

LOCOTRACK – OPEN-SOURCE SOFTWARE FOR LOCOMOTOR BEHAVIOR ANALYSIS

Zakharov G.A., Payalina T.L., Levina A.S., Savvateeva-Popova E.V.

Pavlov Institute of Physiology, Russian Academy of Sciences. Makarova emb., 6 199034
St.Petersburg,Russia. Phone: +7(812) 328-1101, Fax: +7(812) 328-0501

Nowadays, automated analysis of phenotype has become more technically complicated task than genotyping. Automatic video-analysis of locomotor behavior is useful for investigation of behavioral manifestation of mutations, environmental factors, and even for screening of therapeutics.

Not only vertebrate animals can be used as a model organisms, but also an invertebrates, like drosophila. It was found, that relatively large set of drosophila genes, associated with neurological disorders, has homologous in human (Fortini, 2000; Reiter, 2001). Methods for automated testing of drosophila locomotor behavior was investigated just recently (Martin 2004; Valente, 2007; Simon, 2010). Now there exist only a few tools for drosophila locomotor behavior investigation, and the price of commercial solution are overstated.

Author has developed an installation and software for automatic analysis of locomotor behavior, suitable both for drosophila and vertebrates. Installation is constructed from available and relatively low cost equipment (Full-HD IP-cam for video recording, LED lights, plastic experimental chambers). The software is written in Python language; it is distributed under LGPL3 license and is available at <https://github.com/GennadiyZakharov/locotrack>.

Software allows to obtain movement trajectory of an animal from video record, divide it into movement/rest intervals, analyze mean duration and speed of movement, compare duration of staying and trajectory length in different parts of the chamber.

Using this installation, the locomotor behavior of very interesting drosophila mutant starting *agnX1*, which has defects of synaptic transmission and some structural brain defects (Savvateeva-Popova, 2002), was investigated. Comparing to wild-type strain Canton-S, *agnX1* mutant has decreased locomotion level, slightly decreased movement speed and drastic defects of visual orientation.

Locotrack software was also used to study the impact of inescapable swimming in water maze on learning ability in the same water maze of two rat strains with different threshold of electrical excitability of the nervous system. The difference of mean trajectory length between this two groups was revealed.