



4-2014

Fluid Inspired Art

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**COVER SHEET
FOR FINAL REPORT**

University of the Pacific

Scholarly/Artistic Activity Grant (SAAG) Report

Project Title: Fluid Inspired Art

Principal Investigator: Said Shakerin

Amount Funded: \$2,500.00

Funding Date: Spring 2013

Final Report Due Date: Spring 2014

Date of Project Completion: April 2014

Final Report must include:

1. Summary of complete activity
2. Expense details – with Banner report from school's Budget Officer
3. List of publications/presentations (completed or anticipated)
4. Intellectual property resulting from project, if any

1. Summary of Activity

The goal of the project was to develop an interactive display to demonstrate the inherent beauty and complexity of fluid flows as a tool for informal science education for the campus community and its visitors. The project was successfully completed with the installation of our display at the main Library as shown below.



The project was accomplished in three phases. Various geometrical variables such as size, shape and other details plus suitability of different fluids were considered in phase one and several models of display were made. The second phase involved design and fabrication of the final display, which was informed by what was learned in phase one. Fabrication of a museum-quality frame to safely house the enclosures and installation at the Library comprised phase three, which was completed in early April 2014.

The display consists of three circular enclosures, each of which is attached to a turn table that allows a user to easily rotate them. The enclosures contain, to approximately one half of their volume, liquid dish soap, beach sand, and precision stainless steel balls, respectively. Air occupies the other half of the volume in each enclosure. At idle, each material is at the bottom of its enclosure, a stable situation. Once turned, the situation becomes unstable, that is, the heavy material is on the top and lighter material, air is at the bottom. The instability causes the material to fall down and air to rise up. This interaction exhibits visually engaging flow patterns that are not only interesting but also show several scientific facts. These include specific formation of soap films (soap enclosure), angle of repose (sand enclosure), and crystalline defects (ball enclosure). Text blocks are affixed to the frame which inform the users how to operate the display, scientific facts demonstrated by the display, and suggestions for further information.

2. Budget

The total expenses were \$2,492. The BANNER report is shown below.

Finance System Fgzpdata	University of the Pacific				Page 1					
	Budget Status: Detail				05/13/14 12:42 PM					
	Fiscal Year: 2013									
	From 01-JUL-2012 To 30-JUN-2013									
COAS: 1	University of the Pacific									
INDEX: BDEN01	Engineering-IDC Allocation									
ORG: 10601	Engineering-Administration									
FUND: 130251	Engineering-IDC Allocation									
PROG: 106001	Engineering - Administration									
Trans Date	Tran Type	Document Number	Document Ref	Description	Acct	Actv	Budget Activity	Transaction Activity	Encumbrance Activity	Cmt Typ
Beginning Balance:		Labware			7042	145	0.00	0.00	0.00	
06/30/2013	INNI	DP406477	10628792	Shakerin, Said	7042	145	0.00	527.28	0.00	U
Ending Balance:		Labware			7042	145	0.00	527.28	0.00	
Beginning Balance:		Other Nonmandatory Transfers			8500	145	0.00	0.00	0.00	
04/18/2013	FT01	J0201105		SAAG SHAKERIN	8500	145	0.00	-2,500.00	0.00	U
Ending Balance:		Other Nonmandatory Transfers			8500	145	0.00	-2,500.00	0.00	
Total Activity:		145		Activity #145			0.00	-1,972.72	0.00	
		DIRECT EXPENDITURES			70		0.00	527.28	0.00	
		TRANSFERS			80		0.00	-2,500.00	0.00	

COAS: 1 University of the Pacific
INDEX: BDEN01 Engineering-IDC Allocation
ORG: 10601 Engineering-Administration
FUND: 130251 Engineering-IDC Allocation
PROG: 106001 Engineering - Administration

Trans Date	Tran Type	Document Number	Document Ref	Description	Acct	Actv	Budget Activity	Transaction Activity	Encumbrance Activity	Cmt Typ
Beginning Balance:				Lab, Research Equip. Non-Capital	7040	145	0.00	0.00	0.00	
05/06/2014	INNI	I0716424	10645795	Shakerin, Said	7040	145	0.00	1,446.46	0.00	U
Ending Balance:				Lab, Research Equip. Non-Capital	7040	145	0.00	1,446.46	0.00	
Beginning Balance:				Labware	7042	145	0.00	0.00	0.00	
Ending Balance:				Labware	7042	145	0.00	0.00	0.00	
Beginning Balance:				Miscellaneous Supplies	7048	145	0.00	0.00	0.00	
01/30/2014	INNI	DP406492	10641039	Shakerin, Said	7048	145	0.00	515.61	0.00	U
Ending Balance:				Miscellaneous Supplies	7048	145	0.00	515.61	0.00	
Beginning Balance:				Printing/Duplicating - Services	7747	145	0.00	0.00	0.00	
04/30/2014	FDD1	J0209519		td dup april 2014 61502	7747	145	0.00	2.00	0.00	U
Ending Balance:				Printing/Duplicating - Services	7747	145	0.00	2.00	0.00	
Total Activity:				145 Activity #145			0.00	1,964.07	0.00	
				DIRECT EXPENDITURES	70		0.00	1,964.07	0.00	

3. Presentations

Research Day, April 26, 2014 – Most of the models developed during phase one were made available for public inspection. The photo below shows two young visitors at my table.



Gallery of Fluid Motion, American Physical Society, Nov. 2014 – poster to be presented.

Journal/Magazine – article to be written and submitted.

4. Intellectual Property

To my knowledge, this is the first time such fluid motion display is developed, and it may merit patent consideration. However, I do not have resources to pursue a patent on this display.