

PhD Program at the Virtual Research Laboratory (VRL)

What is VRL?

Founded recently and utilizing the experience gained in predecessor laboratories, VRL is research laboratory of the DSAIAM. VRL consists of PhD student research projects as organized in collaborative virtual spaces. Each project develops content items for autonomous experimental model system on world class modeling platform. Fundamental and application oriented scientific research results are aimed to achieve in informatics and mathematics mainly for systems organized and situation controlled object structures. Own renewable and suitably configured platform is available for PhD research in the 3DEXPERIENCE cloud platform operated by the Dassault Systèmes S. A.

Why PhD Research at VRL?

Full model centric research is possible on a scientific-engineering platform. This platform has proven at the forefront of full integrated research-intensive industrial practice and it is based on strong theoretical, methodical, and systemics background. PhD research results are represented in autonomous active models and can be reproduced, proofed, explained, and developed for unlimited time. Results can be integrated with cyber units of cyber physical biological configurations for physical experiments and verification. VRL provides an unprecedented opportunity for PhD projects which can be organized jointly with industry using platform capabilities. Projects with global participation can be organized in professional cloud environment. The scientific, professional and practical preparation of DSAIAM-VRL can be learned from [scientific publications](#) available at the IEEEExplore and other digital libraries.

PhD project in the VRL

The PhD student does four years PhD research in a project on the platform in collaborative virtual space as member with PhD specific roles and access to platform components accordingly. PhD student and produces new scientific results as organized in collaborative space as content items realizing research plan. Project related capabilities of platform have been developed in leading world class engineering.

PhD research topics at VRL

The currently available PhD topics are in models of functional organic and flexible bodies (i), system level models together with behavior representations serving their virtual execution (for F and L level components of RFLP structure. For example, Dymola and LCM models.) (ii), integrated simulation structures and processes (iii), contextual model structures (iv), and autonomous communication between cyber physical biological structures and related model systems (v). At representation of scientific results, structures of outside and inside contexts including algorithms, procedures, mathematical functions, etc. are essential. The AIAMDI is open to accommodate new topics with proposed supervisor. VRL makes efforts to bring new cooperative topics for the solution of real world industrial and other problems, mainly from research level users of the platform.

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We are waiting for application by

motivated prospective PhD students who would like to participate in research at VRL as members of research group. Members of the VRL team will make own PhD research in their topic and in the meantime, will do local platform management tasks and keep contact with the management of the platform operator. This is an excellent opportunity for PhD student to gain experience in a leading professional research environment which is same as research and development teams use at the forefront of the world. No doubt, career prospects are excellent for students who worked in VRL topic. Actual information about the application is on our home page.

Basic concept of VRL

VRL joined to the recent trend in which theoretical and experimental research are organized by modeling called as *third paradigm*. PhD student research results are collected in *autonomous generic model system which has the capability of integrated representation of theory, methodology, practice, and experience*. Creating concept, finding theory, fundamental research, problem solving research, and industrial research can be integrated in PhD project. High abstraction model representation, autonomous communication, and situation awareness are in the center of VRL concept. This is enforced by dynamic development of informatics centered high level automation in industry. PhD student is guided by situational awareness and keeps in mind that failed situation recognition in systems must be corrected by human using situation awareness. In accordance with the current trend for wide integration in applications requires PhD research to produce integrable results, during research on platform which is suitable for this purpose.

PhD for future researchers

Research at VRL follows the changing world of systems which are developed towards highly automated and autonomous operation as well as full integration where control is organized in virtual spaces and cyber units. In this world, development is stimulated by research results in applied informatics with applied mathematics and systems science in its background. VRL joins to this trend. PhD students work in real, practice oriented and research configured platform which has proven at world class engineering-scientific product development projects. This guarantees advanced and scientifically sustainable environment for PhD students. VRL is motivated and prepared to realize a new type of university student research. The VRL platform is ready for accommodation of PhD student projects.

We are looking for strategic partners

mainly to bring knowledge and experience into VRL's PhD projects and to achieve PhD research results those can be utilized at industrial companies. Above all partners are waited from companies and institutions doing research on the platform. PhD projects at VRL inherently ensure global access of results. In one form of possible cooperation is that our partners can propose PhD research topics as well as supervisors and other assistance in the collaborative space configured on the platform.