**Abstract ID: 6015776**
**Submission Type: Scientific Papers**
**Submission Status: Accepted**

Contact:
Joan Marti Phone:
University of Girona E-Mail: joanm@eia.udg.edu

Primary Category: Physics
Secondary Category: Ultrasound
**Sun Nov 30 2008 11:15AM - 11:25AM ROOM S402AB**
**04)**

# Automatic Method for the Detection of Fully Developed Speckle Patterns in B-scan Images to Perform a 3D Reconstruction Using Only Image Content Information from Freehand Sensorless Images

*R Marti, PhD; J C Vilanova, MD; J Freixenet, PhD; J Barceló; M Arzoz, MD; J Marti, PhD, Girona, Catalonia SPAIN (joan.marti@udg.edu)*

## PURPOSE

To develop a computerized tool for guiding prostatic biopsy by fusing information from freehand sensorless US and pre-biopsy MRSI images.

## METHOD AND MATERIALS

MR Spectroscopic Imaging (MRSI) has been shown to provide a structural and metabolic evaluation of prostate cancer location, aggressiveness and staging. On the other hand, ultrasound imaging (US) is commonly used in order to guide the biopsy of the suspicious area, with the difficulty of being unable to exactly localize the area of interest seen in the pre-biopsy MRSI.

A novel and robust reconstruction of a 3D volume using sensorlesws freehand US images is presented, based on an improved method for detecting speckle regions and obtaining correlation measures between them in adjacent B-scans. The alignement between such reconstructed 3D US volume with the MRSI forms the basis for a fast and accurate method for 2D/3D correspondence of a given US B-scan (2D) to its MRSI position (3D) in real time during biopsy.

The new speckle detection methodology is based on extracting optimally discriminant low order speckle statistics and simultaneously estimating the decompression factor of the data. Instead of using a specific statistical distribution, the alternative approach here used is to describe speckle based on statistical features directly computed from the amplitud moments of the US image, which leds to a two-class pattern recognition problem.

## RESULTS

As an initial evaluation, different experiments have been carried out to validate the speckle detection framework. From a total of 8 different sets of 4000 samples simulating speckle and non-speckle data, R-S features have been computed as a function of the power of the statistical moment (v). For the $v_{opt}$ value, we obtained 91% of correct classification, with a lower accuracy for the other v values. The proposed algorithm has been later tested using prostatic and liver US images.

## CONCLUSION

The study shows the feasibility of using MRSI and freehand sensorless US registered images to guide prostate biopsy.

## CLINICAL RELEVANCE/APPLICATION

A deep change to the diagnostic approach of prostate cancer, since a more accurate procedure to sample a suspicious target can be performed, instead of the current method of blinded multiple biopsies.

---

**Disclosures:**

**Nothing to disclose:** Robert Marti

| | |
|---|---|
| **Nothing to disclose:** | Joan Vilanova |
| **Nothing to disclose:** | Jordi Freixenet |
| **Nothing to disclose:** | Joaquim Barceló |
| **Nothing to disclose:** | Montserrat Arzoz |
| **Nothing to disclose:** | Joan Marti |

**Questions:**

1. **Published email:** Do you wish to have an email address published in the RSNA program?

Yes

If yes, please provide one email address:

joan.marti@udg.edu

2. **Disclosure of "Off-Label" usage:** The RSNA recognizes the authors may discuss the application of devices, materials, or pharmaceuticals that are not FDA approved for the discussed application. In keeping with the highest standards of professional integrity and ethics, the RSNA requires full disclosure of the discussion of the unlabeled use of a medical device, product, or pharmaceutical that has not been approved by FDA. Please mark the appropriate response below as to whether you or any of your co-authors will or will not describe the investigational or "Off-label" use of a medical device, product or pharmaceutical that is classified by the FDA as investigational for the intended use. If you or any of your co-authors will discuss or describe investigational or unlabeled products, the presenting author is responsible for disclosing the information to the audience.

No, I do not intend to discuss off-label uses

3.

**Submission of Manuscript:** An important part of scientific progress is the timely publication of new research; also important is the thorough peer review of all manuscripts prior to acceptance for publication. (To view how to submit your manuscript, click on HELP>Publications). Please tell us to which of the following journals you plan to submit your work (select one):

**No response**

If you marked Other please indicate the name of the journal:

**No response**

4.

**Digital Scientific Presentations**: If your presentation is accepted, and with the permission of the authors, RSNA will post digital scientific presentations on the Web for a maximum of one year after the RSNA annual meeting. RSNA scientific presentations posted on the Web are not considered prior publication by the editors of *Radiology* and *Medical Physics*. Thus the manuscript of your presentation will be considered for publication if you choose to submit it.

I give RSNA permission to record and post my presentation.

5.

**Institution:** This work was primarily conducted at the following institution: (Provide institution name, city, state [or country] only, *no addresses, please*. Ex: University of Name, Chicago, IL --or-- University of Name, Athens, Greece)

University of Girona, Girona, Catalonia, Spain

6.

**Department Chair:** RSNA provides department chairs a list of accepted presentations from their institution. In order to ensure that your work is appropriately recognized, please provide the name of your department chair. Name only, no institution or addresses, please. (Ex: John Smith, MD):

Xevi Cufi, PhD

7.

**Department Chair Email Address:** Please provide the email address of your department chair:

xcuf@eia.udg.edu