

# Pocket Microscope Slide Scanner

# Project Apollo

## **Team Members:**

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## **Sponsor:**

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# Objective Statement

According to the World Health Organization, 70% of deaths caused by cancer worldwide occur in developing countries (Chan, 2010). The overwhelming majority of these cases when diagnosed are late-stage terminal cancers. To relieve this burden, it is imperative that these countries have the accessibility to affordable cancer diagnostic equipment. The objective of this product is to provide a solution to diagnosing child cancers in developing countries where access to biomedical tools are limited.

# Value Proposition

This product aims to provide both private and public institutions with the ability in providing premium diagnostic tools by facilitating the overwhelming problem of cancer diagnosis in third-world countries with a low-cost and affective cancer diagnostic method. This device will save lives by giving physicians the ability to catch cancers before they metastasize.



# Product Requirements

## User Interface Requirements

- Minimal buttons
- Interface smartphone via Apollo app support
- Live view of slide
- Coarse and fine adjustments to adjust field
- TIFF and JPEG compliant
- Port for charging and slide loading

## Storage and Battery Requirements

- MicroSD card support
- Utilization on phone storage
- Connectivity with online cloud storage
- Minimum of 8000 acquisitions per charge cycle

## Optics and Camera Requirements

- 20-40X effective zoom
- 0.25  $\mu\text{m}$ /pixel resolution
- large format imaging capability (up to 1cm<sup>2</sup>)
- LED light source (5600K)
- Auto white-balance (optional)
- Auto-focus

## Networking Requirements

- Wi-Fi (802.11 b/g/n compliant)
- Bluetooth 4.1 compliant
- 4G LTE when paired with smartphone

**Device will cost < \$1000**

# Comparable Products



## The PathScan Enabler 5: ~~\$1,895~~

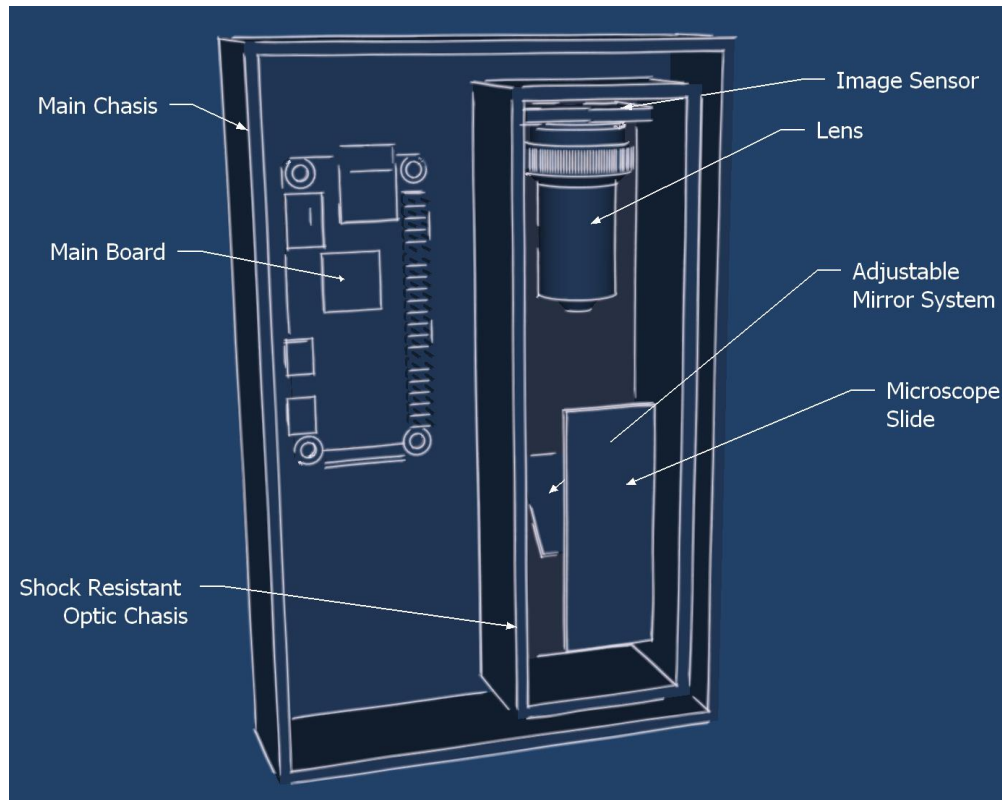
- Typical scan times is just over 1 min.
- Includes two (2) holders which accepts two (2) 1 x 3" glass slides
- Optional geological polarizing holder
- 10,000 x 10,000 dpi resolution
- 2.54 microns per pixel



## uSCOPE MXII Digital Pathology Slide Scanner: ~~\$10,000~~

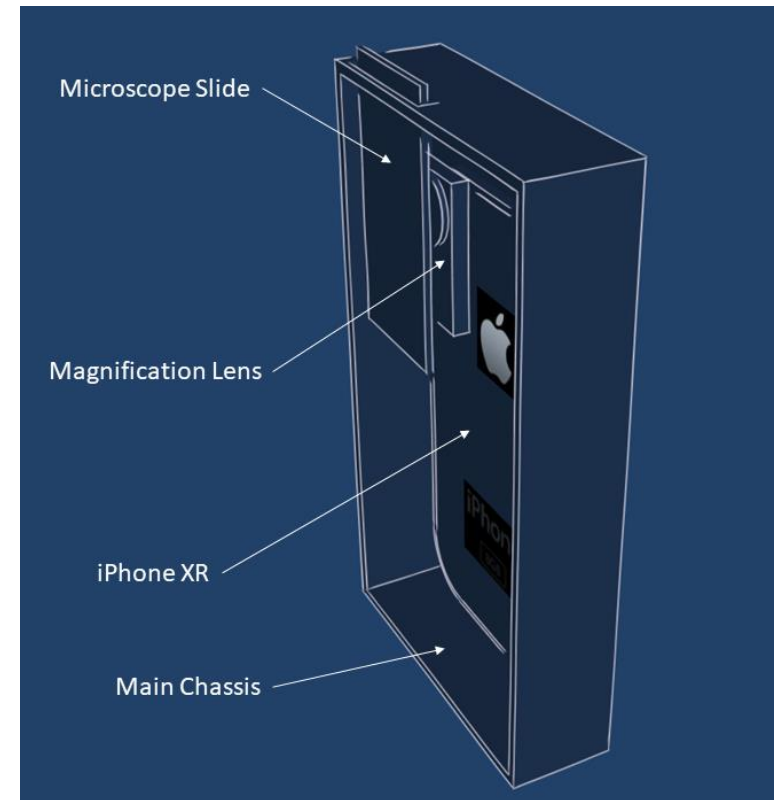
- Whole slide imaging
- .25 microns per pixel
- Variable zoom (4x, 20x, 40x)
- Interfaces with PC, intended for desktops
- 1980X1080 resolution
- 24 bit color

# Design Concepts



## Concept A:

- Standalone and optimized device
- Utilizes a Raspberry Pi 4 to process and distribute image to phone
- RPi4 Compatible CMOS image sensor
- Bluetooth connectivity to phone
- Phone app for device control and image stitching



## Concept B:

- Integrated as a phone case
- Magnification Lens is available as a consumer product
- Utilizes a phone for image capture, processing, and stitching
- Also requires a phone app for device control, stitching, etc...

# Schedule

Task Description	Duration	Assigne
Testing Nurugo Micro	2 weeks	10-Oct
Finalize appropriate path for design	2 week	17-Oct
Brainstorm Cirteria for design validation	1 week	17-Oct
Brainstorm and submit project value Proposition	1 week	24-Oct
Build and update Wikipage	3 weeks	24-Oct
Sanpshot #2 Preparation	1 week	26-Nov
3D Modelling of device	2 week	3-Nov
Visit Client at Portand	2 days	24-Nov
Review Budget and Track progress	1 week	8-Dec
Design Expo Resitration	1 week	21-Jan
Prototyping	3 weeks	15-Jan
Stress Analysis on enclosure	2 weeks	2-Feb
Design Validation Analysis on the prototype	2 weeks	9-Feb
Engineering Release review	1 week	16-Feb
Sanp Shot #3 Preparation	1 week	28-Feb
Report Writing-1	2 weeks	6-Mar
Expo Preparation	3 weeks	12-Apr
Finalize design Porfolio and Report	2 weeks	28-Apr
Poster Preparation	1 week	1-May

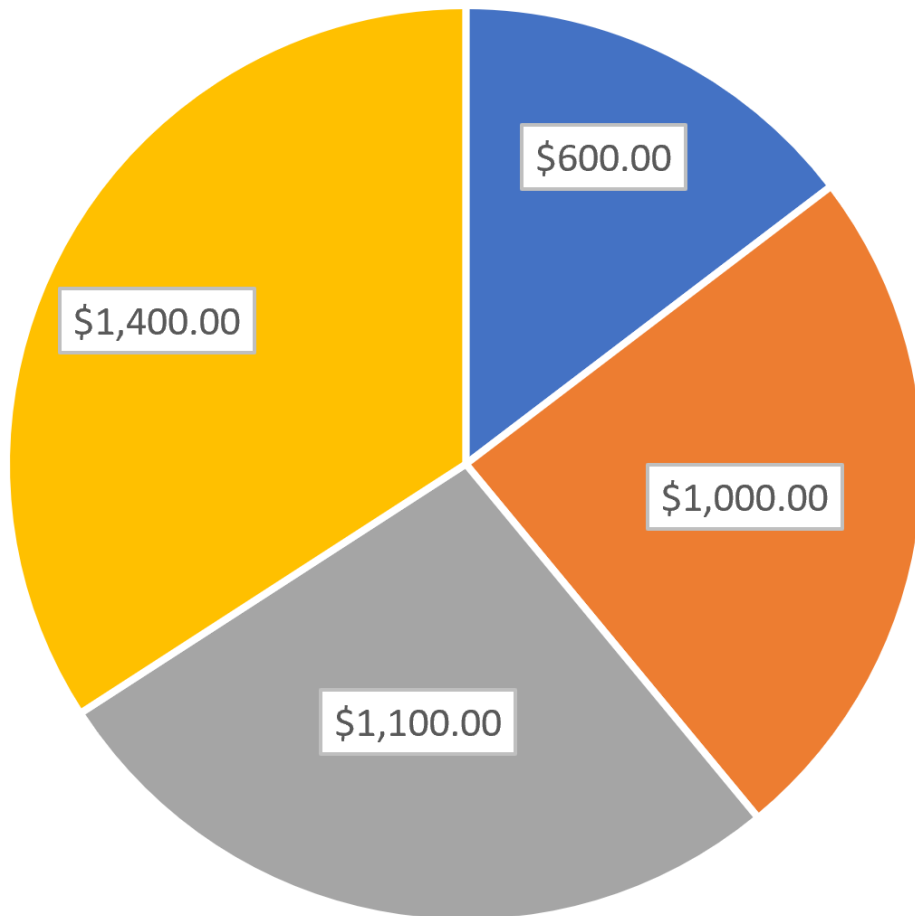
Fall 2019

Spring 2020





# Budget



- Equipment / Tools
- Travel
- Supplies/Parts/Services
- ME Shop Usage

<b>Total Budget</b>	<b>\$7,000.00</b>
Projected Budget Expenses	\$4,830.00
Surplus	\$2,170.00