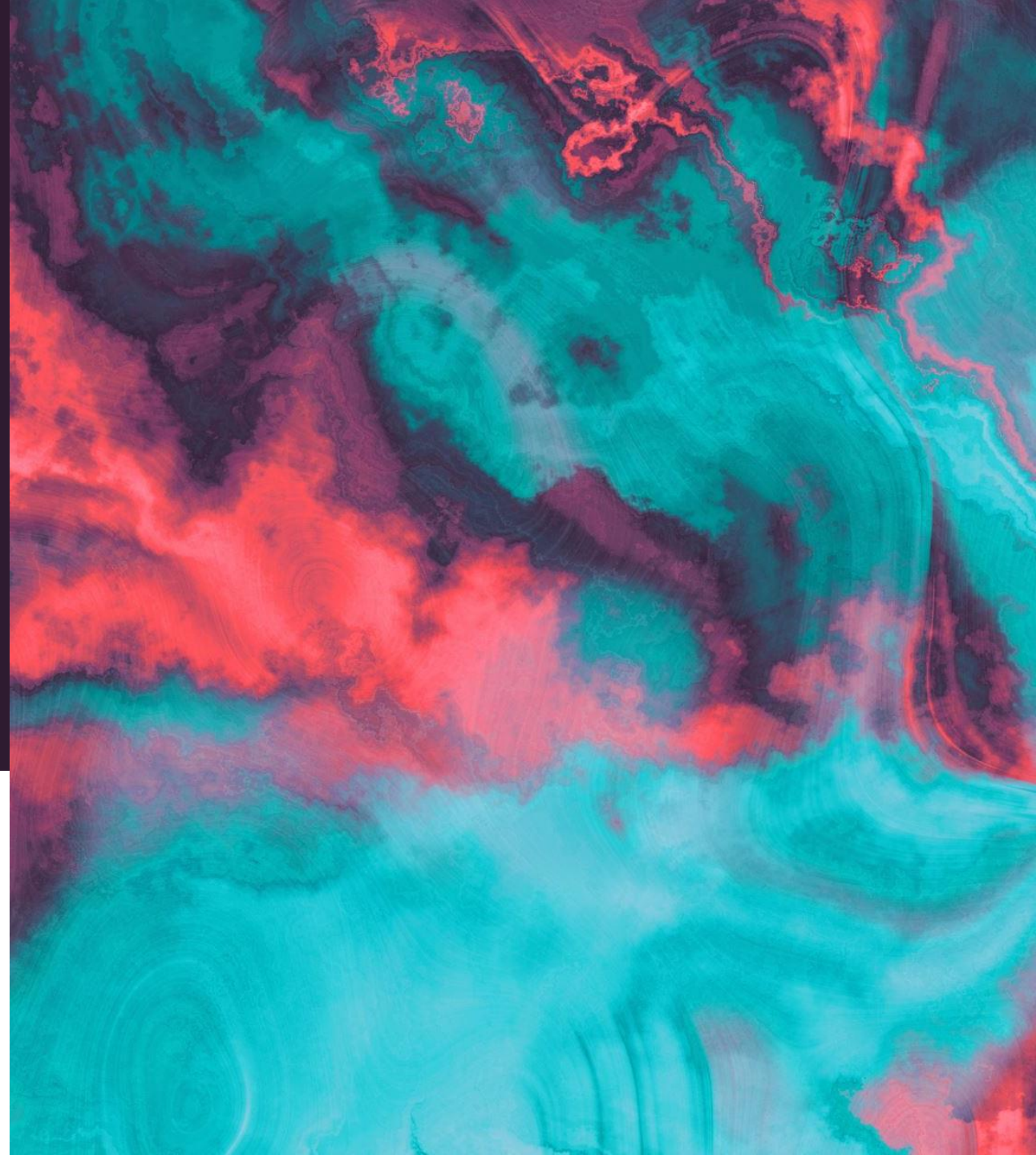


# Multiple-view V-SLAM with rotating cameras

Please also go through the report  
and the simulation video.



# Motivation for the problem

Limited FOV, Limited number of  
readings

**ESPECIALLY WITH CHEAPER CAMERAS**



NOT OPTIMAL  
MAPPING !!!



The ideal result is this →



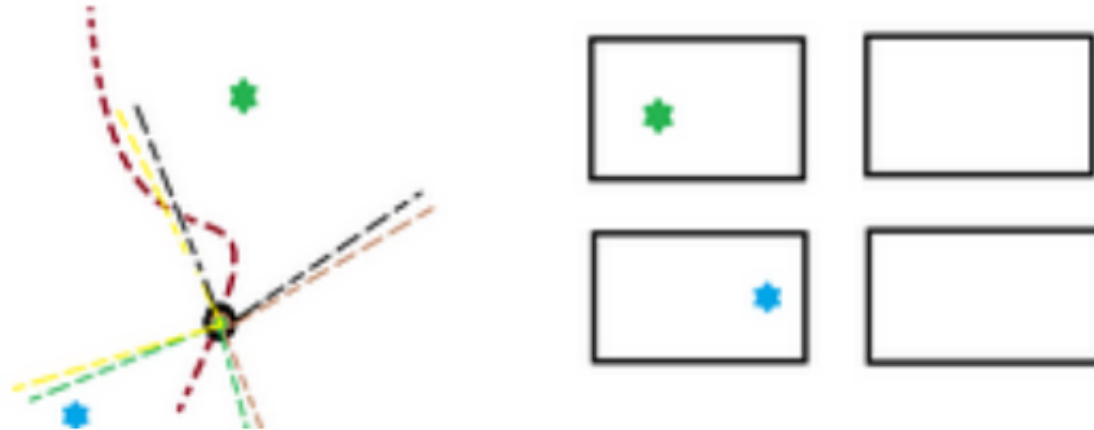
# Solution to this:

- Take more number of readings on the object
- Take readings from a different angles than before

# How is this possible?

One possible solution we tried:

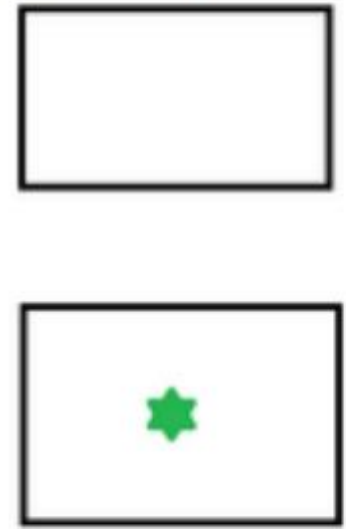
Put multiple static cameras whose total FOV is 360 degrees



However, we have chosen to implement a different mechanism as it appeared more interesting.

# What we did

- In addition to having a single static camera, we added multiple moving cameras that focus on the assigned object throughout its visibility region (say 180 degrees).



OBJECT IS ALWAYS  
AT IMAGE CENTER!!

Black cone- FOV of static camera Yellow cone- FOV of rotating camera

# The real question: why this?

- We capture more number of readings on an object (so?)
- We can focus more on the objects that we expect to provide better mapping than the others. Let us call them important objects for now. (A good important point would be some object which is not occluded, or has a lot of feature points)
- It is often required to have high quality cameras (often expensive on some scale) for the sake of good mapping. But with this method, we need not. Because, even with a cheap camera we get the same positions of the important landmarks as we are extracting the angle of the camera from a servo motor (which can be pretty accurate even at the most basic implementation) rather than extracting it from the camera's image view by taking into consideration the distortions.

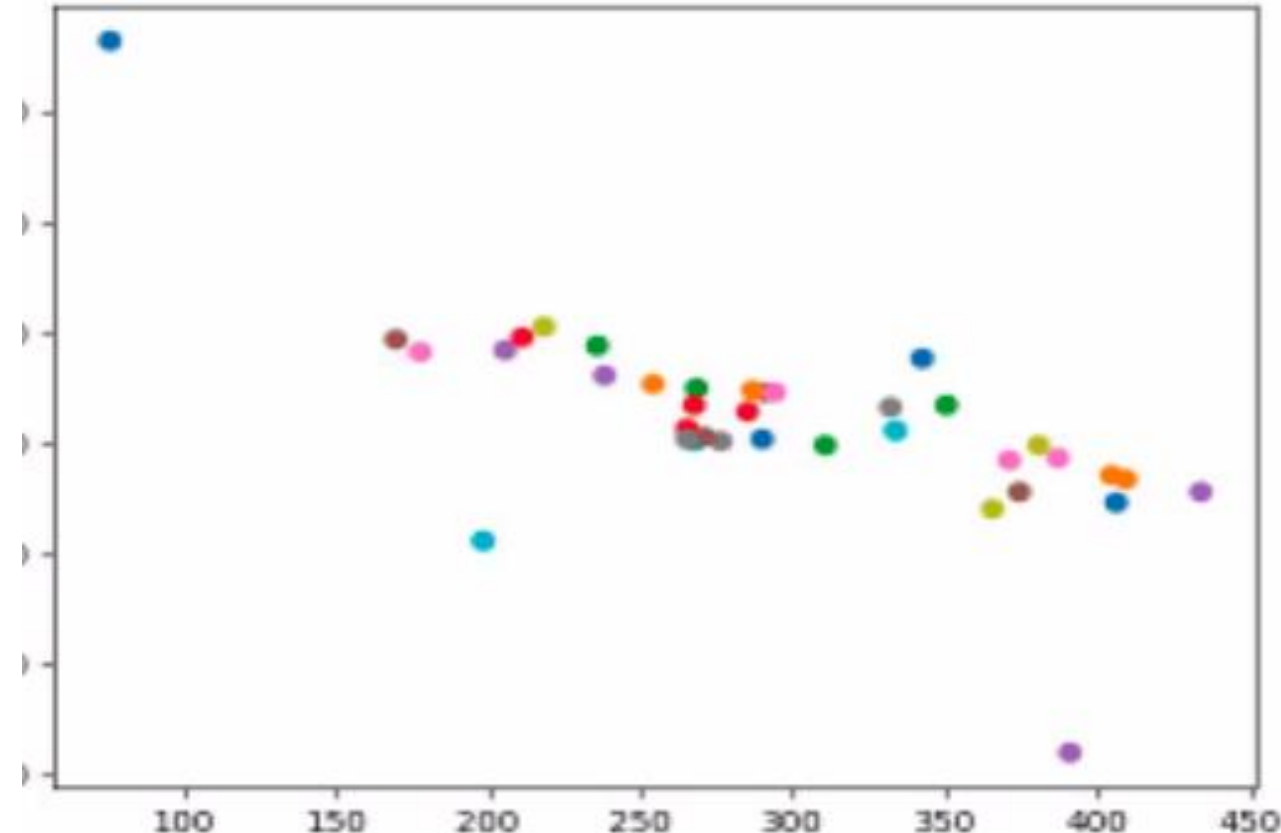
# Contd..

- This also makes it ready to go kind of approach without the need to calibrate the camera(In most cases).
- Therefore, for most indoor applications, if one were to make this a product, all the components needed will be a set of cheap cameras and cheap motors.



# Why would one need these important points?

- The real utilization of these is to optimize the rest of the map with these as the set anchors.
- In other words, we need to develop some kind of optimization technique to use these points which we know are more accurate and rearrange the other points with the help of these hoping to get a better map.



# What I think is lacking in this

- The response time of the servo (camera's center) and the object alignment might be a problem in outdoor kind of setting. Especially considering that a reading can be taken only once the PID control stabilizes.
- Currently I have no idea if the map optimization at this level will be of any help at all when compared to having a good enough single camera.

# CONCLUSION

This method can be beneficial when one tries to bring cheaper robotics into the market. We are talking on a scale where it becomes a household thing. Having multiple cheap cameras (Even the cheapest of the cheapest can work) and few cheap motors might be a better replacement to having a high resolution camera (Highly expensive) if we can come up with a proper optimization technique to be applied on the map.

**THANKS!!**