

Report from CCP_PETMR for the Period 06/06/16 to 24/11/16

Dr Kris Thielemans – 24 November 2016 <http://www.ccppetmr.ac.uk/>

Background

The recent integration of positron emission tomography (PET) and magnetic resonance (MR) imaging into a single simultaneous imaging system opens up exciting potential for synergistic imaging. This EPSRC-funded collaborative computational project (CCP) aims to bring together the best of the UK's PET and MR image reconstruction expertise.

Work has progressed according to the job plan: adding content for the website (www.ccppetmr.ac.uk) and email lists (we now have 84 members on the CCP-PETMR announcement email list [14 on the developers and 61 on the users lists]); organising working group and executive meetings, organise a series of well-attended Developers Days' (every six weeks – latest was 10th meeting) to construct an API for the new software (to be incorporated within a Python/MATLAB development environment), and management of minutes and bookings, etc. all within a OneDrive account.

Core team staffing within STFC includes; **Evgueni Ovtchinnikov, Ron Fowler and Martin Turner; with Erica Yang joining the team.** The core team is funded (1.16 FTE) where Martin Turner (0.1 FTE) has a secretariat position. The focus is creating a framework for different software toolkits combining PET and MR (initially using STiR and Gadgetron open source software).

Highlights for the Current Reporting Period

Summary of successful networking events in this six month period:

- Four software framework meetings have been coordinated: these developers' workshops have continued to be popular and been held at various user locations (UCL, Manchester) – 6 Jun 2016 (**att 20**), 3 Aug 2016 (**att 17**); 21 Sep 2016 (**att 23**); 14 Nov 2016 (**att 14**)
- 7 September 2016: *PET/MR educational workshop* at the 22nd Annual Scientific Meeting of the British Chapter of the ISMRM in Leeds. **Att 73 (9 speakers)**. We included live demonstrations of the CCP software. All presentations and live recordings are now available via our website. This meeting was preceded by PETMR informal gathering for those attending ISMRM-BC, Leeds 11.00-12.00 (**att ~25**).
- 21-23 September 2016: *UCL PET/MRI Methodology Workshop*, facilitated by our CCP. **Att 120 (36 speakers)** with several international attendants. Most presentations are now available via our website.
- 3 November 2016: STiR Users' & Developers' Meeting <http://stir.sourceforge.net/MIC2016UsersMeeting/>. This year the event took place in Strasbourg (France) during the IEEE NSS-MIC (<http://2016.nss-mic.org/>) **Att 47 (6 speakers)**
- Advertised three events:
 - **KCL course for PETMR** 29-31 Jun 2016 Simultaneous PET-MR: Technology and Applications;
 - **Leeds Seminar** 9 Nov 2016 "Dual-tracer 18F-FDG:18F-NaF PET/MR for quantitative multi-parametric cardiovascular imaging Speaker: Dr. Nicolas A Karakatsanis from

the Translational and Molecular Imaging Institute, Icahn School of Medicine at Mount Sinai, New York. PET imaging seminar;

- **UCL Seminar** 3 Aug 2016: Talk by prof. Rich Carson (Yale PET Center) after developer and exec meetings that was well attended (**att 21**)
- Embedding of STFC developer (EO) in the network: 1 day per week at UCL, 1 day in Manchester.
- EPSRC Flagship proposal “A framework for efficient synergistic spatiotemporal reconstruction of PET-MR dynamic data” submitted, involving CoIs of 4 institutions.
- The 3rd CCP PETMR Working Group meeting was held at UCL on 14 November 2016 (**att 16**) where past and future activities were discussed. A proposal for a legal document to be used by contributors to the CCP PETMR software was discussed. This will now need to be checked by the various institutions. We also discussed the need for a name for the software output of CCP PETMR that looks towards the future. Final name will be discussed on the mailing lists.

Progress in software development:

- Aug 2016: added facility for switching Virtual Machine to developer version, all via online scripts, i.e. no need for new download of the Virtual Machine image.
- Continued updates of software (available via github) in preparation of first release for semi-developers which is planned for Q1 2017
 - MR: Simplified code for adding Gadgets (intermediate layer)
 - PET:
 - Addition of extra terms the acquisition modelling to be able to cope with measured data
 - Renaming of many classes/functions to be consistent with MR
 - Extra additions to the underlying STIR code are currently under evaluation. This includes simplification of estimating “corrections” (such as scatter background), Time-of-Flight support and initial support for the GE Signa PET/MR.
 - Addition of “intermediate” functions for making own algorithms
 - All the demos shown are now included in the distribution, including those used at the Leeds Workshop, though there is only limited documentation available. This will be improved.
 - Continuous Integration Testing (CIT) of the CCP code via Jenkins on CCPForge initiated. Underlying STIR code now uses CIT via Travis.

Funded Exchange Scheme: <http://www.ccppetmr.ac.uk/exchange.html>

The first occurred and a report is now online; second has been completed and report in preparation.

Workshops and New Opportunities

Future networking and sustainability opportunities, as well as continued software framework meetings to include further dissemination;

1. First software release: Q1 2017
2. Educational workshop associated to PSMR 2017, the 6th Conference on PET-MRI and SPECT-MRI in May in Lisbon, Portugal, <http://www.psmr2017.pt/>.

Report from CCPETMR to the CCP Steering Panel

3. We are investigating the use of our software in interactive training at the IEEE Medical Imaging Conference in Atlanta, Georgia, USA, <http://www.nss-mic.org/2017>.
4. Proposed embedding activity of STFC staff at KCL and repeat at Manchester
5. Workshop on synergistic reconstruction (joint with CCPi) – proposal stage
6. Establishment of databases for phantom data is ongoing and good links formed with the Dementia Platform UK.
7. PETMR Seminars to be broadcast in next year.

Issues and Problems

- Applications for 'good' new exchange visits are difficult and needed.
- Input from non-STFC software developers needs to grow.
- Following the planned underspend at STFC in the first year (of 0.4 FTE) a new recruit is underway.

The next CCPETMR Working Group meeting is planned to be held in June 2016 (date TBC).

Ed. Martin Turner –24 November 2016