

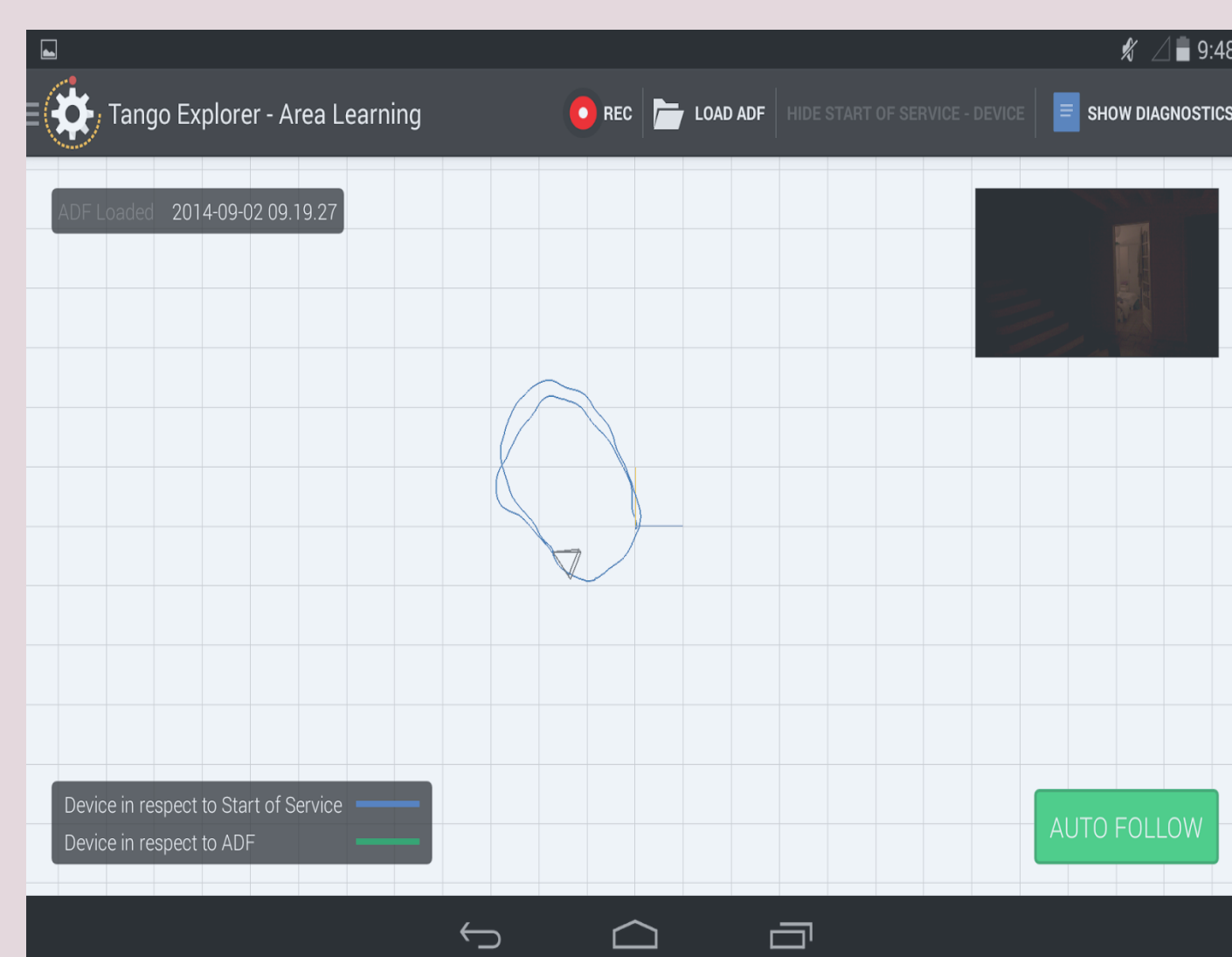
# Swimming Tango

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## What is it?

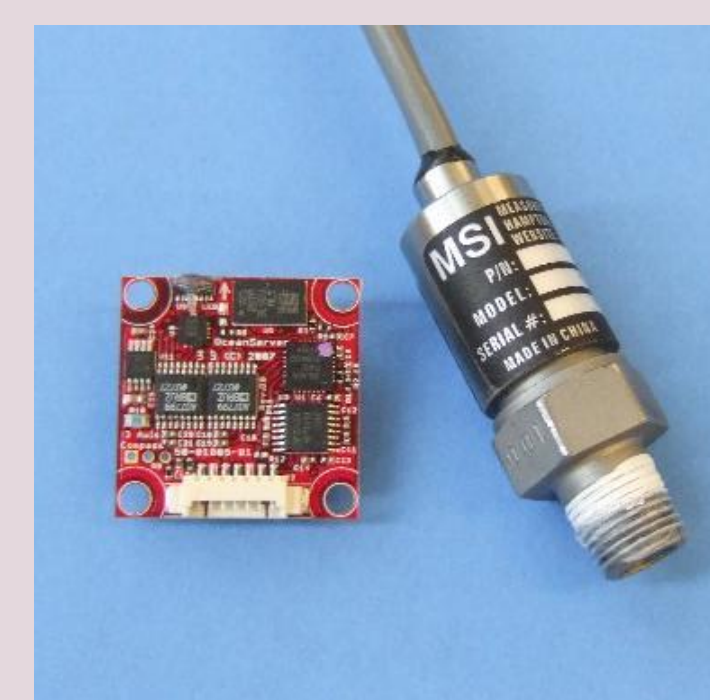
- “Swimming Tango” is a proposed device that allows a diver to map their position in real time while they explore underwater
- Based of Google’s Project Tango
- Would use underwater image data and position data to do visual odometry in real time



Google’s Project Tango has an explorer app that does visual odometry.

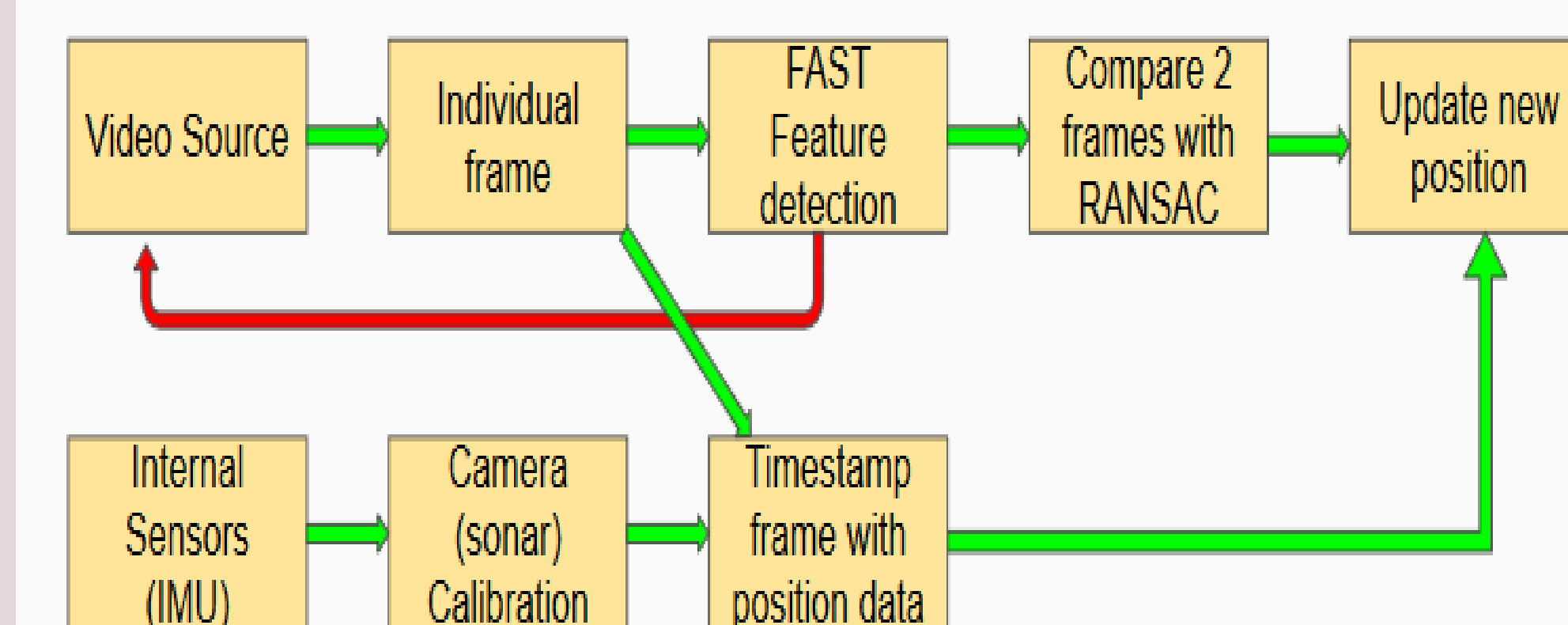
## Methodology

- Utilize a Sonar to collect images of the underwater environment
- Use a visual odometry Algorithm to track relative position in real time
- Have an IMU and pressure sensors to make the relative position absolute
- Implement a SLAM algorithm to allow mapping of the environment



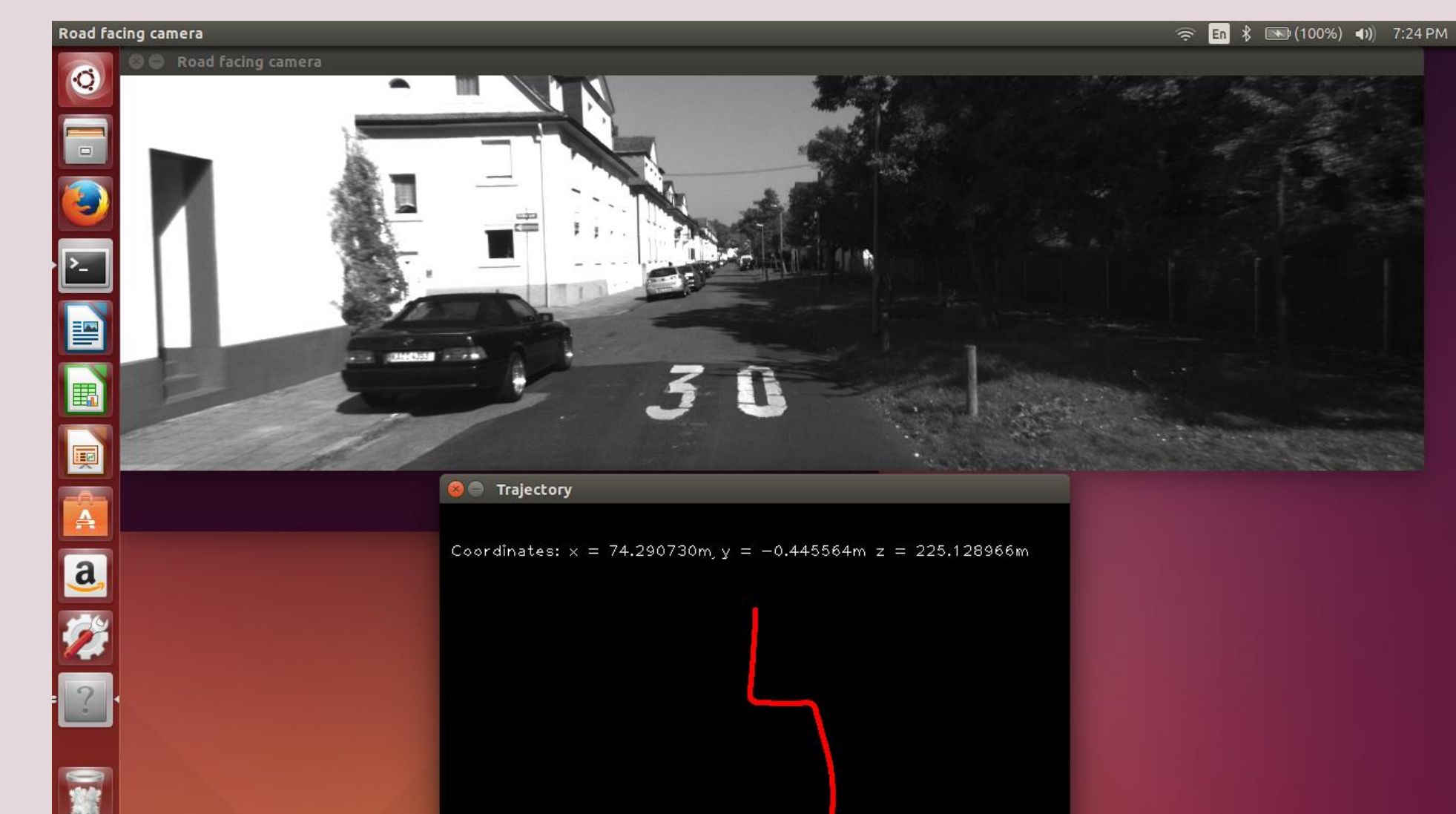
## Visual Odometry

- Allows a robot to track its motion trajectory in real time
- Can utilize Stereo vision or monocular vision (2 cameras vs 1 camera)
- Run feature detection on frames to find and locate key features of the image
- Track the movement of the features between frames
- Use calibration data for translation to real units



## Swimming Tango’s Implementation

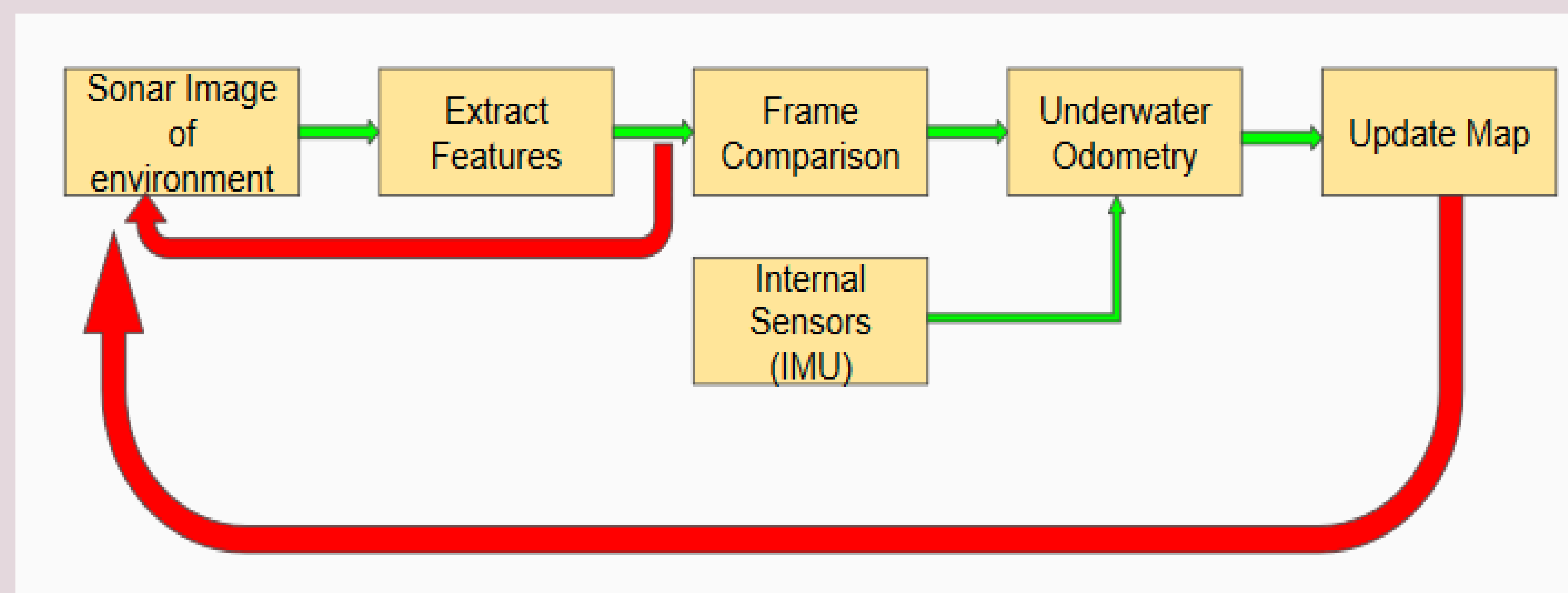
- Derived from an MIT implementation using OpenCV
- The algorithm takes individual frames from images and performs FAST feature detection
- The algorithm then uses RANSAC to calculate the distance between features in frames
- Use IMU timestamp data to do real time position



## Motivation

- Helps divers communicate in case of emergency.
- Allows divers to be found in case they lose their way.
- Enable autonomous exploration while mapping.

## Solution Concept



## Resources Used

- Blueview Sonar SDK:  
<http://www.blueview.com/software/software-development-tools/sonar-sdk/>
- OpenCV:  
<http://opencv.org/>
- KIT visual odometry data and implementation:  
[http://www.cvlibs.net/datasets/kitti/eval\\_odometry.php](http://www.cvlibs.net/datasets/kitti/eval_odometry.php)