



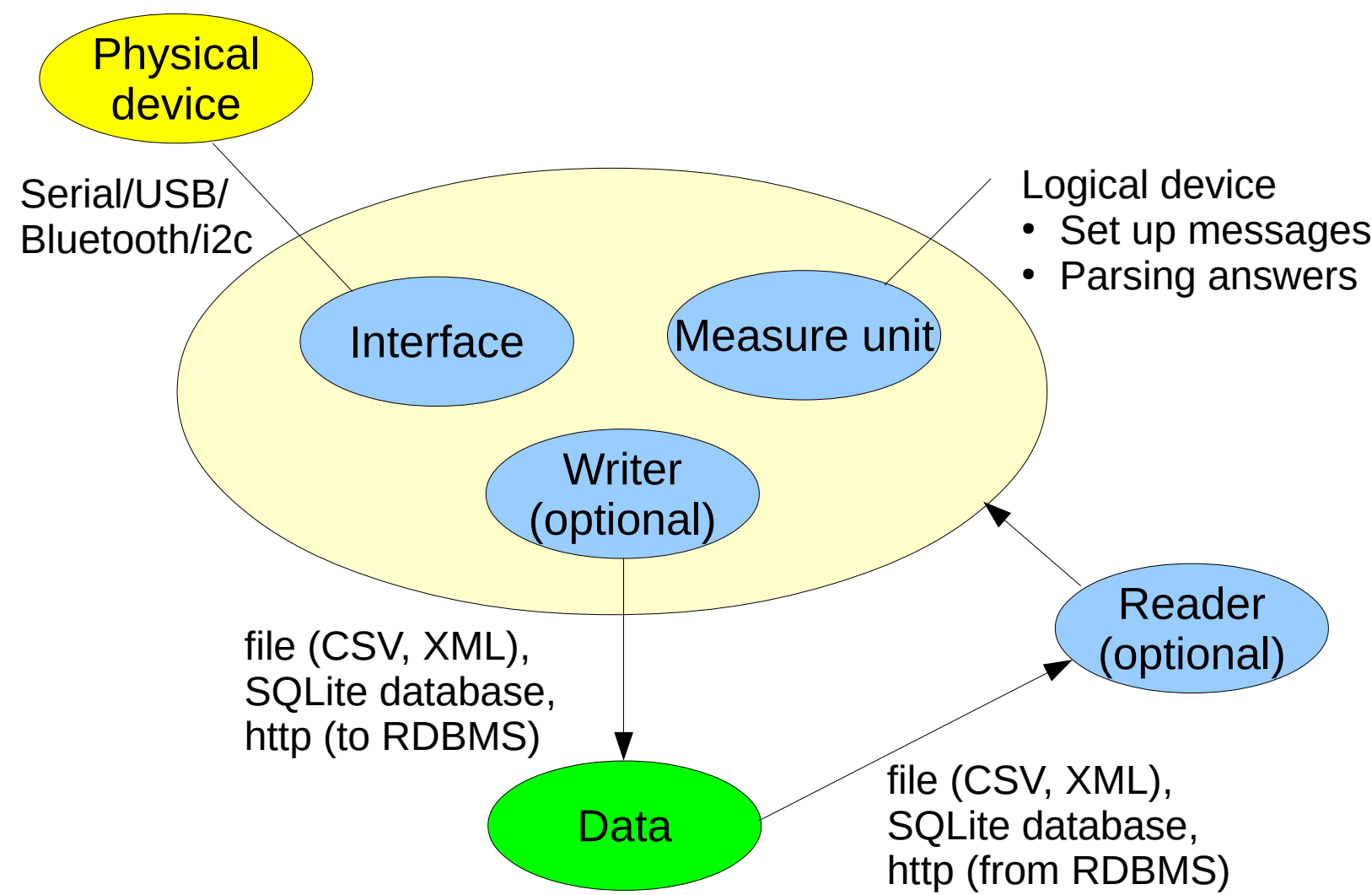
Ulyxes: an open source project for automation in engineering surveying

<http://www.geod.bme.hu/ulyxes> <https://github.com/zsiki/ulyxes>

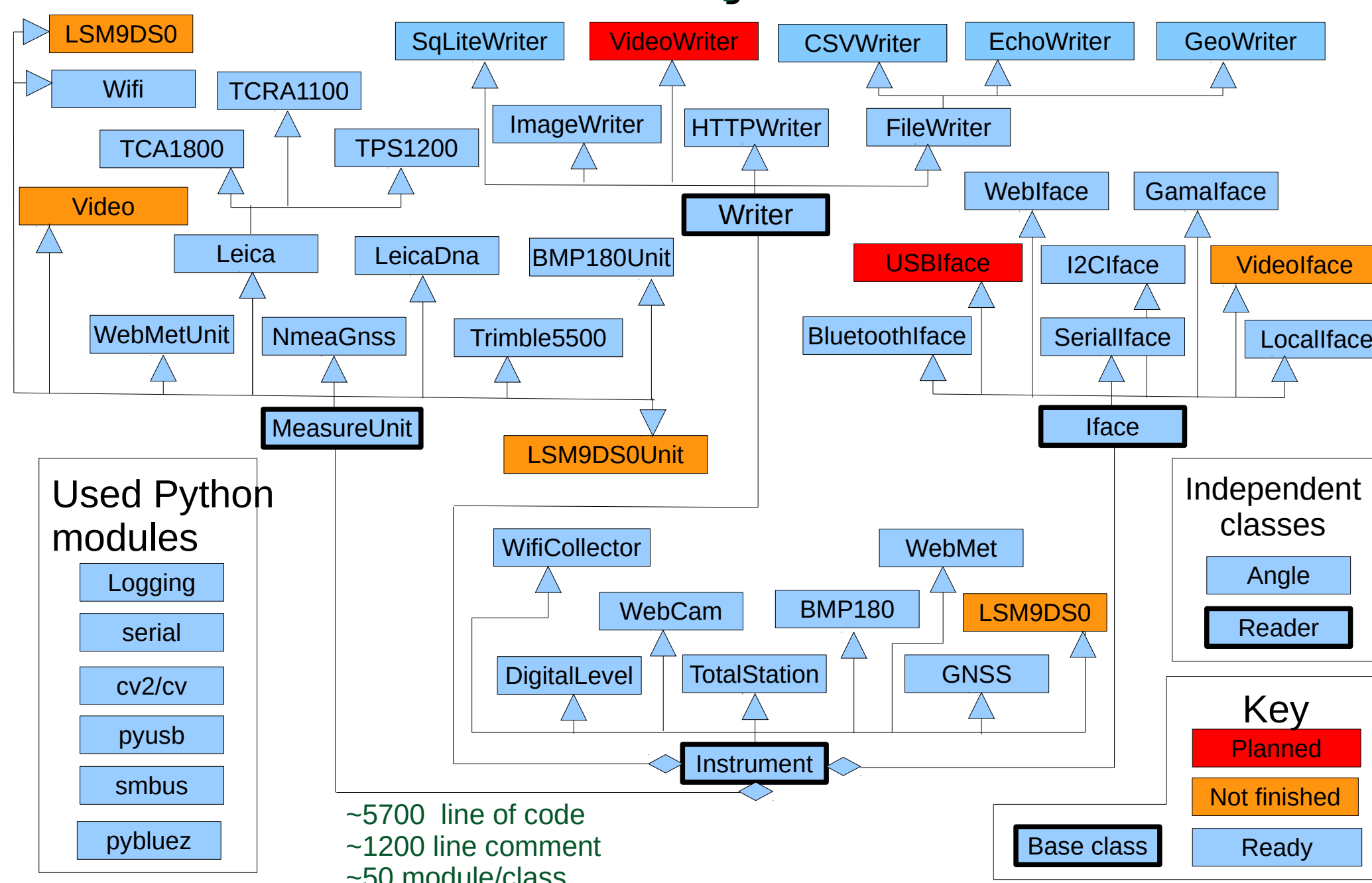


Ulyxes is an open source project to drive robotic total stations as well as other sensors, collect their measurements in database and finally publish the results for authorized users on the web. On special requests the results are also presented with web based maps in the background. This project is like an instant coffee: three in one (coffee, sugar and milk). The coffee and the strongest part is the research and coding. The sugar is the application of the program in industrial environment and the milk on the top is the educational usage. The software development started in 2008 connected to a monitoring task in the Hungarian Nuclear Power Plant. Since then the development has been extended from total stations to different positioning capable sensors. In 2012 the development of a new Python based object oriented framework started. The code is based on the results of some other open source projects, Python, PySerial, GNUGama, SQLite, OpenCV, etc. After connecting to the international Geo4All network in 2014, Ulyxes became a project of our Geo4All Lab. The project has its own home page (<http://www.agt.bme.hu/ulyxes>) and the source code is available on the GitHub portal (<https://github.com/zsiki/ulyxes>). The code is maintained by the colleagues at the Department of Geodesy and Surveying at the Budapest University of Technology, volunteers from all over the World are welcome. BSc and MSc students are also involved in the development and testing. More theses were connected to this project in the recent five years. In the curriculum of an MSc subject called Surveying Automation, Ulyxes is used to demonstrate automatized tasks in engineering surveying. The system has been applied for several projects during the last 10+ years. Typical applications are the load tests of bridges and other engineering structures and on the other hand Ulyxes can be used to monitor the movements of buildings in the nearby of constructional works, like metro stations, underground garage and other buildings as well. Raspberry Pi small, single board computers are used with Raspbian operating system during on-site works. The source code is divided into three parts. The first one is the Ulyxes API which is the core of the system. The second one, Ulyxes Apps is a collection of applications based upon the API. Some of them were developed by our students. The third part is the server side scripts to publish observation results through the Internet.

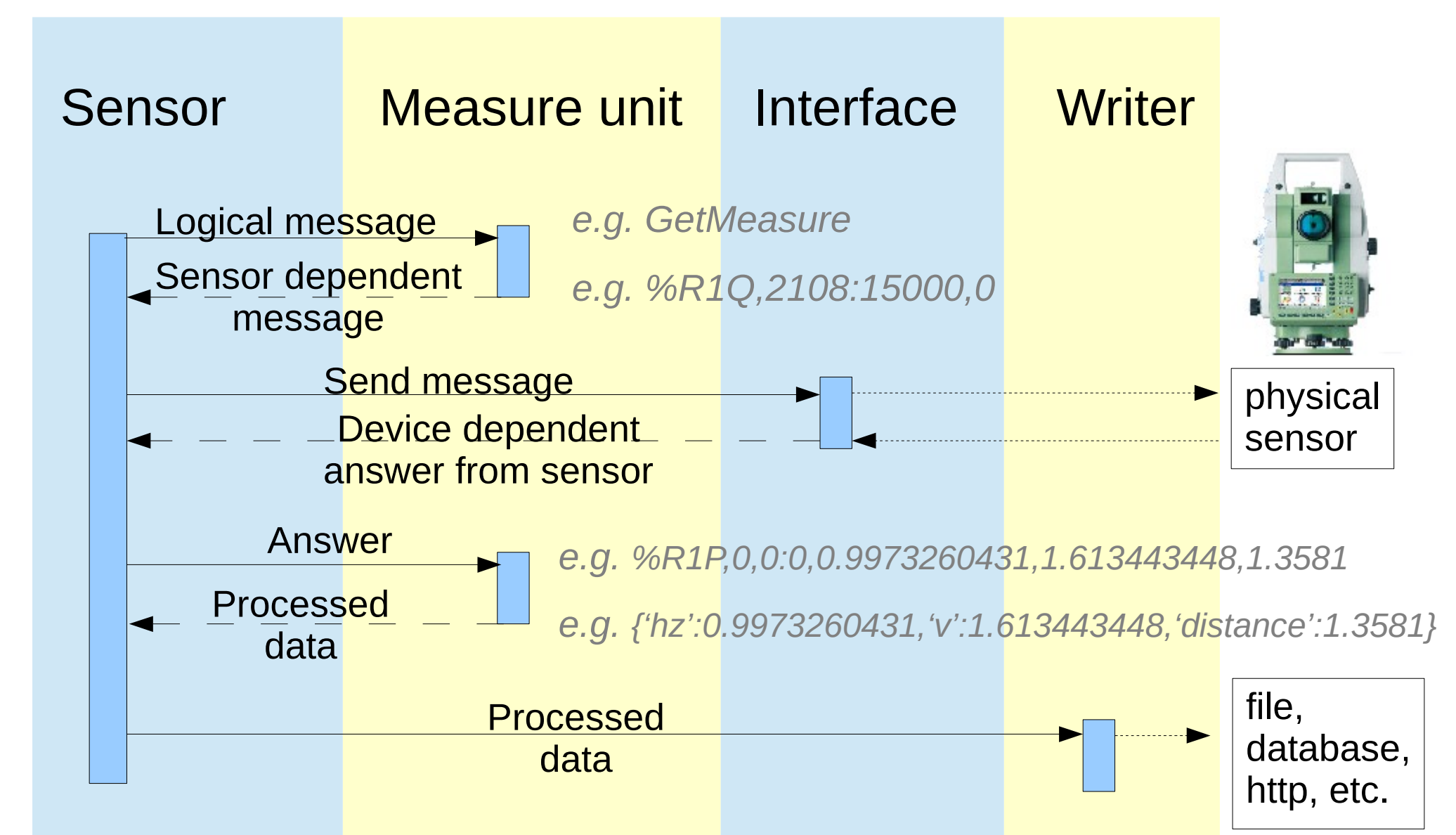
Sensor object model



Detailed object model



UML sequence diagram



Application areas

Deformation analysis



Test load of bridges and overpasses



Building monitoring



Educational usage



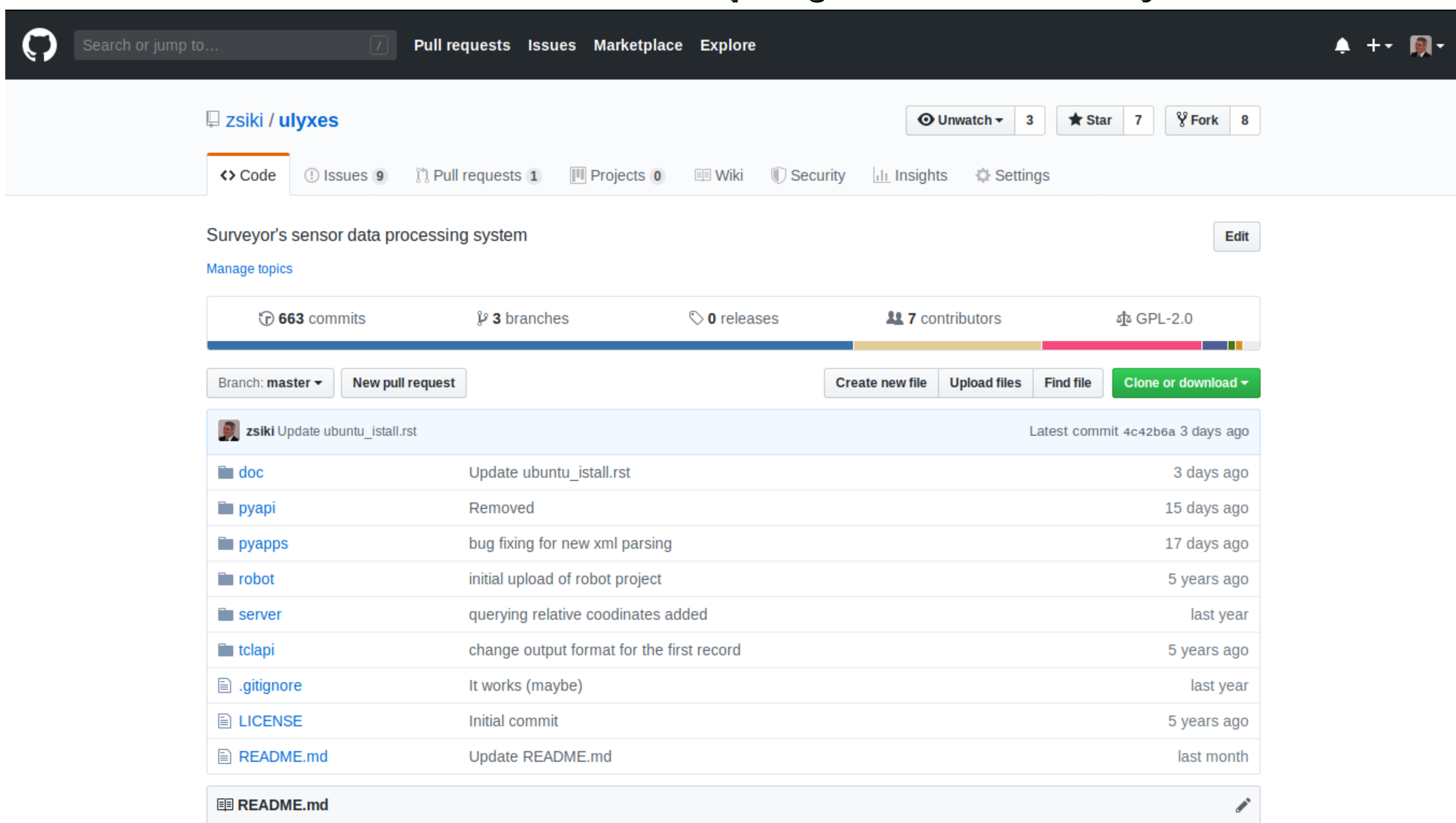
Used open source projects

Python2, Python3
PySerial, PyBluez
OpenCV
PHP
PostgreSQL/PostGIS
MapServer
JavaScript
OpenLayers
jQuery/jQuery-ui

Tested sensors

Leica TCA1800 + GeoCom
Leica TCRP1201 + GeoCom
Leica TCRP1103 + GeoCom
Leica DNA03
Trimble 5503DR
TopCon HiperPro II
Garmin GPS18
Leica GPS 500
USB web camera, PI camera
BMP-180
LSM9DS0

Source code on GitHub <https://github.com/zsiki/ulyxes>



Home page of the project <http://www.geod.bme.hu/ulyxes>

