ECE 532 Project Propsal

1 Tentative Title: The DongleVerse™®

2 Team Members

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3 Brief Overview of Topic and Motivation

People look to the stars for ages for naviagation, hope, and beauty. Mythological figures and important events have been immortalized in the stars for ages, and their stories have been passed down through the generations. We all know the Big Dipper (Ursa Major), the Little Dipper (Ursa Minor), and Orion's belt (a few of us even know where Orion went off to), but where is the Happy Monkey, Giant Stick Man Weilding an Ax, or the Weird Looking Dong?
Systems have been developed to find constellations in images of the sky taken from earth, but they have not been able to take images of new constellations and send them to the stars. We propose a system that allows for users to draw images and see their creations turned into constellations!
Welcome to the DongleVerse™®!

4 Core Concepts

Image Processing will be used to determine key features of hand-drawn images. There must exist enough features for users to identify their drawings accurately, but there cannot be so many features that the constellation-finding system will stuggle to meet fit requirements. Thus, the number of features for a specific drawing must be optimized for accuracy and speed.
Planar Projection will be used to map stars from 3d spacial locations (given by dataset) to planar surfaces that represent a visible portion of sky from earth.
Procrustean Analysis will be used to match key features from images to constellation planes. The set with the minimal error will be chosen as the proposed constellation.

Reach Goals
If time permits, an easy-to-use GUI will be developed to allow for quick input of new images for feature recognition and constellation mapping. Further, they system will be able to match constellations for the specific season or location on earth (thereby narrowing the search feild - increasing speed - as well as improving overall functionality). This system is proposed to be submitted to the Engineering Expo.

5 Related Papers, Datasets, or Resources

Datasets
http://astronexus.com/node/34
Database containing all stars in Hipparcos, Yale Bright Star, and Gliese catalogs (almost 120,000 stars, 14 MB)

Papers
http://lepo.it.da.ut.ee/~timo_p/constellations/petmanson-krips-algo-project.pdf
http://www.renken.de/or1997.pdf
http://web.stanford.edu/class/ee368/Project_Spring_1415/Reports/Ji_Liu_Wang.pdf

Resources
https://en.wikipedia.org/wiki/Procrustes_analysis
Analysis based on the mythological theif Procrustus, who stretched or cut off victims' limbs so they fit his iron bed.
For data bases.... there's that star data base. I'm finding out how to "cite" that. There are plenty of papers dealing with a similar problem - taking an image of the sky or star map and finding known constellations, which is useful for satellite

orientation and navigation:

Hartmut Renken and H J Rath. A Method for Three-Axis Attitude determination by Image-processed star constellation matching. *Space Technology*

Kristjan Krips and Timo Petmanson. The constellation database. pages 1–7, 2011

Suyao Ji, Jinzhi Wang, and Xiaoge Liu. Constellation Detection