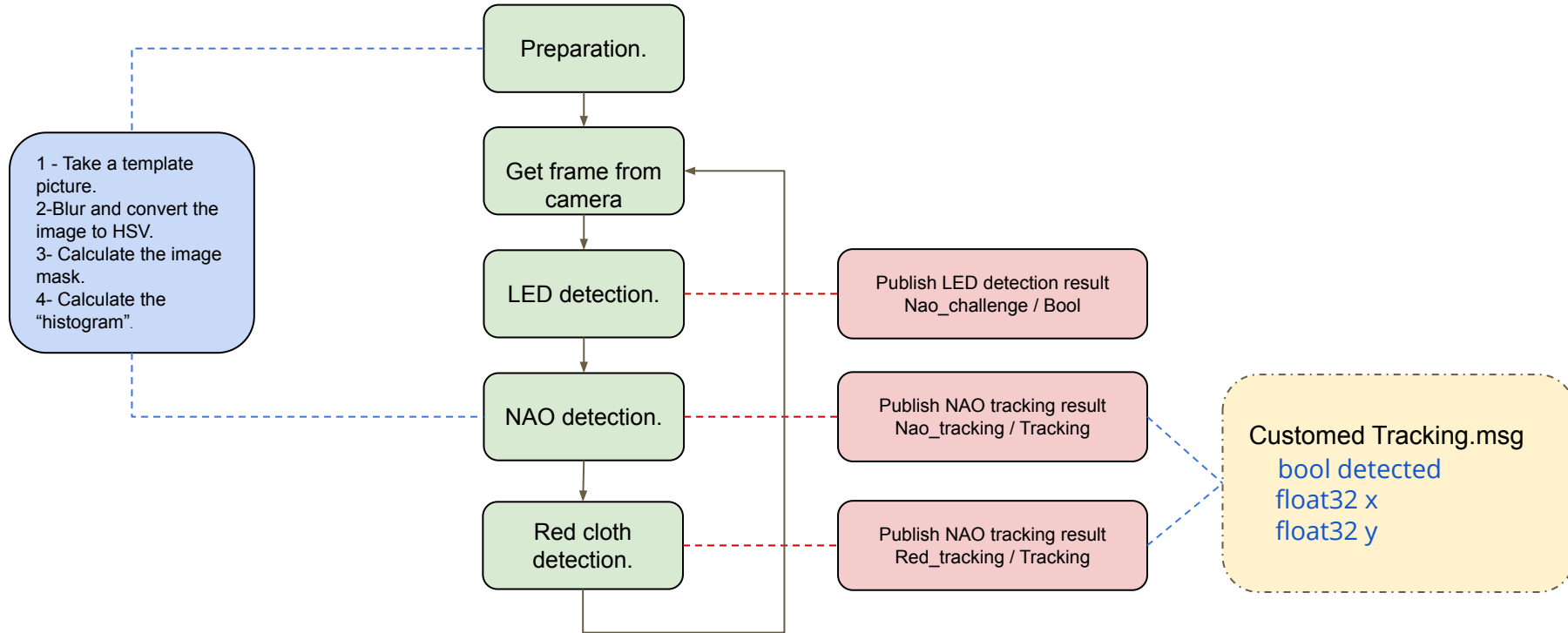
- Read Infrared sensor and Ultrasonic sensor data from GPIO
- Subscribe Vision data from ROS topic:
 - Nao_tracking / Tracking
 - Red_tracking / Tracking
 - Nao_challenge / Bool

Actuation:

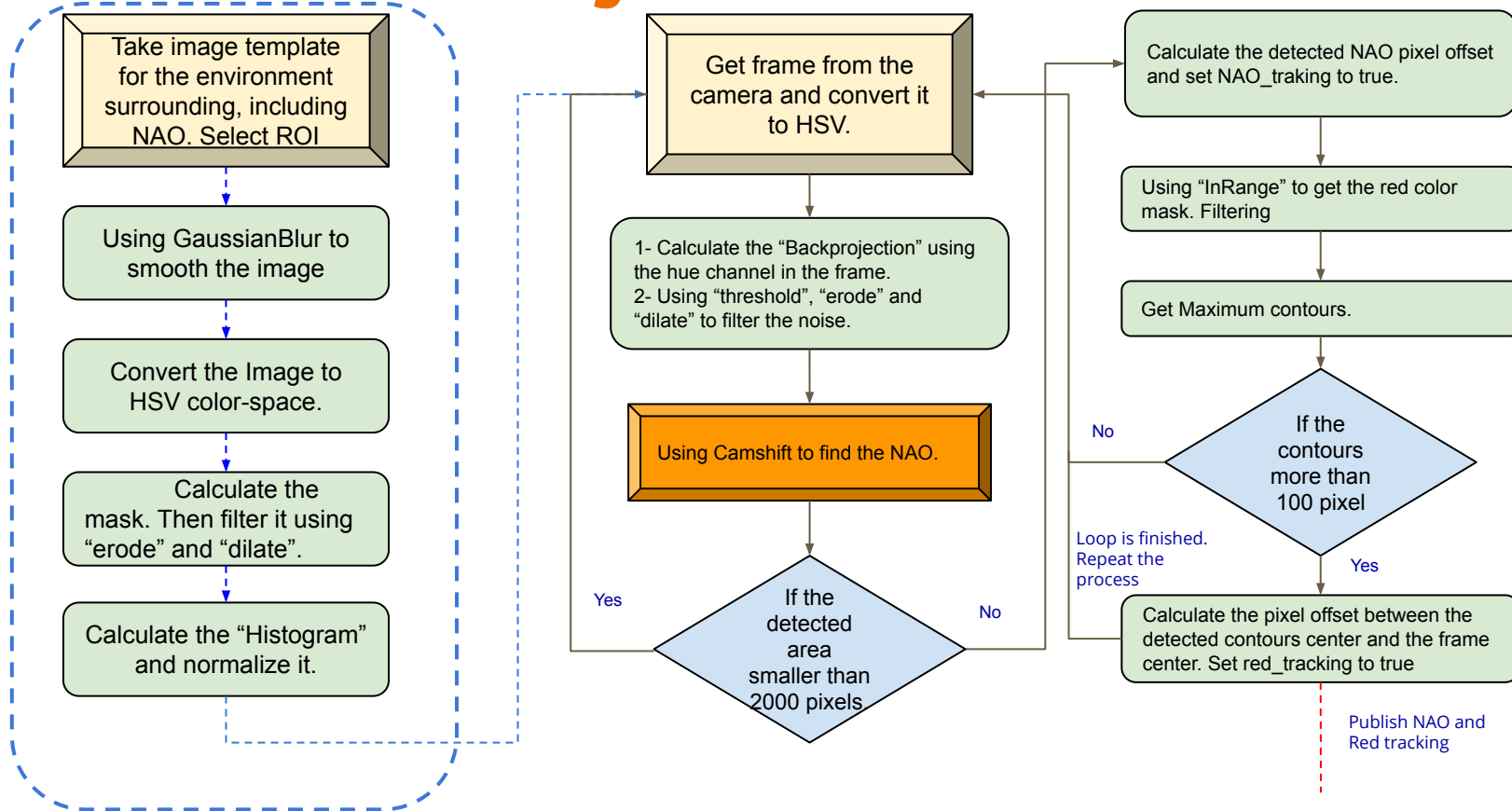
- Set PWM duty cycle for servo and motor



3.3 Camera Node



3.3.1 Bull Vision Algorithm



Happy new year!

