

Preliminary Concept

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Requirements

- **The design shall map unknown coordinates through exploration.**
 - Location of choice should not dictate mapping method, i.e. a room vs a field.
- **The design shall not be limited to enclosed or man-made structures.**
 - The scans must be accurate enough to recognize a low profile object as an obstacle/structure in its map.
- **The design shall be capable of 2D SLAM.**
 - SLAM shall be used to handle 2D mapping.
- **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, one floor of the ECS building.

Limitations

- **The design is not confined to color recognition of the surroundings.**
 - With use of LiDAR, the capture is not interested in color, therefore detail is lost of surroundings.
- **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.

Purpose of Design

For us:

- **Explore high performance embedded system design.**
- **Expand territory into industry applications such as point cloud capture, machine vision, and SLAM.**

Purpose of Design

For the consumer:

- **3D maps introduce depth to a panoramic capture, and allow for implementations such as virtual real estate, virtual visits to landmarks, and cave, ocean, or other exploration.**
- **This platform will serve as a self-contained system capable of remembering where it began its journey, while also creating a map of the area it explores beyond that point.**

Top Level Block Diagram

