



THREE-DAY PULSE SEQUENCE PROGRAMMING COLLABORATIVE WORKSHOP ON IDEA VE11 8TH-10TH DECEMBER 2015, LYON

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Motivation: New generation of magnetic resonance imaging (MRI) scanners of the manufacturer Siemens (Aera, Skyra, Prisma) employ a strict object oriented sequence programming. This pulse sequence programming workshop based on IDEA VE11 is aimed at beginners, who attended the IDEA VD13 course, or at users of the IDEA versions VB17/VB19 (TIM-Trio) interested to learn about IDEA VE11. During the three-day intensive workshop, the team will collaboratively write a pulse sequence for gradient- and spin-echo echo-planar imaging (EPI), based on the IDEA VE11 manual, user guide, and sequence examples.

Hands-on approach: The sequence will be analyzed then designed using sequence building blocks classes (SBB) responsible for performing parts of the sequence including fat saturation, slice selective excitation, phase correction, CPMG refocusing, and EPI readout.

	TUESDAY 8 TH	WEDNESDAY 9 TH	THURSDAY 10 TH	FRIDAY 11 TH
9:00 – 12:00	Introduction to MR physics. Overview of VE11 C++ pulse sequence programming and real time events. Creating a sequence class.	Source code programming of SBB classes. Discussion of advanced topics.	UI programming, special card, SAR and gradient safety. Reports for each SBBs and discussion	Optional visit of the Prisma 3T MRI in St-Étienne
13:00 – 17:00	Analyzing the parts of the sequence. Preparing SBB headers for class definitions of fat saturation, slice selective excitation, phase correction scans, spin-echo refocusing, and EPI readout.	Source code programming of SBB classes. Combination of SBB source codes for the sequence prototype.	Finalization of the sequence with SBBs. Compilation of the sequence prototype. Sequence testing. Unit test.	Optional visit of the Prisma 3T MRI in St-Étienne

Programming of SBBs will be performed in small groups, and combined on the third day of the workshop to build a sequence prototype. The intensive format chosen for the workshop is inspired from that of the European Marie-Curie projects in Sep. 8th-10th, 2009 at the École Polytechnique Fédérale de Lausanne (FAST), and in Dec. 9th-11th, 2014 at the Université Claude Bernard Lyon I (HiMR/TRANSACT).

Workshop attendants: The workshop was attended by PhD candidates of the Écoles Doctorales “*Interdisciplinaire Sciences-Santé*” and “*NeuroSciences et Cognition*”, and by researchers of CERMEP and CREATIS at the Université de Lyon.

Venue: Lyon Ingénierie Projets, Université Claude Bernard Lyon I, Campus de la Doua, Bâtiment l'Atrium 43 boulevard du 11 novembre 1918, F-69100 Villeurbanne (1^{er} étage Bât. Atrium, arrêt Condorcet).

Requirements: Laptop with 30 GB free space, VirtualBox, Windows 7 virtual machine, Visual Studio 2008 Professional, SDK version 6.1, and the sequence development environment for Siemens IDEA VE11.

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