

# Runtime Verification for Software

## The Invention

Prior to being launched, computer software is tested against numerous user inputs and events, allowing developers to pick up on any errors and amend them before the product is implemented. However, it is impossible to predict and simulate all the possible variations exhaustively.

Runtime Verification offers a complementary approach to support error handling. This process automatically creates monitors which observe the system while in use in order to identify errors during runtime. Such errors can then be used to trigger appropriate responses to rectify them. The system uses real-time user input, eliminating the need to create hypothetical inputs which is the main difficulty in testing, whilst also ensuring that runtime errors are addressed immediately.

At the University of Malta, we have developed the LARVA toolset, a runtime verification platform for runtime verification of critical systems, including Larva for Java programs, eLarva for Erlang systems and polyLarva, a language agnostic runtime verification system. These tools have been used on a number of industrial use cases.

## NOVELTY

The technology allows for the runtime verification of software without needing too much processing power or memory access. It can also give an entire set of new possibilities to run any kind of rules to be tested over existing machines and software. Monitoring can also be conducted without changing any code in the system being monitored.

LARVA use can be limited during the testing phase as well as utilised after the software has been deployed. The input language used for LARVA has been kept simple in order to facilitate its use. Furthermore, LARVA allows for real-time clocks in the specification. These can be used to trigger events and measure the time elapsed between events.

## APPLICATION FIELDS

The application can be applied in a number of areas, including but not limited to:

- The technology has numerous applications, including:
- Support in the financial and banking sector
- Ensure fair play and adherence to contractual agreements relating to online betting
- Cheat detecting in computer games
- Astronomy
- Health management and diagnosis systems
- Privacy policies for social networks
- Mobile phone usage management for parental and organisational control

The LARVA toolkit is available [online](#).

*The development was executed at and supported by the University of Malta, sole owner of the rights. The university's IP is managed by its Knowledge Transfer Office. Inquiries shall be submitted to [knowledgetransfer@um.edu.mt](mailto:knowledgetransfer@um.edu.mt), or further information may be obtained on +356 2340 3466.*

## IP STATUS

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## COMMERCIAL INTEREST

We are looking for companies who may require specific contract languages for their area of operation.

## LEAD INVENTORS



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