

DCBA 3D Scanner

Low-Cost, High-Precision, User-Friendly

Vision

Our Vision:

All work in measurement, design, art, and manufacturing will soon take advantage of the accuracy and speed of 3D scanning.

Our Goal:

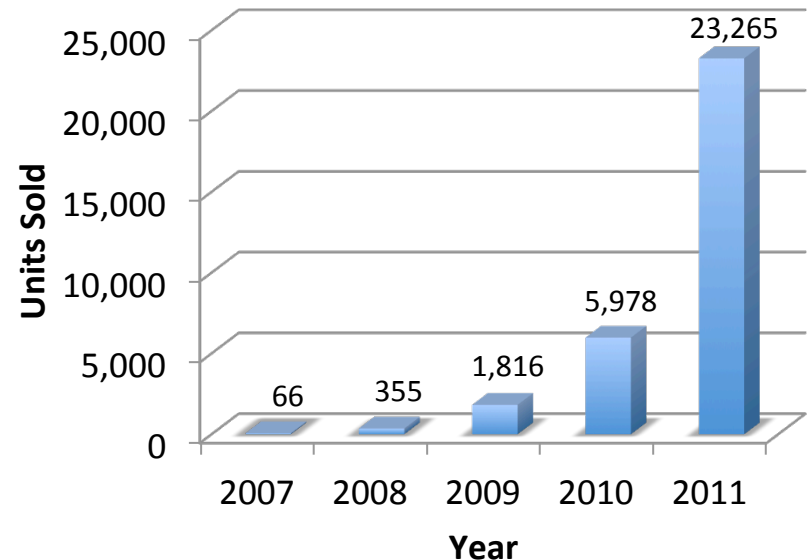
We will develop high-quality 3D scanners accessible to individuals and businesses on small budgets.

Market

- Existing \$350 million 3D scanning market targets large businesses – similar accuracy and lower price exposes a much larger market
- Potential users
 - Research labs
 - Hobbyist builders
 - Artists
 - Product Designers
 - Small manufactures
- Interest in and use of 3D printing is growing wildly. 3D scanning is the second half of this revolution

Global Personal 3D Printer Sales

Machines or kits priced between \$500 and \$4,000



Data from Wohlers Report 2012: Additive Manufacturing and 3D Printing State of the Industry

Relevant Technology Advances

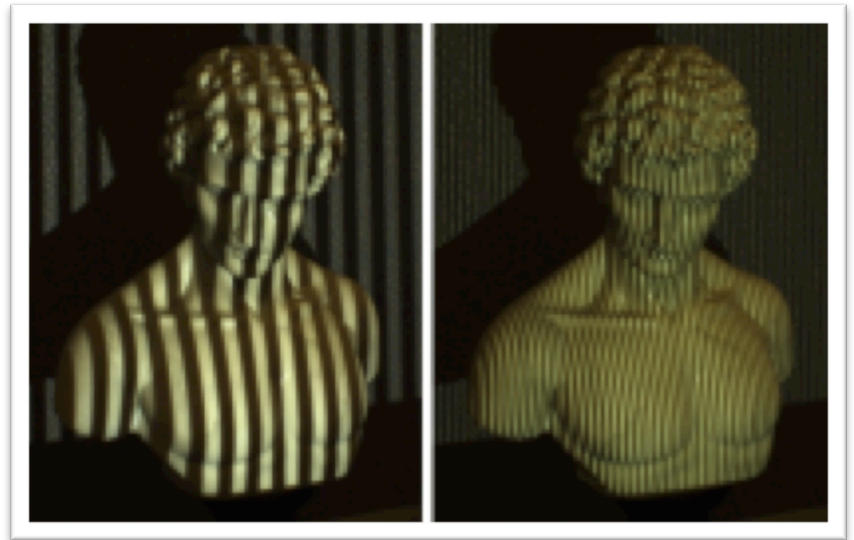
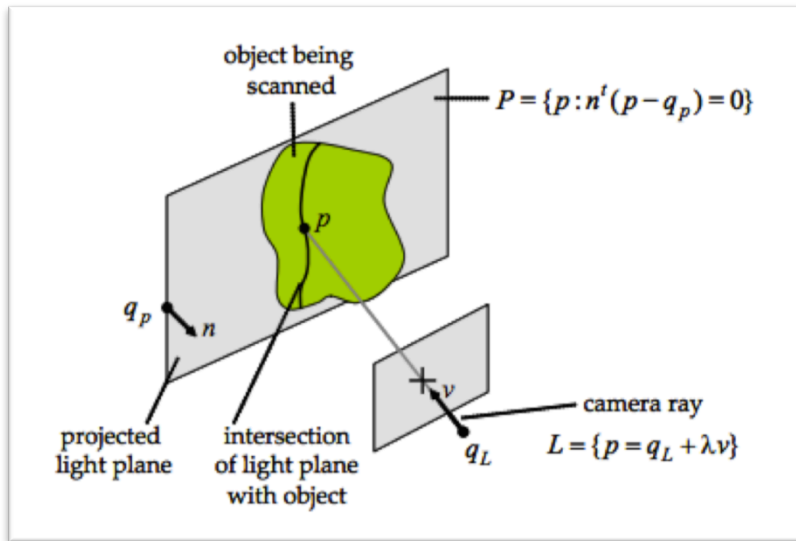
- **Optics and Digital Imaging**
 - Notably emergence of high-quality, compact, and cheap cell phone cameras
- **Computing**
 - High-power computers are practically ubiquitous
- **Digital Fabrication**
 - High-precision laser cutting and CNC machining is now easily attainable

Scanning Techniques

- Existing methods include
 - Structured Light
 - Image Reconstruction
 - Laser Time of Flight
 - Laser Triangulation
 - Computed Tomography
 - Serial Sectioning
 - Contact Scanning
- Recent interest in 3D scanning has spurred academic research advances, particularly in structured light and image reconstruction

Structured Light Scanning

1. Known light pattern is projected onto scene
2. Scene is imaged using one or more cameras
3. Point cloud calculated by triangulation



Product Goals

- **Accurate**
 - 0.025 mm accuracy
 - This level of precision comparable to or better than most manufacturing processes
- **Low-cost** – less than \$500
- **Usable**
 - Intuitive website and software UI
 - Computer-controlled calibration
- **Compact** – fits on top of a desk

Our Team



Troy Astorino

Year: 2013

Major: Physics/AeroAstro

Job: Team Lead/Programming



Gus Downs

Year: 2013

Major: Physics, Math

Job: Mechanical & Electrical
Engineering



Craig Cheney

Year: 2014

Major: Mech. Eng.

Job: Mechanical Engineering

Our Current State

- Can successfully complete a scan using a DLP Projector
- Confident an array of cheap pinhole CMOS cameras can provide desired cost and accuracy
- DLP Projector is cost driver – low-cost alternatives to DLP Projection include:
 - Fixed and moving gratings over LEDs (Talbot imaging)
 - Optical interference fringes

Next Steps

- Prototype Prototype Prototype!
- Validate viability of low-cost projection alternatives
- Explore algorithmic methods for combining multiple scanning methods and reducing error