

# PDR Week 3

TeaM4C (R Dominick, L Gogley, M Munoz, D Tran)

# Requirements

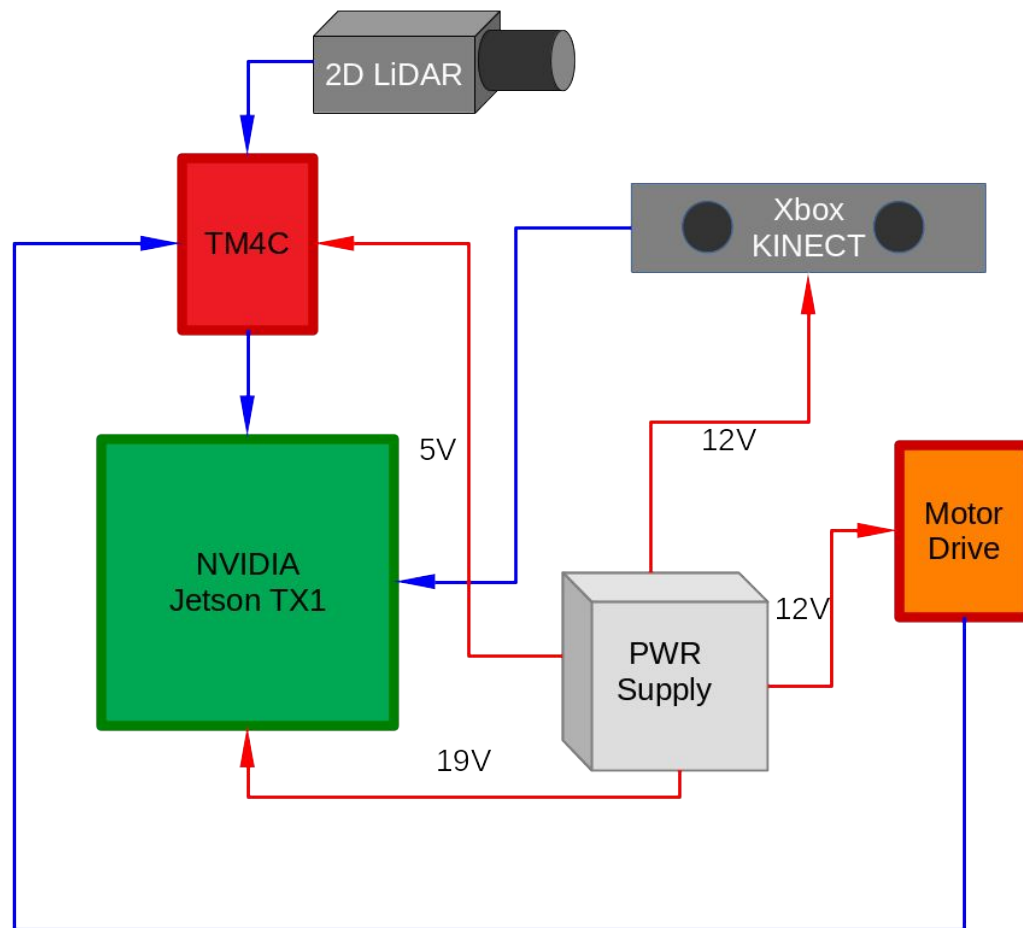
- **The design shall map unknown coordinates through exploration on passable terrain.**
  - Location of choice should not dictate mapping method, i.e. a room vs a field.
- **The design's structural capture shall be capable of producing a visual map.**
  - The scans must produce an image with the desired map.
- **The design shall be capable of 2D SLAM.**
  - SLAM shall be used to handle 2D coordinate recognition, and assist in 3D sampling.
- **The design shall be capable of 3D capture.**
  - 3D capture can be pulled from samples or from real-time/soft real-time capture.
- **The design shall be powered from an independent power supply.**
  - This power source shall provide enough power to explore, at minimum, 20 minutes of capture.

# Limitations

- **The design is not confined to low light, visible image capture.**
  - High resolution 3D structural capture is used to compensate for loss of visuals under low light.
- **The design is not confined to autonomous navigation, simply the capability of such.**
  - The design will be capable of mapping and localization, but the platform may not drive autonomously as functionality of mapping is the first priority.
- **The design is not confined to real-time 3D mapping, due to limitations of price and available algorithms.**
  - Real-time 3D is sometimes limited to ability of hardware readout, and may be an unrealistic endeavor. 3D may instead be done from sampling.
- **The design is not interested in object recognition.**
  - Point clouds will be used to simply display raw data, and points on a 2D plane will only be used to determine the explored area.

# Systems Engineering

# Top Level Block Diagram



# 3D Capture

- **xBox Kinect**
  - **Use of NIR projector and receiver for depth information.**
  - **RGB Camera: 640x480 @ 30 FPS**
  - **Depth: 320x240 @ 30 FPS**
  - **Allows for image overlay, with point cloud for depth**

# Software Engineering

# Open Kinect

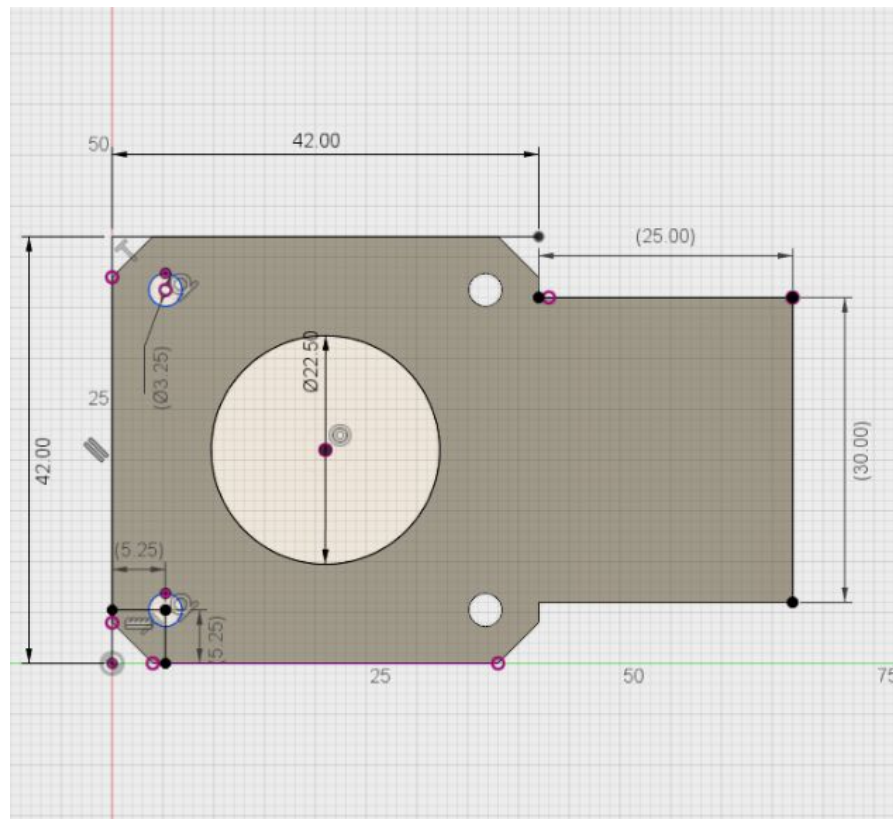
- **OpenKinect**
  - **Apache License open-source Kinect Driver**
  - **Used for point cloud registration and image overlay**



# Mechanical Engineering

# Top Level Motor Assembly

3D capture bay assembly, driven by stepper.

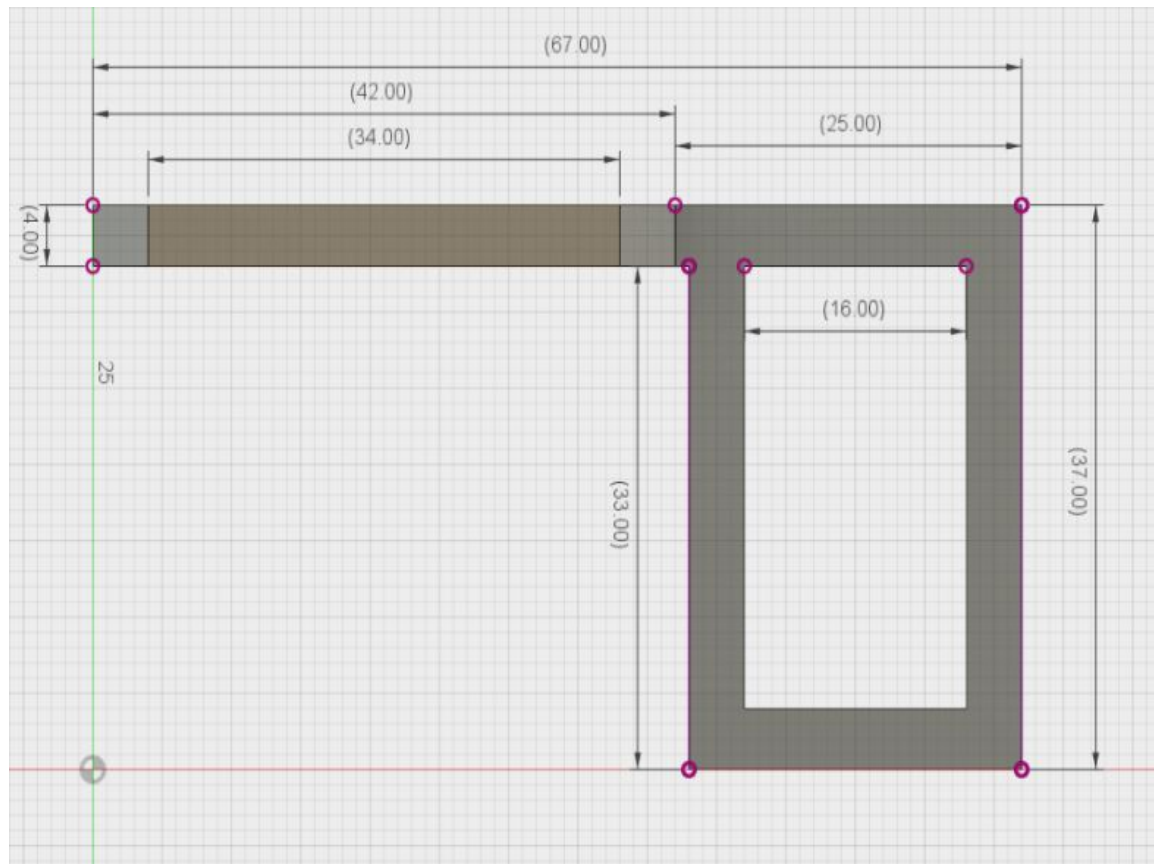


## Motor drive support assembly



# Motor Platter Assembly

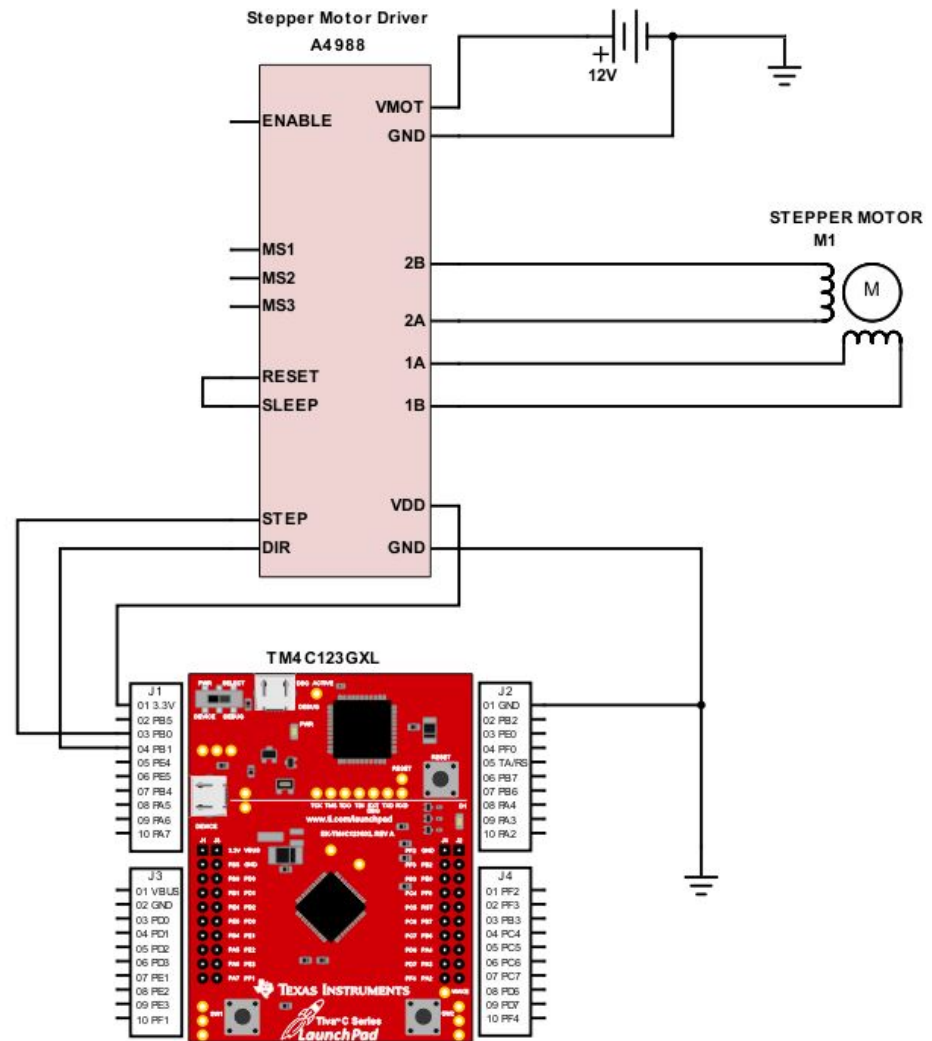
## Platter support assembly to 3D capture bay



# Electrical Engineering

# Motor Control Circuit

## A4988 Driver to TM4C



# Power Supply

Devices with corresponding voltage, and current draw in amps.

DEVICE (Amps)	3v3	5v	12v	19v
TM4C		0.50		
Jetson TX1				0.80
xBox Kinect			0.50	
Motor			0.50	

# Power Supply

Voltage supplies, current draw in amps, and total power in watts.

VOLTAGE	CURRENT	PWR 29.7
3.3	0	0
5	0.50	2.5
12	1.00	12
19	0.80	15.2