White paper on
Laboratory Robotics in Europe
Status and prospects
within Horizon2020

Report for ELRIG

Dr. Patrick Courtney

Dr. Francesco Becchi

email: patrick.courtney@acm.org

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1 Executive summary

The role of robots in manufacturing is well established. They contribute to the quality and speed of goods produced, and we have all benefitted from this outcome. But robots also have a role in generating information. The use of robots in the laboratory has brought many benefits in the development of new medicines and industrial R&D. It supports the development of novel intellectual property and in saving lives.

This report presents the current status of laboratory robotics, its strengths, and indicates where future innovation would be most beneficial, both for the laboratory and robotics more generally.

- The laboratory robotics industry is already a **substantial economic activity** worth some €2-3bn annually and is one where European suppliers currently have a market lead.

- A well-developed **business ecosystem** has grown-up around laboratory robotics. The business model incorporates a wide range of often highly profitable complementary offerings, including recurring revenues of various kinds. This may form a model for other areas of robotics.

- **Laboratory robotics brings** expertise in the efficient handling of fluids. This capability to manipulate a very wide range of valuable, delicate or dangerous materials has been hard won and could usefully be applied in other industries. This has grown out of the long track record of creating and commercialisation of complex optical-electro-mechanical systems. These have been integrated into systems carrying out tasks to a very high standard in a regulated environment.

- **Laboratory robotics needs** specific capabilities to meet current and emerging trends. Some example opportunities are identified including the manipulation of complex solid samples, smaller robotics systems, effective laboratory assistants / co-workers, innovations to support the smart laboratory and looking further ahead, the robot scientist.

This report aims to raise the profile of this successful area to others within H2020, to build bridges with other related areas such as agriculture, medical, logistics and civil robotics. This can happen by establishing a working group within the euRobotics organisation, defining common actions and making available baseline data and initial directions for potential collaborative research and innovation projects with the academic research base.

2 Objectives and scope

In recent years the European Commission has established a significant investment in robotics amounting so far to some €800M. The goal is to increase Europe's market share in industrial robotics and professional service robotics. Application areas from manufacturing, surgery to underwater and space robotics have been identified as worthy of support. This has been achieved following the creation of SPARC - a Public-Private Partnership (PPP) in robotics - and discussions at the European Robotics Forum and is based around roadmap documents: the Strategic Research Agenda (SRA) and the Multi-Annual Roadmap (MAR).

However the profile of laboratory robotics within this programme is low compared to other application areas. This means that investment in a range of technologies potentially relevant to laboratory robotics is being carried out without good knowledge of current success and future needs. The field is therefore not benefiting from the attention of leading researchers to address scientific and technical challenges. Likewise the contribution to economic competitiveness and social well-being is not being exploited.

This white paper attempts to explain the role and value of robotics in the laboratory, as well as some of the key technical and business issues. It indicates where future innovation would be most beneficial, both for the laboratory and for robotics more generally. This report also highlights potential links between end-user markets, and the topic groups active within euRobotics, and the H2020 road-mapping documents as well as other priority areas such as Factory of the Future.

It is hoped that this white paper will provide a useful insight and raise the profile of the area within the Commission, the PPP and the broader robotics research community, and assist in identifying opportunities to access funding for projects.

Within the UK, robotics has been identified as one of the Government's "eight great technologies" deserving of support, though again laboratory robotics is not specifically mentioned. The Technology Strategy Board has created a special interest group on robotics and autonomous systems (SIG-RAS). The white paper could also be used to inform discussions within the UK to support laboratory robotics.

Methodology: This white paper on laboratory robotics has been developed with the support of ELRIG and members. The information presented here is based on a number of interviews, email exchanges, product literature, trade press and papers in the literature. However it remains a qualitative overview rather than a quantitative one and should be treated as such. An update can be prepared based on feedback received and readers are invited to contact the authors with suggestions and comments.

Note laboratory robotics here refers to robotics operating as a tool in the scientific laboratory, as distinct from the laboratory which is working to develop robotics technology.

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