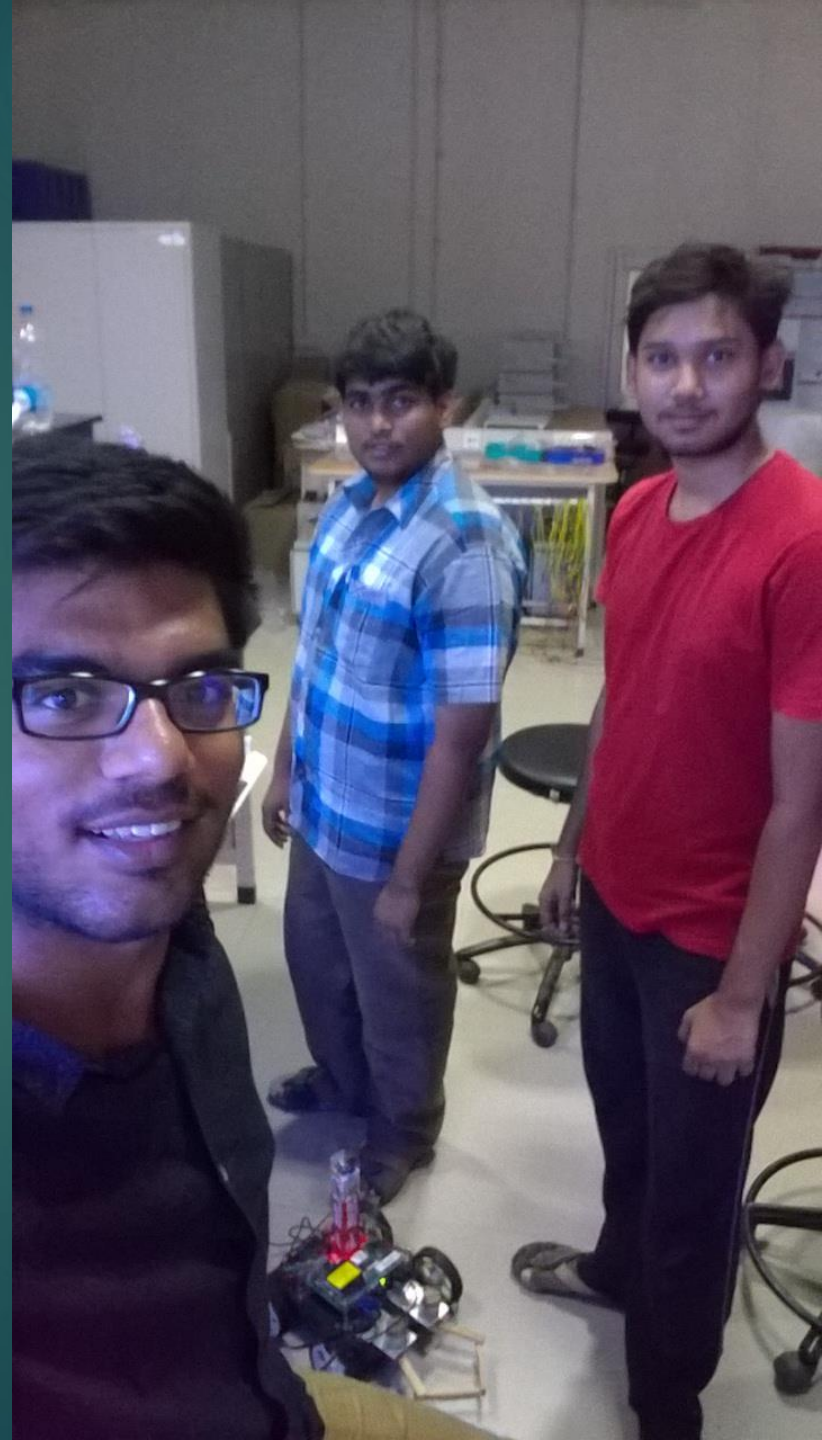
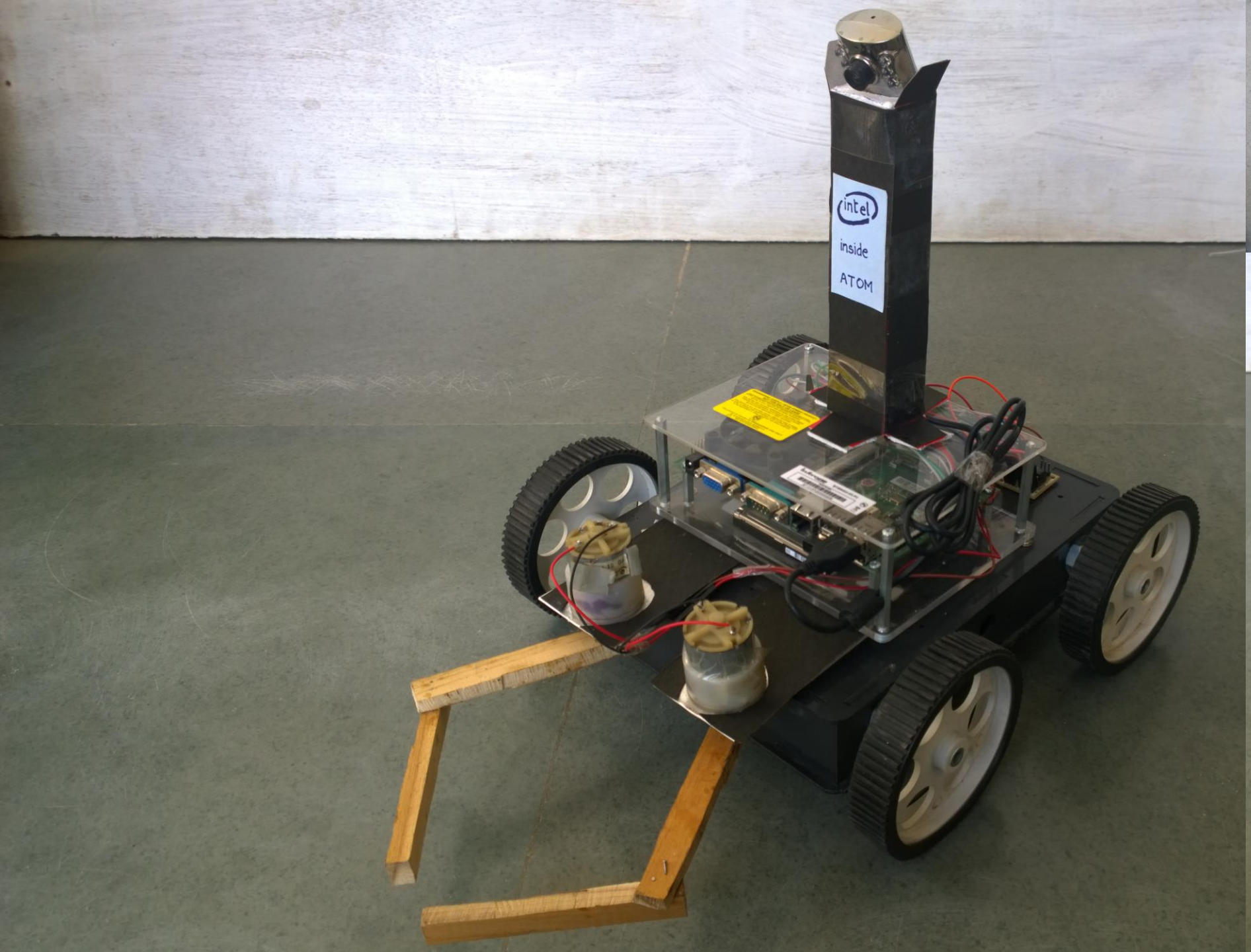
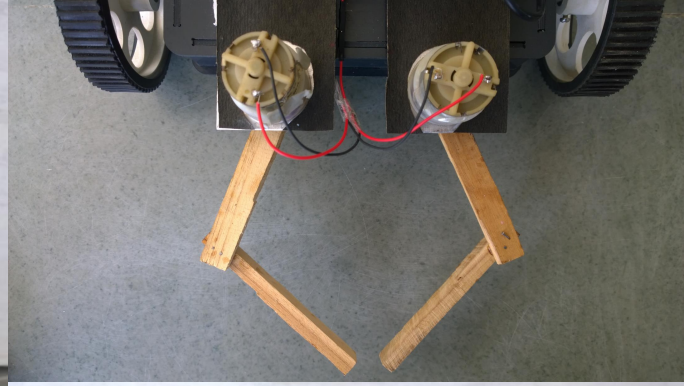
ASOP

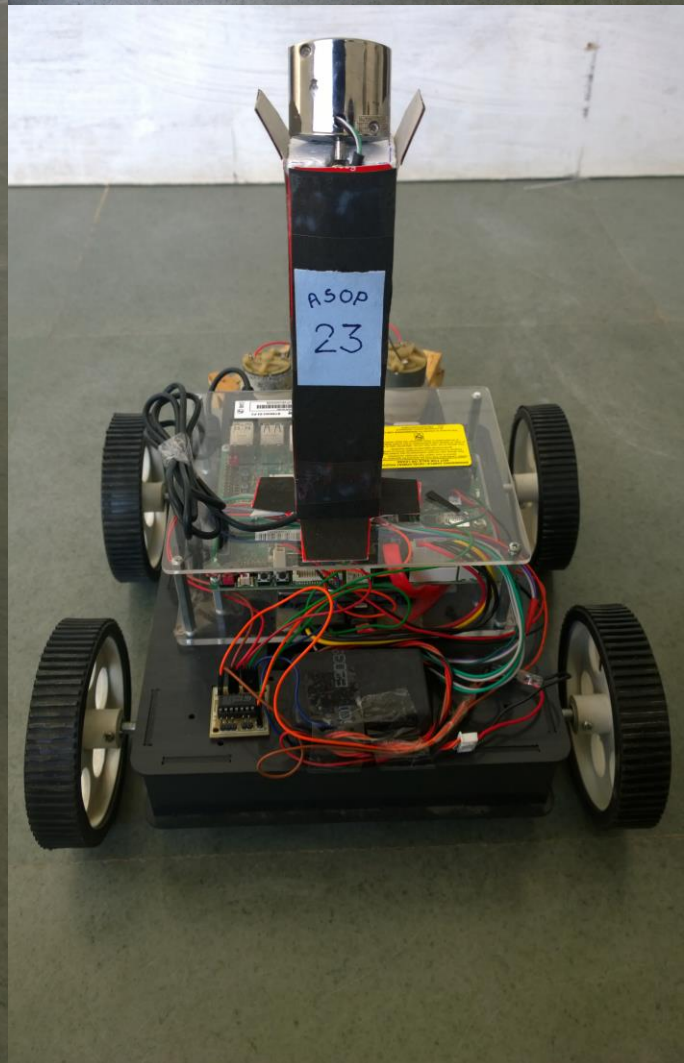
AUTONOMOUS **SO**CCER **P**LAYER

EE404 Embedded Systems
Instructor: Prof. Joycee Mekie
TA: Sneha Ved




intel
inside
ATOM




ASOP
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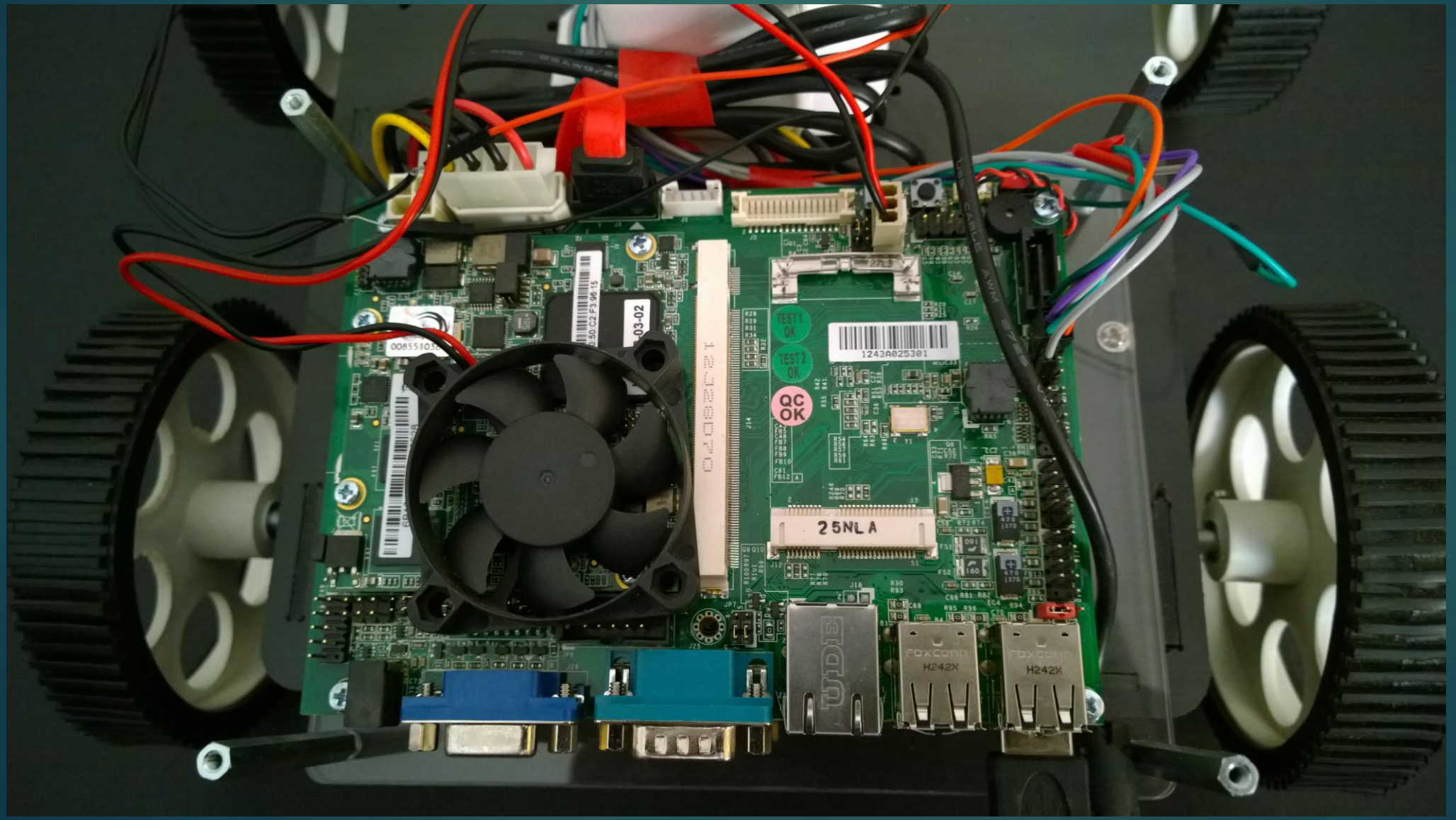
What Does it Do?

- Detects the location of the ball in the field
- Approaches it and “holds “ the ball
- Detects where the goal post is
- Pushes the ball into the goal

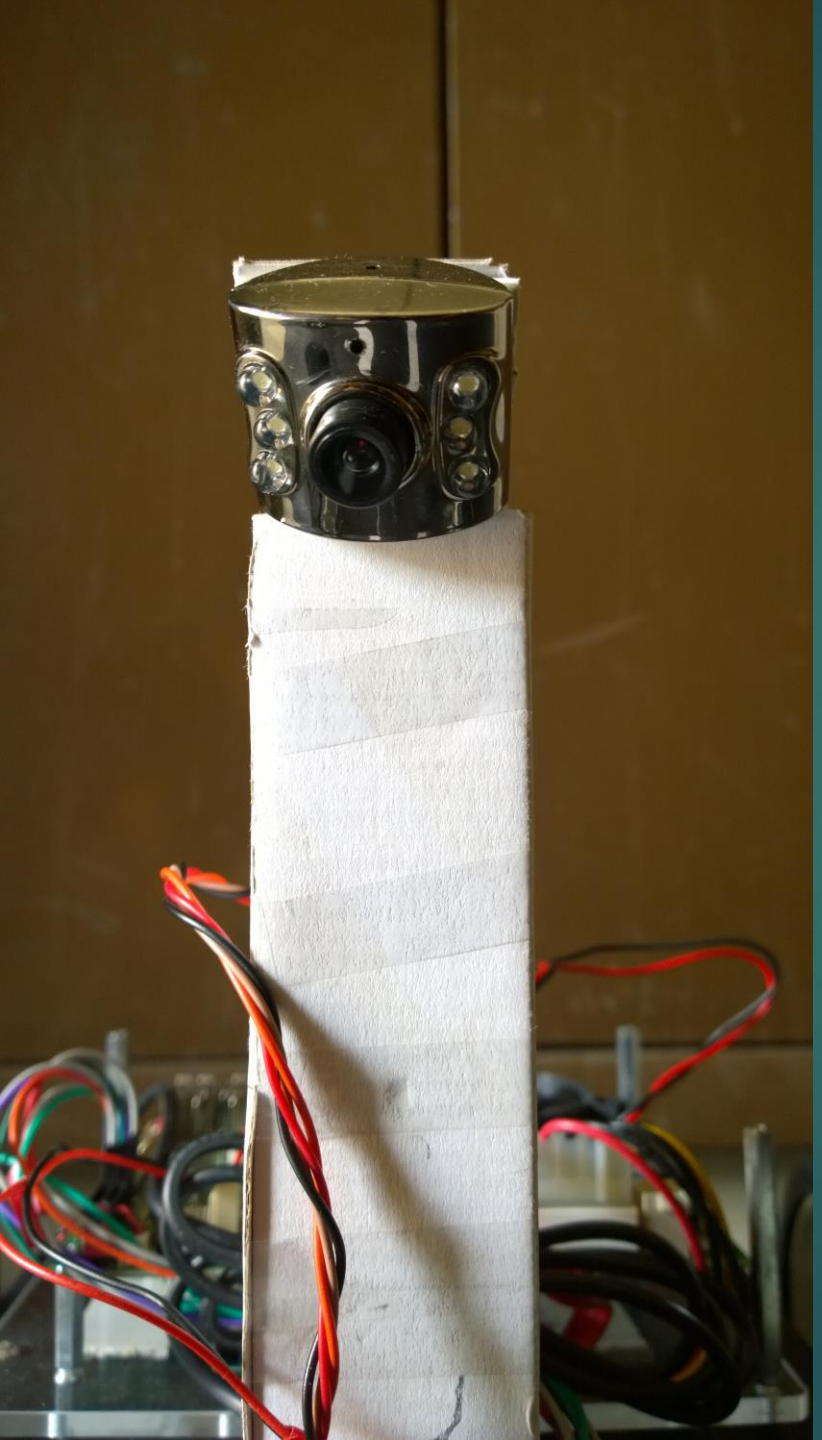
The Brain:



Intel ATOM Processor

Speed: 1GHz

RAM:1Gb

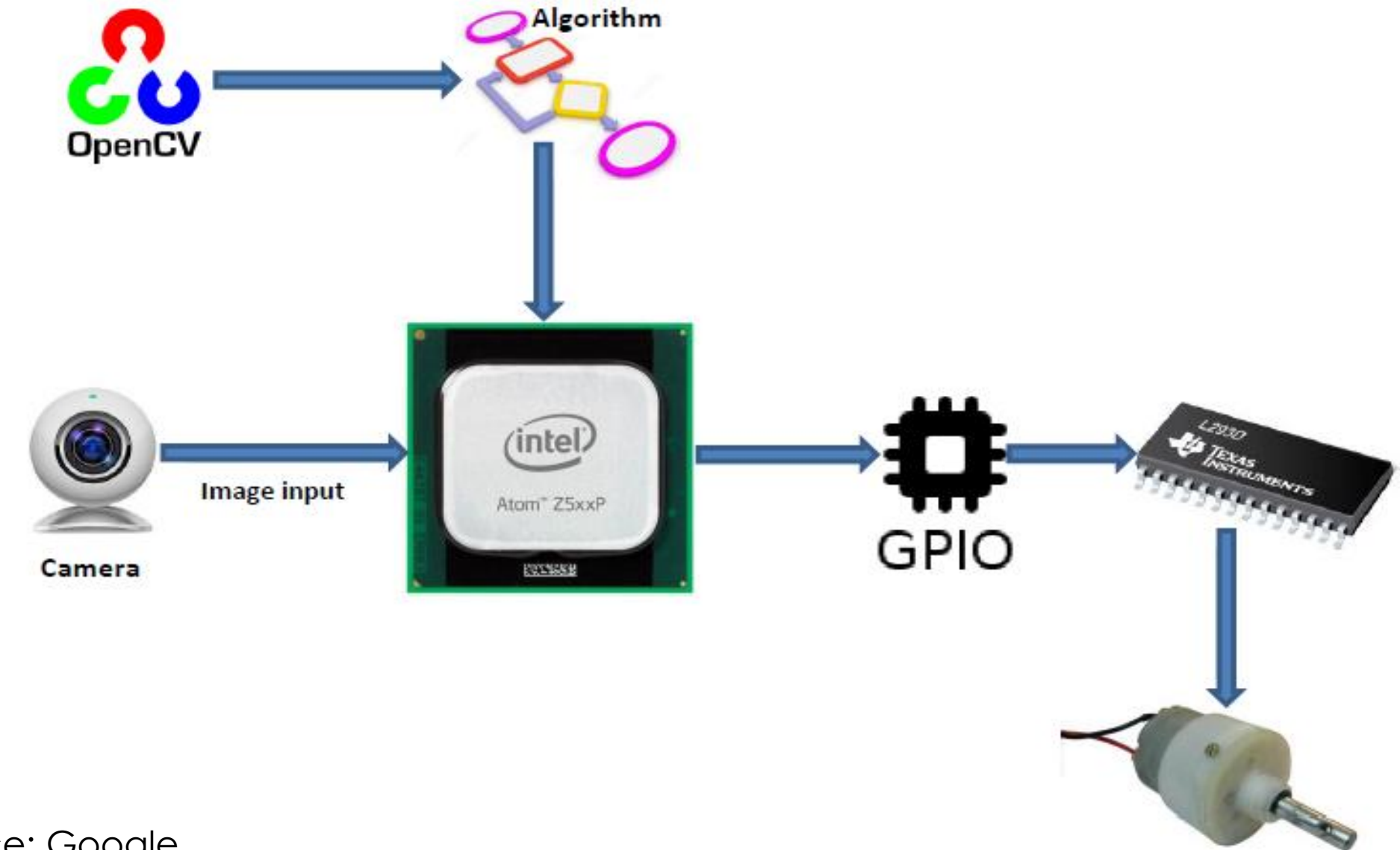


The Eyes:

Web Cam

2.0 MP USB camera. Resolution – 480x640

Implementation



Images source: Google

Ball Detection and acquisition

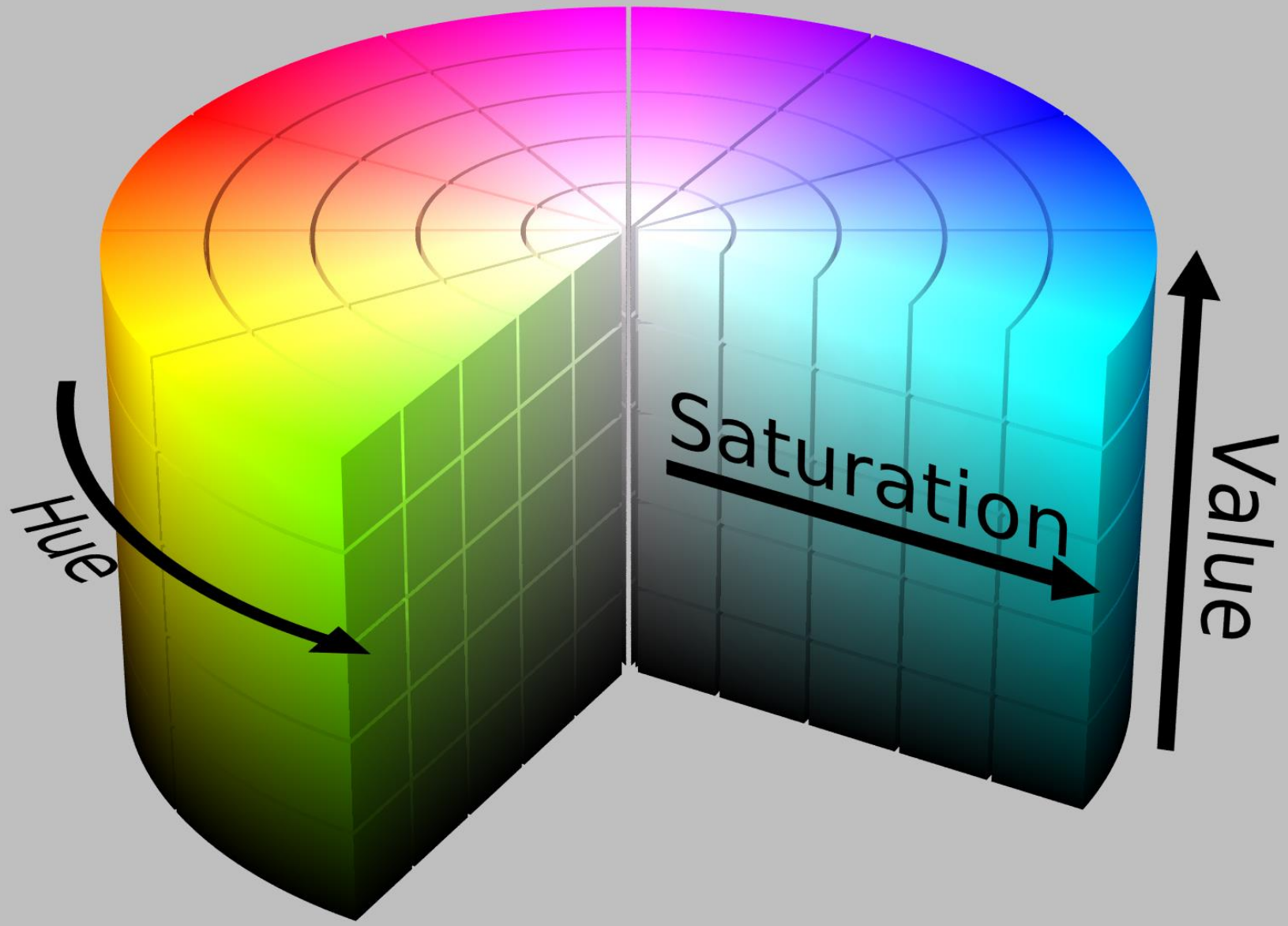
Algorithm

Detecting the ball:

- The algorithm changes the input image from RGB to HSV colour space
- The ball is in green colour, so we search for green hue and get the appropriate mask
- The location of the ball in the image can then be obtained
- Depending on which part of the image the ball is located, we can estimate how far or near the ball is and get a rough idea of where the ball is and where should the robot go.

Catching the ball:

- When the ball is close enough, the arms get closed enclosing the ball

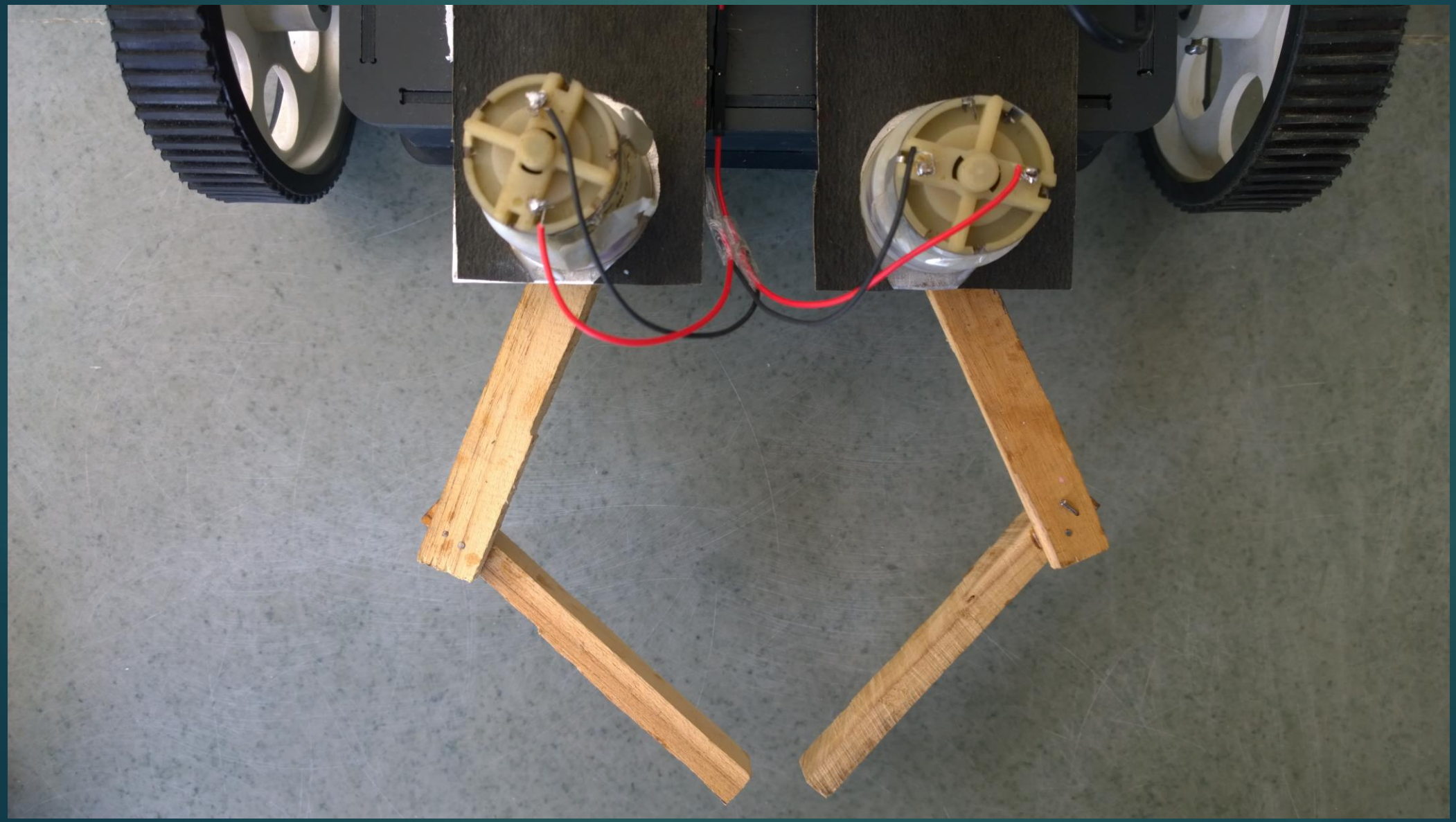


Why HSV colour space?

Images source:
https://upload.wikimedia.org/wikipedia/commons/0/0d/HSV_color_solid_cylinder_alpha_lowgamma.png

Through the eyes of ASOP

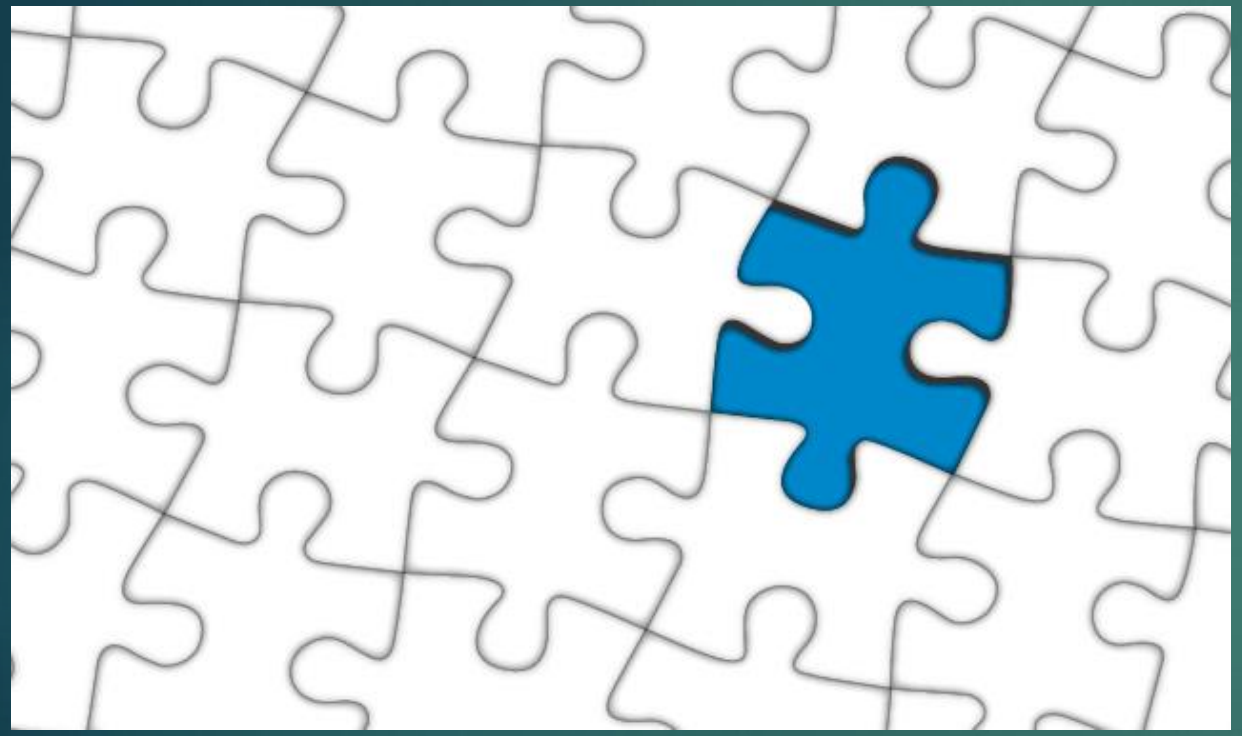
Holding Mechanism

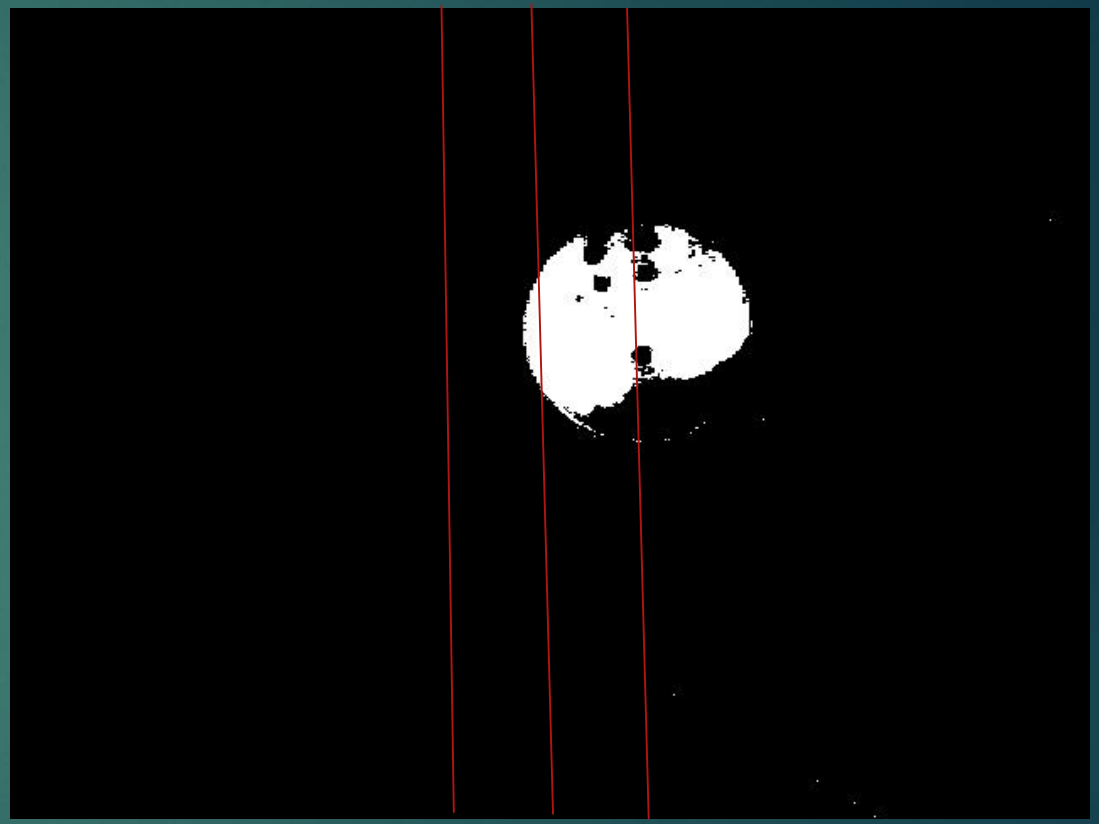


https://33.media.tumblr.com/5da32377611852ddef1a3197f7c6714f/tumblr_newnw9vaql1s2wio8o1_500.gif

http://25.media.tumblr.com/tumblr_lzpreoPAEs1rq535ko1_500.gif

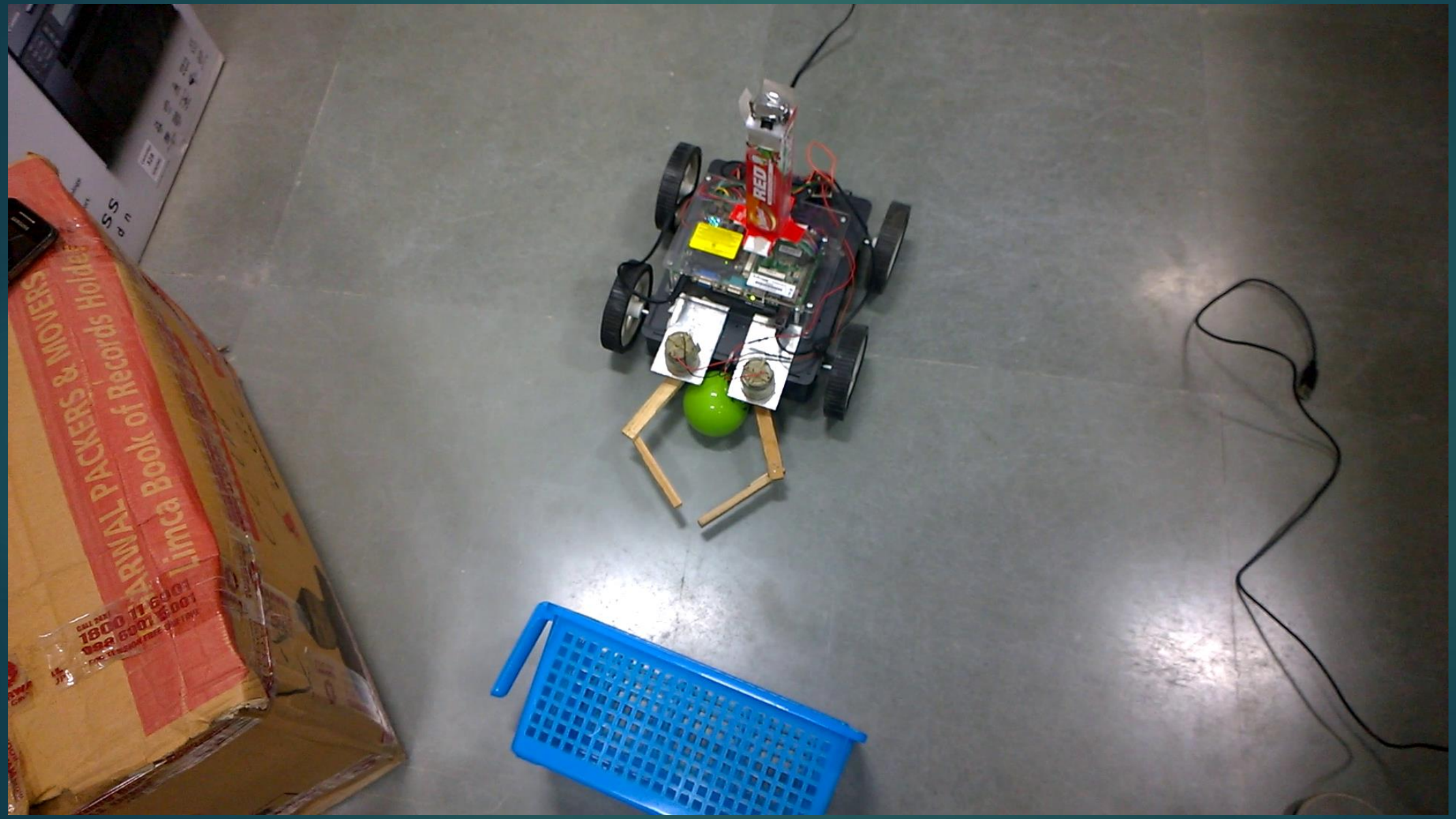
We are interested only in a few pieces !!





Finally, Real Time speed !!!

Goal Post Detection and Scoring

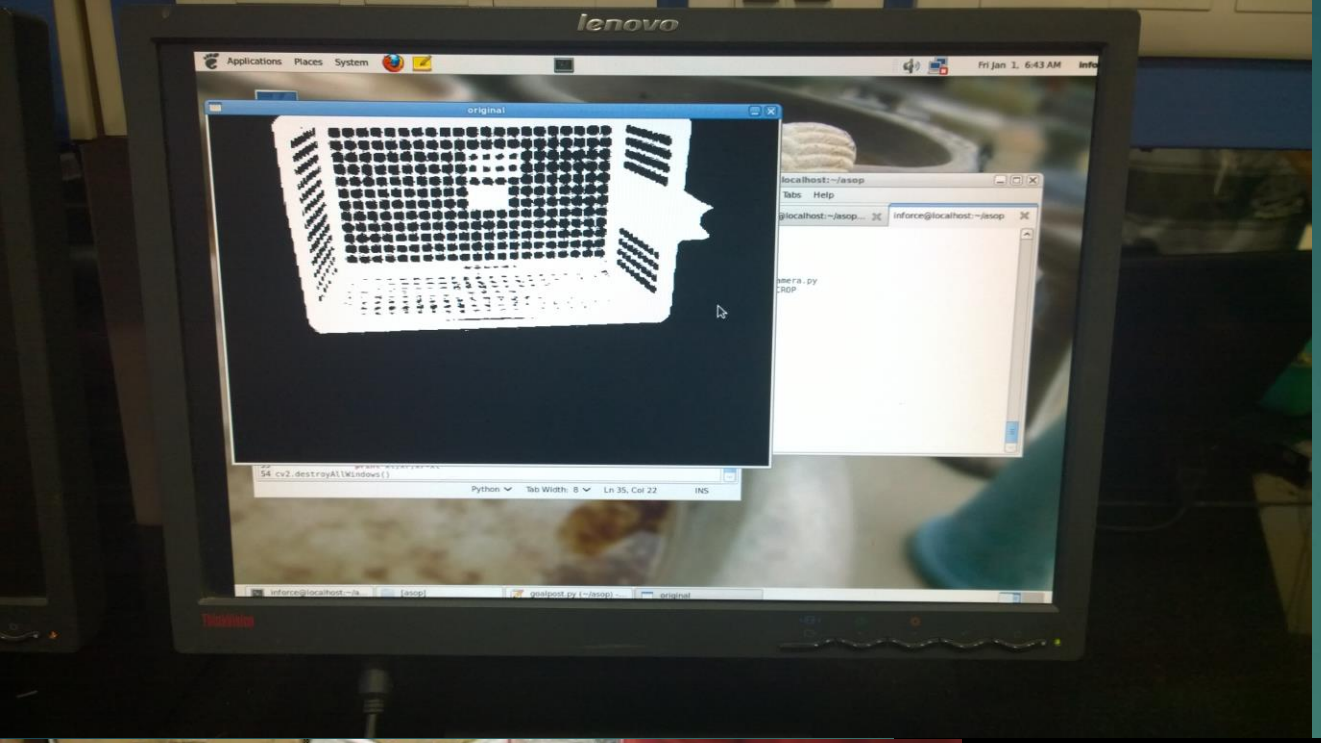


Goal Post Detection:

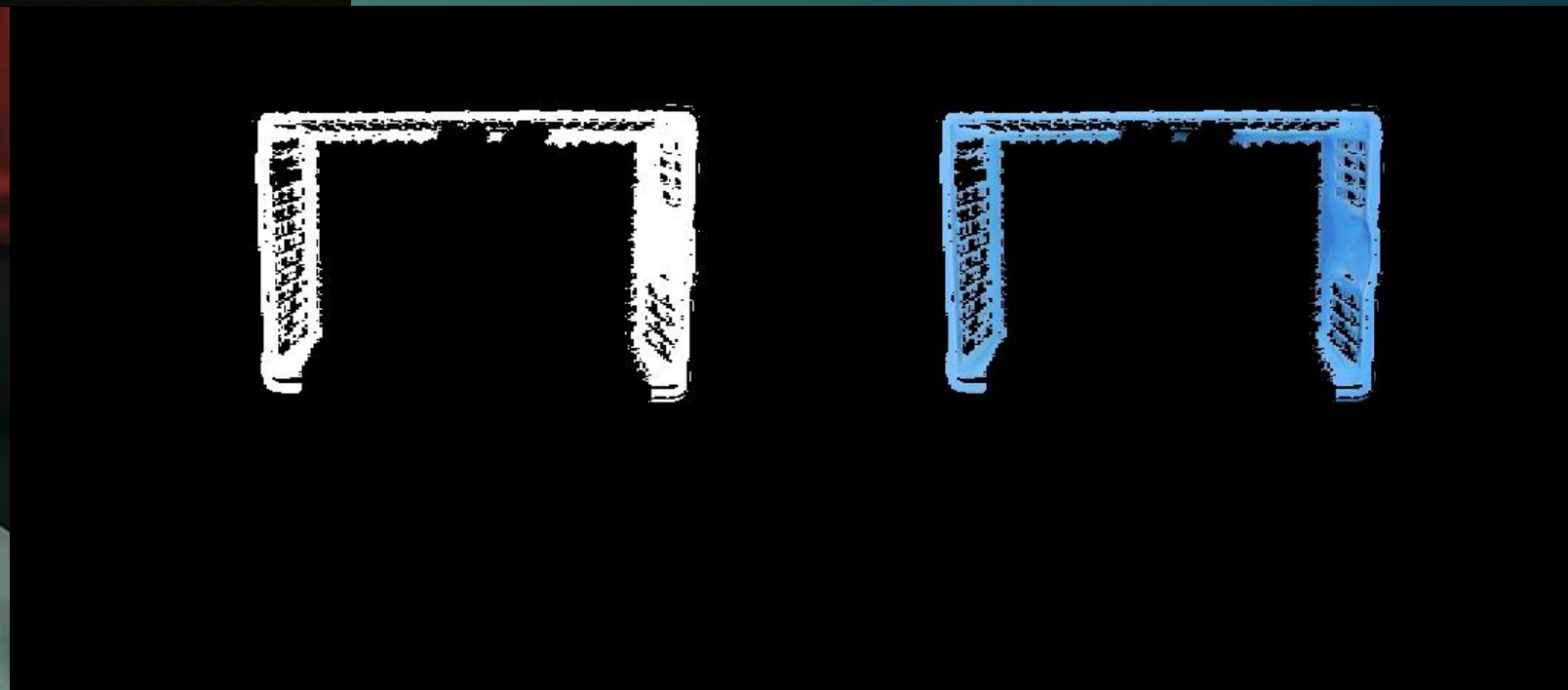
- The algorithm changes the input image from RGB to HSV colour space
- The goal post is in blue colour, so we search for green hue and get the appropriate mask
- The location of the goal post in the image can then be obtained
- Depending on the width of the goal post in the image we can estimate how far or near the goal post is and get a rough idea of where should the robot go.

Scoring :

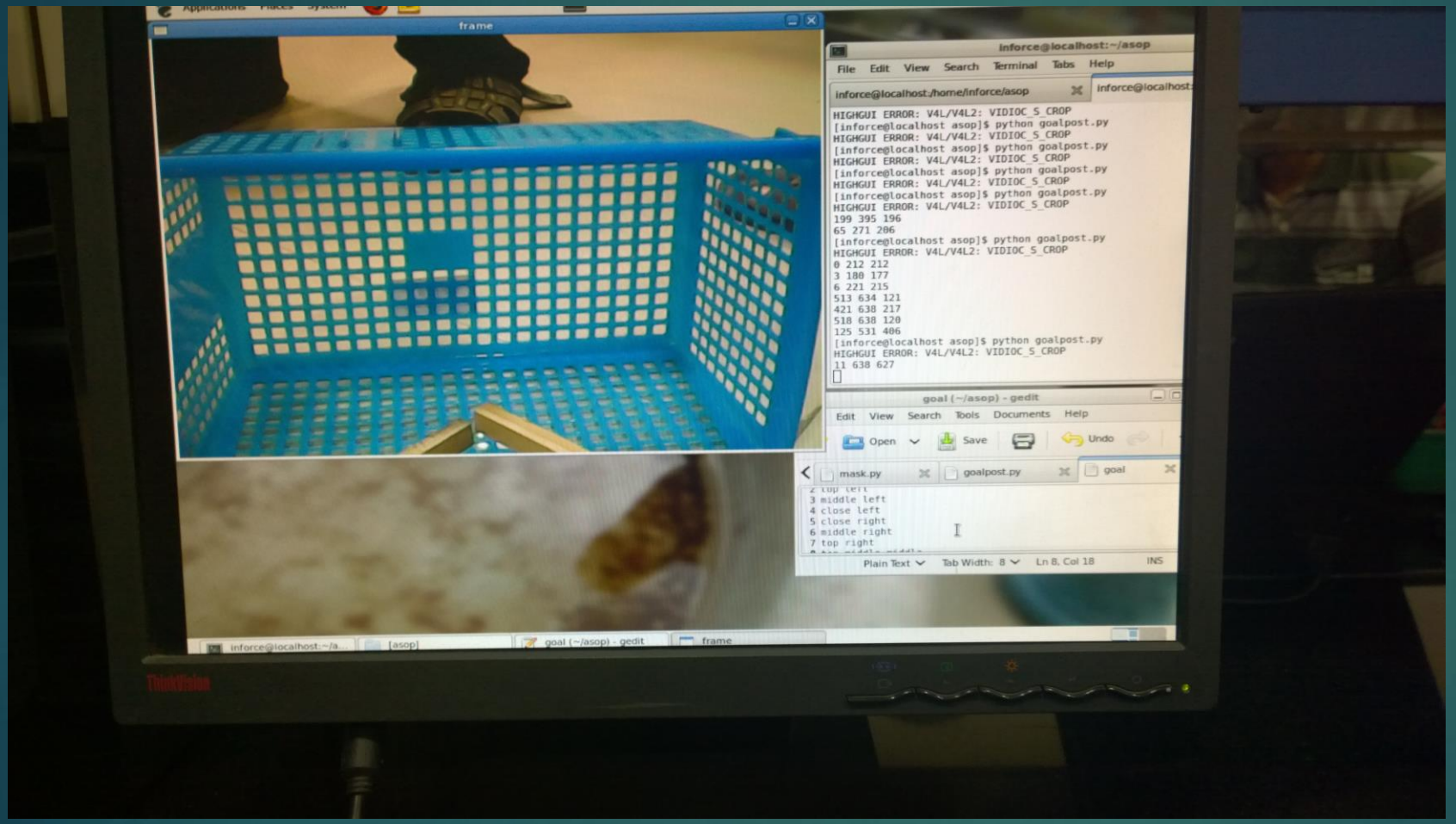
- When the goal post is close enough, the ball is released



Through the eyes of ASOP



Maximum Range



The width of the goal post
In the image is used to
determine how far the goal is

What next??

- Speed
- Axle control instead of motor control
- Searching for ball, goalpost
- Ball release mechanism
- Memory and intelligence
- Coordination with multiple robots

THANK YOU.