

## UTRGV SPIE Student Chapter Annual Report: 2015-2016.

### 1. Officers

President: Mengqi Hu

- SPIE ID Number: 3687359

- Email Address: mengqi.hu01@utrgv.edu

Vice-President: John Montalbo

- SPIE ID Number: 3647274

- Email Address: john.montalbo01@utrgv.edu

Secretary: HaichengGu

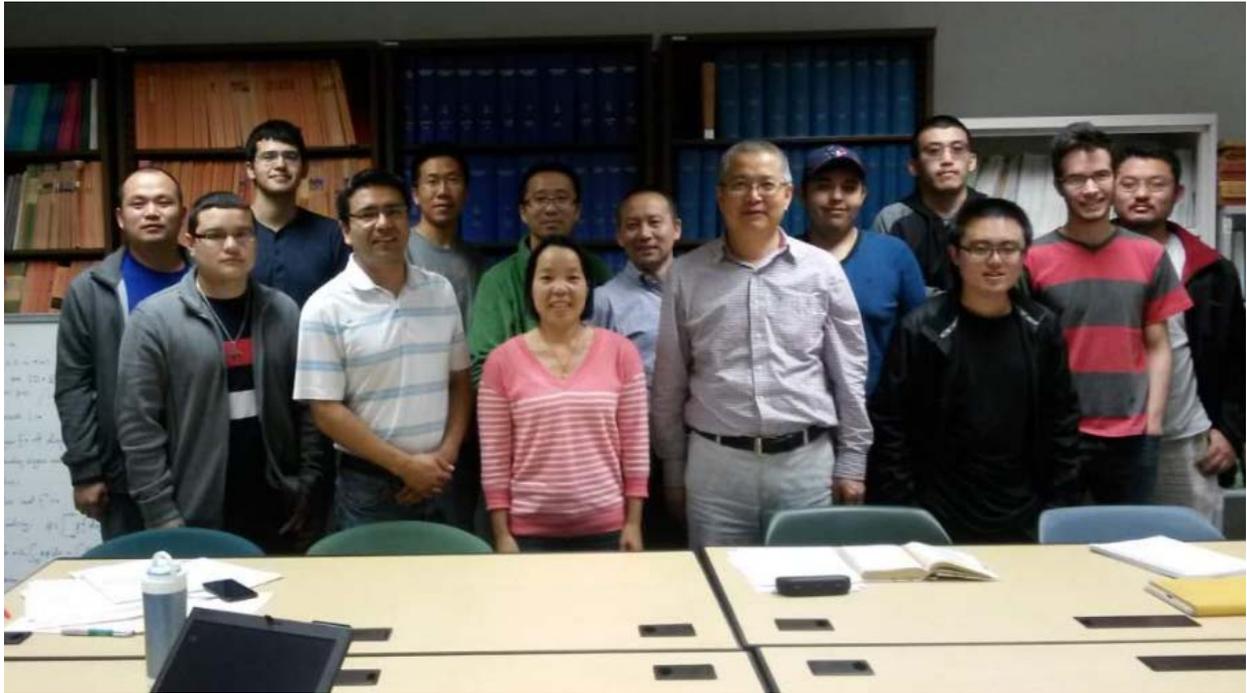
- SPIE ID Number: 3585440

- Email Address: hgu@broncs.utpa.edu

### 2. List of Current Student Chapter Members

<b>Name</b>	<b>Expires</b>
Jorge Cisneros	7 February 2017
Jasmine Cruz	15 June 2017
Jose de Jesus Galarza	15 June 2017
Cesar Galvan	9 February 2017
Mengqi Hu	21 April 2017
Cheng Li	9 February 2017
John Montalbo	9 February 2017
Joseph Schmidt	15 May 2017
Ligang Sun	17 December 2016
Victor Villalpando	9 February 2017

### 3. Details of Chapter Activities



#### **UTRGV SPIE Student Chapter Seminar (Fall 2015 to present):**

This seminar has been the staple of our student organization. Dr. ZhijunQiao, our chapter advisor and Dr. Erwin Suazo one of the senior members, have organized and maintained the weekly seminar. Seminar topics range from Maxwell Equations, Radar Imaging, Compressive Sensing, Polar SAR, ISAR, non linear telegraph equations, non linear PDE and many others. Various student members participate in this seminar and present the findings of their research.

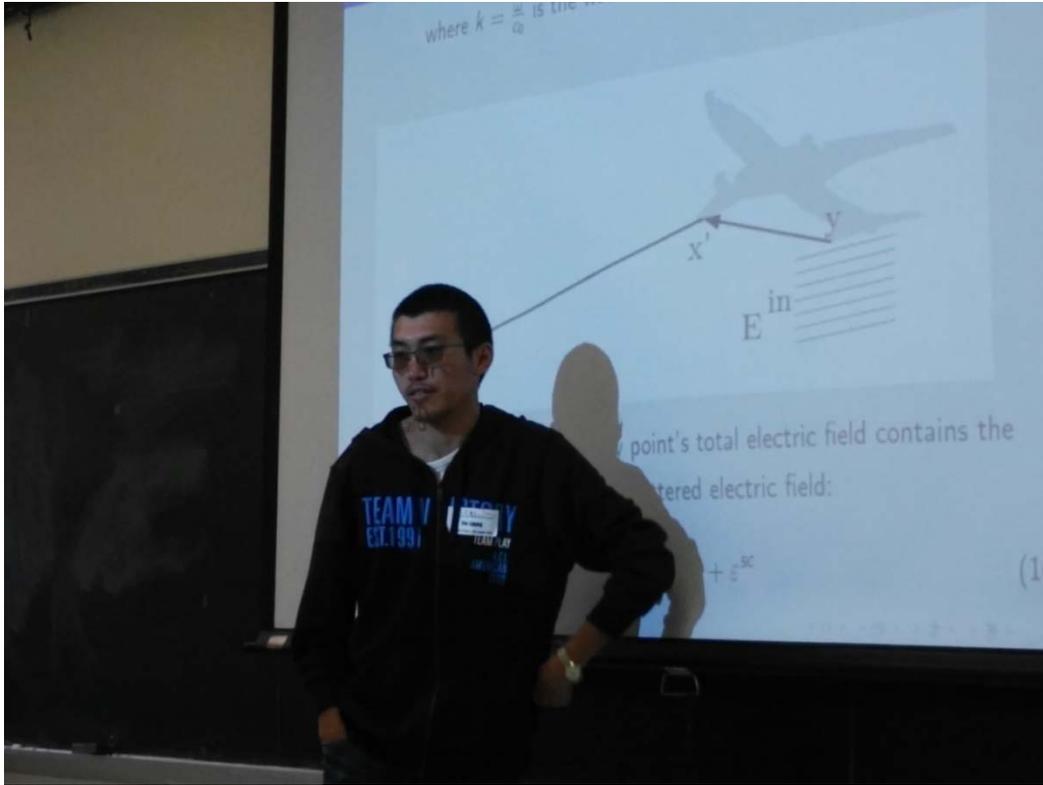
#### **Visiting Scholars:**

With the help of Dr. ZhijunQiao, he facilitated the arrival of visiting scholars Dr. Shouming Zhou, Dr. Qiaoyi Hu, Dr. Long Wei, Dr. Shouzhong Fu. They have provided talks in our weekly seminar and also have helped with the students research.

San Marcos in 2016 Texas DE conference.



In 2016 Texas Differential Equations conference, our group member Mr. Ligang Sun made a presentation about Second Order Born Approximation in Radar Imaging. Generally in scattering theory, the Born approximation consists of taking the incident field in place of the total field as the driving field at each point in the scatterer. The Born approximation is named after Max Born who proposed this approximation in early days of quantum theory development. It is the perturbation method applied to scattering by an extended body. It is accurate if the scattered field is small compared to the incident field on the scatterer. For example, the scattering of radio waves by a light styrofoam column can be approximated by assuming that each part of the plastic is polarized by the same electric field that would be present at that point without the column, and then calculating the scattering as a radiation integral over that polarization distribution. The second order Born Approximation need advanced calculation for the scattered signal, but we can also get more accurate information and then get the clearer image of target after signal processing.



### 2016 SPIE Defense and Commercial conference

In 2016 April, our radar imaging group took part in the SPIE Defense and Commercial Sensing Conference 2016 in Baltimore. There are three students (John Montalbo, Mengqi Hu, Ligang Sun) presented at that international conference, among them Mr. Ligang Sun was awarded travel support from the SPIE conference, and every student obtained the help from our university and department. The chapter advisor Dr. Qiao helped a lot on both the research and the travel.

During the 5 days conference, the students got the great opportunities to communicate with the famous scholars in various imaging fields, such as medical imaging, radar imaging and commercial sensing. Further, the group members got a cherish chance to know the trend of imaging, which is much better for our future research work.



Mengqi Hu presented Sparse representation for the ISAR image reconstruction on the conference. In this paper, a sparse representation of the data for an inverse synthetic aperture radar (ISAR) system is provided in two dimensions. The proposed sparse representation motivates the use of a Convex Optimization that recovers the image with far less samples, which is required by Nyquist-Shannon sampling theorem to increase the efficiency and decrease the cost of calculation in radar imaging.

Ligang Sun presented our current research work about ISAR imaging. In that paper, we designed a new two-stage algorithm to formulate accurately the focusing image with the highly squinted synthetic aperture radar. First of all is the general model of the squinted synthetic aperture radar (SAR) focusing a fixed area. After the echo data collection, the first stage of the algorithm is to establish the coarse image by performing the conventional range cell migration correction and azimuth matched filtering. In the second stage, the azimuth-variant was corrected and the motion compensation was carried to achieve a better image. A simulation experiment was given in the end.

Last but not least, John Montalbo did a presentation about New method for applying manifold learning into the compressive sensing scheme, which is part of his master thesis in University of Texas Rio Grande Valley.



#### 4. Financial Health of Chapter

Revenue and expenditures FY 2015-2016. This is the same as 2014-2015 since nothing was bought with the current money.

#### 4. Financial Health of Chapter

REVENUE AND EXPENDITURES		FY 2014-2015	
Notes	Date	Description	Amount
Cash Deposit	9/19/2014	SPIE Chapter Activity Grant	500
Cash	10/11/2014	HESTEC Beverage Cash Sales	1,761.55
Credit Cards	10/14/2014	HESTEC Square Payments	31.89
Credit Cards	10/14/2014	HESTEC Square Payments	23.66
Total Revenue			2317.1
<b>Fixed Asset</b>	9/18/2014	SPIE Custom Table Cover	-208.23
	10/6/2015	HESTEC Booth Rental Fee	-50
<b>Fixed Asset</b>	10/6/2014	Cash Box Purchase	-34.63
<b>Fixed Asset</b>	10/6/2014	Inflatable Pool (Drink Storage)	-38.46
	10/8/2014	HESTEC Beverage Purchases	-840.47
	10/9/2014	SPIE Member T-Shirts	-255.5
	10/9/2014	Pizza for Visiting Lecturer	-129.8
	10/11/2014	HESTEC Breakfast Tacos for Members	-12
	10/11/2014	Ice for HESTEC	-40
	10/11/2014	U-Haul Van (Rental for HESTEC)	-74.16
	10/11/2014	U-Haul Van (Gas for HESTEC)	-15
	12/1/2014	Food/Supplies for BBQ Event	-192.98
Total Expenses			-1891.23
<b>End Balance</b>	<b>1/15/2016</b>	<b>Ending Balance</b>	<b>425.87</b>