ULC Malaria Scope, Process Flow
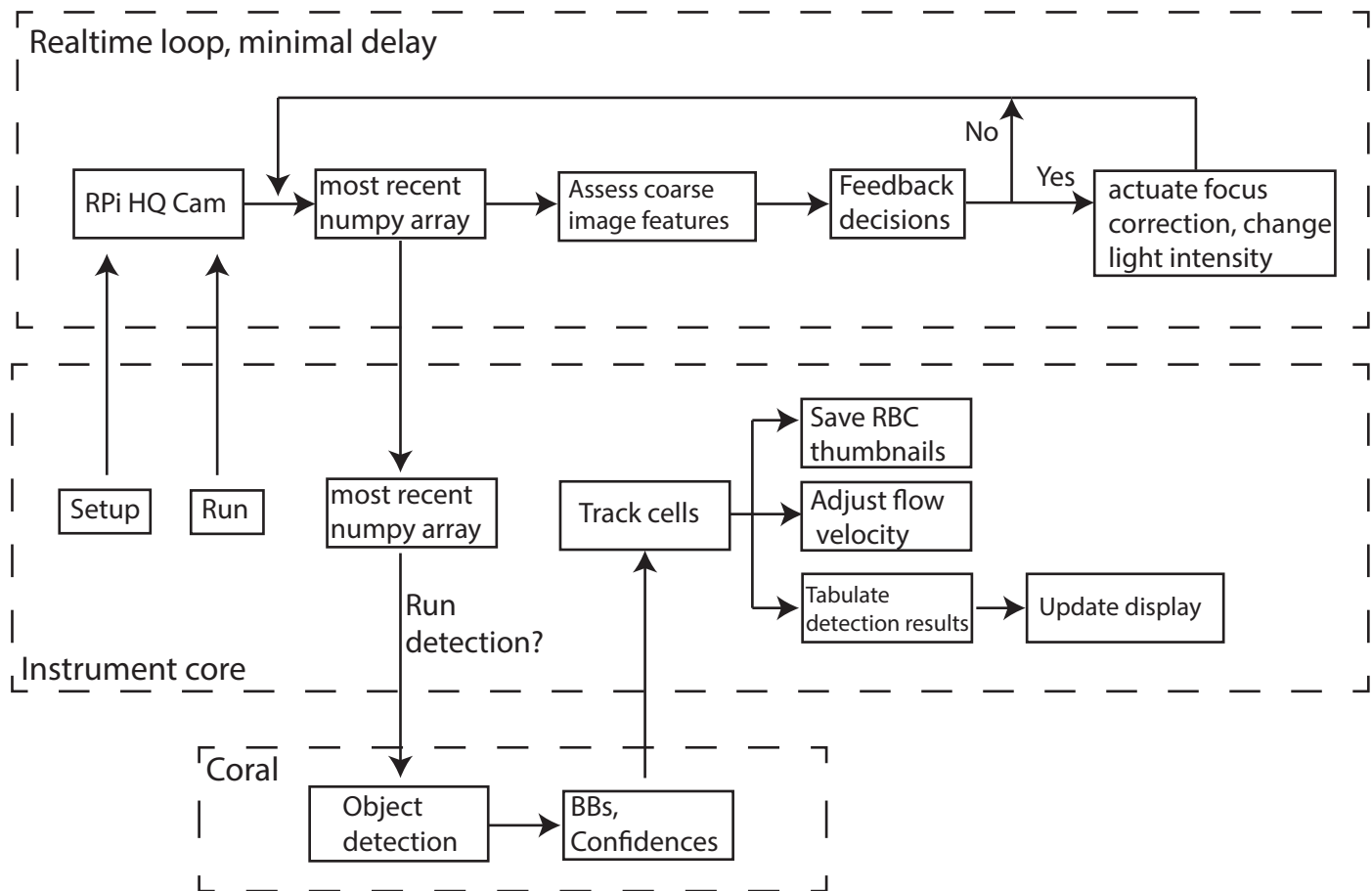
Realtime loop, minimal delay

RPi HQ Cam → most recent numpy array → Assess coarse image features → Feedback decisions

Feedback decisions → No (loops back to most recent numpy array)

Feedback decisions → Yes → actuate focus correction, change light intensity (loops back to RPi HQ Cam)

Instrument core

Setup → RPi HQ Cam

Run → RPi HQ Cam

most recent numpy array (from realtime loop) → most recent numpy array

most recent numpy array → Run detection?

Track cells → Save RBC thumbnails

Track cells → Adjust flow velocity

Track cells → Tabulate detection results → Update display

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Object detection → BBs, Confidences → (to Track cells)

most recent numpy array → Object detection

Definitions

Assess coarse image features =
- Assess image exposure
- Quantify focus offset
- Frame quality control: TBD

Track cells =
- Store cell positions

- Implement algorithm that uses current cell position and velocity of the flow stream to assign cell identity (ie. is this a new cell that just entered the view, or do we have other images of this cell?)

- Compute updated flow velocity estimate

Update display =
- Update image axis with most recent annotated image

- Update bar plot with accumulated counting stats (number of each parasite stage detected, total number of cells)

- Update info panel with summary of results, 95% and 99% confidence windows of the diagnostic