1. Project Title

Light Sight

2. Primary Contact

Brandin Leon Watson

3. Project Summary

Our goal is to create a well-documented, open source system for the fabrication of extremely low cost parabolic mirrors for the use in amateur telescopes. We will achieve this goal by applying our team's familiarity with epoxy and cnc machine construction to develop a machine that uses the controlled dispensing of epoxy on a spinning bed in order to achieve a parabolic form that can then be plated in order to make a mirror for the use in telescopes.

4. Relevance to SpaceGAMBIT Mission

Our project is in direct alignment with SpaceGAMBIT's goal of lowering the barrier of entry for amateur astronomers to get involved with the detection of asteroids by developing a low cost system for the creation of telescopic mirrors with diameter of 18 inches or more.

5. Project Description

We want to offer the world a radically cheaper alternative to existing methods for the production of parabolic mirrors for the use in telescopes. In order to achieve this goal, we will use a computer controlled spinning turntable upon which epoxy resin are deposited upon through a computer controlled system of pumps. We aim to create mirrors of a diameter of 18 inches or more, as are appropriate for the use in optical systems, for the identification and tracking of asteroids that pose a potential threat of impact with our own planet. We will achieve this low cost through the appropriate use of pre-existing technologies, by integrating existing hobby level components into a complete and easy to use assembly.

Our sole target in this phase is the creation of a basic epoxy, parabolic form that can subsequently be plated to form a mirror in telescopes with minimal post-process machining. We are orienting our design towards forming the epoxy mirror bases at a size of around 20 inches. This is a proven technology. We want to make it more mainstream by integrating existing low-cost maker oriented technology such as Arduinos, common aluminum extrusion and open source software into a fully documented system with easy assembly instructions.

We will also create and host a community centered on our community for the future open-source improvement and exploration of this technology.

6. Methods and Implementation Plan

Upon awarding of funds, our team will begin fabrication of a prototype system based on preliminary designs. We will complete this system within a month and begin immediate testing. After a further month of testing and review, we will begin the design and fabrication of a beta system. This will accomplished within another four weeks. Another three weeks of testing will then occur. After this time, design documentation will be uploaded to at least two independent, open-source hardware repositories as well as the MAG Laboratory website. Upon proof of concept, an independent company will then be formed by the team members, using our equipment for the sale of our mirrors on websites such as Ebay.

7. Team, Hosting and Partner Organizations

Team Instigator and Lead:

> Name: Brandin Leon Watson
> Profession: Design and Manufacturing Engineer, AVT Inc.
> Qualifications: Familiarity with the use of epoxy in fabrication. Strong familiarity with design, manufacturing documentation and team management.

Chief Fabricator:

> Name: Trenton Wilson
> Profession: Lab Technician at Mount San Antonio College
> Qualifications: Familiarity with the use of epoxy in fabrication. Extensive fabrication experience. Procurement specialist.

Electrical Engineer and Chief Programmer:

> Name: Martin Mason
> Profession: Department Chair, Engineering and Physics, Mount San Antonio College
> Qualifications: Familiarity with asteroid detection using optical systems. Expert in robotic design.

Mechanical Engineer and Blogger:

> Name: Kevin Salvini
> Profession: Manufacturing Engineering Student, Cal Poly Pomona
> Qualifications: Very strong research and interpersonal skills. Familiarity with telescopic systems. Mechanical and electrical design background.

Bookkeeper:

> Name: John Cunningham

Profession: Aerospace Engineering Student, Cal Poly Pomona
Qualifications: Accountant at MAG Laboratory. Space Enthusiast.

Hackerspace:

MAG Lab,(Makers Artists and Gadgeteers Laboratory), Pomona, CA

A small, not-for-profit, community oriented hackerspace located near the Cal Poly Pomona and Mount San Antonio campuses with a strong orientation towards offering local, creative geniuses with a budget, a 24 hour location where they can find a supportive community that is just as interested as they are in bringing to life the products of their imaginations with the tools that can make it possible.

8. Budget

$8000

This amount will be used to cover the costs of the development of two concurrent systems consisting of; an extruded aluminum frame support system, a machined spinning round table and wall system, precision stepper motors and driver boards, microcontrollers, epoxy mixing materials, plating of test products, testing of surfaces, pumps, mixing chambers and website hosting of documentation.

An additional $2000 dollars, if awarded, would be used for the integration of a finished mirror into a telescope for a fully functional system for use at monthly, MAG Laboratory hosted, star parties at a nearby International Dark Skies Organization recognized locations. At these activities, the public would have an opportunity to become familiar with our system and the opportunities to identify asteroids.

9. Project Deliverables

We will develop, fully document and host documentation of, an alpha and beta system for the production of epoxy forms, of a high precision shape of a size of 18 inches or more, that are to be plated through vacuum disposition, for the use in telescopes that are capable of identifying asteroids that pose a potential threat of impact with Earth.

In addition, we will provide all documentation that is consistent with the requirements described as contingent with award of this funding including a written and photographed report. Additionally, we will provide a weekly updated blog documenting our progress.