**MDP proposal: Orthogonal/** **Proabot Flotilla**

**Mentor:** Professor Simon Penny, Art.

**Co-Mentor**. Professor Mike McCarthy, Mechanical Engineering

**Project Description.** Orthogonal / Proabot Flotilla is a radically transdisciplinary research project involving anthropology, hydrodynamics and aerodynamics, design, prototyping, experimental structures and materials science, traditional and contemporary artisanal practices, sustainability and ‘critical technical practice’ (Agre).

We are building a unique experimental ocean going sailcraft based on Micronesian Voyaging canoes. For thousands of years, Micronesian and Polynesian peoples have sailed the vast Pacific using navigational techniques as effective as they were mysterious (Hutchins). Their sailing craft - outrigger canoes, called ‘proa’ (or ‘prao’ in french) were recognised by 16th -18th century European explorers as being exceptionally fast.

Orthogonal is a project to build a modern proa, exploiting some of the special qualities of traditional proas - such as bilateral asymmetry and shunting - while using modern materials (aluminium, carbon fiber, stainless steel, Kevlar, epoxy, plywood), to produce a light, fast shallow draft, demountable and trailerable, coastal ocean sailing boat of about 30’. The design process involves heterogenous design decisions regarding materials, safety, usability, buildability and cost, along with more subtle decisions regarding the hybridization of well established western style sailing components and techniques with the novel dynamics of proa sailing.

The project has been underway for a year. We are building a 30’ multihull sailboat and an 8’ (25% scale) model with custom instrumentation and radio control. This latter has evolved into its own subproject – proabot flotilla – building a fleet of autonomous sailcraft for oceanographic research.

Recently contact ahs been made with a Micronesian community on the Yap Atoll, where traditional proas are still built and sailed. We look forward to developing this contact.

**Students’ Involvement and Expected Outcomes.** Students will be involved in a complete design/build/test cycle. Useful skills and experience include sailing, carpentry, metalwork and machining, experience with epoxies and fiberglass, sailmaking, analog electronics, sensors, microcontroller programming, 3D modeling, engineering simulation (especially aerodynamic and hydrodynamic). Most important is a willingness to work hard, get dirty, design and problem-solve (collaboratively and autonomously) and work reliably as a responsible member of a group.

 Construction of prototype components and specialised jigs and armatures will be divided into subgroups for hull, foils, mast and rigging, sailmaking, mechanicals and electronics. Documentation tasks, including video production and website will also be required. Skills developed will include design practices (digital and old-school), material realisation of plans and designs, precision carpentry, metalworking and use of synthetic materials.

**Student Eligibility.** Motivation, useful skills anda willingness to do physical work and get dirty is expected.Familiarity with sailcraft and sailing would be an asset. Manual fabrication skills and a hands-on understanding of precision making will be an asset. Students are expected to commit to the project for the full 2-3 quarters. This is because it takes one quarter to become familiar with the dimensions of the project and the tools and materials involved.

**Recommended Background material for review:**

Sailrocket world speed record (its a proa!)

<https://www.youtube.com/watch?v=sZVIj5TUSKE>

Traditional proas

<http://www.pacificproa.com/micronesia/flying_proas_of_the_Ladrone_Islands.html>

<http://www.pacificproa.com/flyproa.html>

A major study (in French)

<http://barreau-neuman.com/ArmoireaPlan/Ecole/2008/Victor%20Laurent/MEMOIRE.pdf>

Cheers, Newicks’ famous original Atlantic Proa

<http://www.wingo.com/newick/cheers.html>

Historic 'Azulao' atlantic proa by Dick Newick

<http://www.histoiredeshalfs.com/50%20multis/G%20N10%20prao.htm>

About Face – 1980s ocean going Australian Atlantic Proa

<http://wikiproa.pbworks.com/w/page/14592436/About-Face>

Samwise proa design by M Schecht

<http://proafile.com/archive/article/samwise_part_3>

**Funding and Budget.** The project is supported in kind by the School of the Arts which has generously dedicated substantial indoor and outdoor premises. The project has been supported by a CORCL grant (winter 2014) and an MDP grant 15/16.

**Workspace.** The project has been assigned workspace in the ‘arts annex’ by the Dean of CTSA. This includes meeting room, storage space, woodshop and covered construction area. Harbor launching/testing space will be negotiated with UCI sailing club or other Newport harbor maritime entities.

**Academic Credit** will be available via 199s etc.