

Virtual Reality Meets Engineering & Medicine

The Virtual Population

High-Resolution Anatomical Models for
Computational Life Sciences



The Virtual Population from the IT'IS Foundation

The Virtual Population (ViP), developed by the IT'IS Foundation and part of the IT'IS for Health initiative, is considered the most advanced and complete set of computational anatomical models and represents a wide range of the population. Each of these models, developed from high-resolution magnetic resonance imaging (MRI) scans of healthy volunteers, has been reconstructed as a three-dimensional computer-aided-design (CAD) object and depicts approximately 80 high-resolution organs and tissues. The CAD format of the models allows meshing at arbitrary resolutions without any loss of detail or small features.

History of the Virtual Population

The ViP started in 2005, when the mobile phone industry launched the development of the Virtual Family, a joint project carried out by the IT'IS Foundation and the FDA. Later, a wider population coverage was required, and additional, more-diverse anatomies were segmented; these, together with the Virtual Family, now comprise the Virtual Population v1.0. More recently, the need to support more than just solvers operating on a rectilinear grid led to the development of ViP v2.0. In the last few months, our team has been working on the total resegmentation of all our models to achieve much higher quality and

to incorporate more anatomical details: these new ViP v3.0 models will gradually be released as they become available. Comprehensive release notes tracking all improvements will ensure that previous applications can be reproduced.

How to Obtain the Virtual Population Models

Since the introduction of the first ViP anatomies, the IT'IS Foundation has provided the models to the research community for unrestricted use related to non-commercial purposes, a service that we are absolutely committed to continuing. The new generation of models is also available for commercial use subject to a licensing fee, the entirety of which is devoted exclusively to continuing expansion of the anatomical variations and to advance improvement of models with details at various levels of physiological organization. We also gladly accept donations at vip@itis.ethz.ch. Please also note that, thanks to the sponsorship of the mobile phone industry, the Virtual Family v2.0 (Duke, Ella, Thelonious, and Billie) is also free for commercial usage.

For academic use of the Virtual Population, orders may be placed online at <http://www.itis.ethz.ch/vip>. To inquire about licensing for commercial applications, please contact vip@itis.ethz.ch.

Name	Gender	Age [years]	Height [m]	Weight [kg]	BMI [kg/m ²]	No. of tissues	Data format
ROBERTA ^{b)}	female	5	1.09	17.8	14.9	66	CAD, posable
THELONIOUS ^{a)}	male	6	1.17	19.3	14.0	76	CAD, posable
EARTHA ^{b)}	female	8	1.36	30.7	16.7	75	CAD, posable
DIZZY ^{b)}	male	8	1.39	26.0	13.4	66	CAD, posable
BILLIE ^{a)}	female	11	1.47	35.4	16.5	75	CAD, posable
LOUIS ^{b)}	male	14	1.69	50.4	17.7	77	CAD, posable
ELLA ^{a)}	female	26	1.63	58.7	22.0	76	CAD, posable
DUKE ^{a)}	male	34	1.77	72.4	23.1	77	CAD, posable
FATS ^{c)}	male	37	1.82	119.6	36.2	79	CAD, posable
GLENN	male	84	1.73	65.0	21.7	84	CAD
PREGNANT WOMAN ^{c)} (3 rd month) Specifications refer to fetus	undefined	3 months		0.015		15	CAD, pregnant women based on "Ella"
PREGNANT WOMAN ^{c)} (7 th month) Specifications refer to fetus	undefined	7 months		1.4		20	CAD, pregnant woman based on "Ella"
PREGNANT WOMAN ^{c)} (9 th month) Specifications refer to fetus	female	9 months		2.7		26	CAD, pregnant women based on "Ella"

The system requirements for using the CAD models of the Virtual Population are 64bit OS (Windows 7, Vista or XP) and at least 4GB of RAM.

^{a)} Virtual Family Models (MMF Project), ^{b)} Virtual Classroom Models (BfS Project), ^{c)} soon available for academic use

* excluding shipping and handling fees

Acknowledgements

The models were developed in collaboration with the Center for Devices and Radiological Health (CDRH) of the U. S. Food and Drug Administration (FDA), Silver Spring, MD, USA; the Austrian Institute of Technology GmbH (AIT, formerly the Austrian Research Centers), Seibersdorf, Austria; the University of Houston, TX, USA; the Universitätsklinikum Erlangen, Friedrich-Alexander-University (FAU) Hospital, Erlangen-Nürnberg, Germany; Siemens Medical Solutions, Erlangen, Germany; Erasmus MC-Daniel den Hoed Cancer Center, Rotterdam, the Netherlands; University of Zurich and ETH Zurich, Zurich, Switzerland.

The Mobile Manufacturers Forum, the GSM Association, and SPEAG funded the development of the original Virtual Family. The German Federal Office for Radiation Protection (BfS) supported the development of four additional models of children, namely the Virtual Classroom. The Swiss National Research Program NFP57, the Netherlands Organization for Health Research & Development (ZonMw), and SPEAG funded the development of the pregnant women and infant models. The EUREKA project MRI+ supported the development of the obese male model, and SPEAG funded the model of the elderly male. Scientists of the FDA (USA) and other specialists have validated all models.