



SIA „Eventech”

Registration No. 40103495910

VAT registration No. LV40103495910

Reg. office: Dzērbenes street 14,

Riga, LV-1006, Latvia

Phone +371 29118068

Fax +371 67751956

E-mail: info@eventechsite.com

www.eventechsite.com

Eventech application summary for future collaboration with potential industry partners

Eventech Ltd is operating since 2011 as a “spin-off” from the Institute of Electronics and Computer Science (IECS) to demonstrate the rest of the world its unique event timing technology for extremely accurate measurements.

We have strong scientific backgrounds with more than 40 years of studies in high-performance and high-accuracy event time measurement systems development. Today we are offering our services to other companies, field/industry experts and scientists all over the world.

Our event timing products have been recognized by NASA and International Laser Ranging Service globally as currently the best practice in the World for Time Of Flight (TOF) measurement instrumentation (http://ilrs.gsfc.nasa.gov/technology/groundSegment/timing_devices.html). Especially A033-ET is well suited for application related to Satellite Laser Ranging (SLR).

Eventech team consists of 6 people – 3 scientific R&D team and 3 managerial team members, all electronic equipment is manufactured by our company, using some of-the-shelf components and integration contractor services, but mostly based on proprietary know-how technology.

Starting February 1st, 2016 Eventech is awarded with its first European Space Agency (ESA) contract for on-board multi-purpose event timer development for space applications supported by Institute of Electronics and Computer Science (IECS) and Czech Space Research Centre (CSRC).

Eventech Ltd are constantly searching for new applications for our technology and are ready to enter consortiums to participate in EU funded R&D programs with partners to develop the proposed application idea according to the market demand for new competitive products.

Following applications are prioritized by the highest possibility and necessity to create Proof-of-concept device and find partners to collaborate with to start new product development process.

1) Gravimetry

Geodetic measurements - the level is used for determining height differences and height reference systems, commonly referred to mean sea level. The traditional spirit level produces these practically most useful heights above sea level directly; the more economical use of GPS instruments for height determination requires precise knowledge of the figure of the geoid, as GPS only gives heights above the GRS80 reference ellipsoid. As geoid knowledge accumulates, one may expect use of GPS heighting to spread.

GPS receivers have almost completely replaced terrestrial instruments for large-scale base network surveys. For Planet-wide geodetic surveys, previously impossible, we can still mention Satellite Laser



SIA „Eventech”

Registration No. 40103495910

VAT registration No. LV40103495910

Reg. office: Dzērbenes street 14,

Riga, LV-1006, Latvia

Phone +371 29118068

Fax +371 67751956

E-mail: info@eventechsite.com

www.eventechsite.com

Ranging (SLR) and Lunar Laser Ranging (LLR) and Very Long Baseline Interferometry (VLBI) techniques. All these techniques also serve to monitor Earth rotation irregularities as well as plate tectonic motions.

Gravity is measured using gravimeters. Basically, there are two kinds of gravimeters. Absolute gravimeters, which nowadays can also be used in the field, are based directly on measuring the acceleration of free fall (for example, of a reflecting prism in a vacuum tube). They are used for establishing the vertical geospatial control. Most common relative gravimeters are spring based. They are used in gravity surveys over large areas for establishing the figure of the geoid over these areas. Most accurate relative gravimeters are superconducting gravimeters, and these are sensitive to one thousandth of one billionth of the Earth surface gravity. Twenty-some superconducting gravimeters are used worldwide for studying Earth tides, rotation, interior, and ocean and atmospheric loading, as well as for verifying the Newtonian constant of gravitation.

Eventech's idea

This application is successful, because Institute of Geodesy and Geophysics (Chinese Academy of Science) in Wuhan are already using existing Eventech's equipment as one of the blocks of their total absolute gravimeter system. There are multiple R&D groups around the world, who Eventech are currently trying to reach with collaboration offer. One of the ideas is developing a compact module for more convenient integration into gravimetry system.

Recently another institute from China have shown interest for using our equipment for gravimetric applications and are willing to order our timing equipment.

Industry

<http://www.microglacoste.com/index.php>

One of the most successful absolute gravimeter manufacturing industrial companies is Micro-g LaCoste, who are aware of Eventech technology and are interested in its further developments.

Eventech's requirement

We are looking for a collaboration partner, who can offer to combine our technology for gravimetric applications with potentially other application uses in one device, we are ready to deliver such product with appropriate funding for R&D and for product manufacturing expenses in terms of a funded collaboration project.

2) Time Transfer through Optical Fibers (TTTOF)

Eventech is in contact with its first client in TTTOF application - scientists from VNIIFTRI Institute of the Russian Academy of Metrology (<http://www.vniiftri.ru/index.php/en/about>), who confirmed very successful experimental results using Event Timer in Summer 2016. Major beneficial features of Event Timer for TTTOF tasks according to our partner are:

- Extremely high accuracy
- Multi-stop option



SIA „Eventech”

Registration No. 40103495910
VAT registration No. LV40103495910
Reg. office: Dzērbenes street 14,
Riga, LV-1006, Latvia
Phone +371 29118068
Fax +371 67751956
E-mail: info@eventechsite.com
www.eventechsite.com

We are aware, that this is a very specific application, but it also includes several application types:

- 1) Precise time transfer through optical fibers (for fiber specification testing app's)
- 2) Development of optical atomic clocks
- 3) Timing error (and uncertainties) detection as a result of transfer via optical fibers

Eventech's idea

We can use our timer to measure time intervals or register the time of the event when the signal reaches its destination after being transferred through optical fiber. At the moment we have positive feedback from industry experts, confirming that Eventech timing technology has a certain fit for TTTOF needs, where industry and academic interest is only increasing day to day.

Most important in TTTOF research is time transfer accuracy – now all of the scientific groups have below 100 ps – 10-40 ps; better results in time transfer compared to satellite based systems (GPS), but we are ready to offer even more precise solution of 2-3 ps accuracy.

Additional point is that ultra-low jitter has to be used while performing such research and measurement, because it enhances the noise ratio, Eventech technology gives opportunity to measure the jitter itself with very high accuracy, but that we broaden the known parameter range.

Organizations

<http://www.npl.co.uk/science-technology/time-frequency/research/time-scales/>

Industry

<http://piktime.com/fibre-optics.html?sl=EN>

<http://www.photonicsolutions.co.uk/datasheets/vigo/VOt2700.pdf>

Eventech's requirement

TTTOF measurements and experiments are held at optical fibers manufacturing industry, where market is only growing with time, as everyone tends to deliver a more novel and efficient product, this is where we can find our market, by providing measurement systems for the testing purposes as well. With a feedback from TTTOF expert we know that our technology may require some minor changes in configuration for specific tasks, which we would be happy to discuss with partners to build a POC prototype and a new product as a result.

3) Flow Cytometry

In biotechnology, flow cytometry is a laser-based, biophysical technology employed in cell counting, cell sorting, biomarker detection and protein engineering, by suspending cells in a stream of fluid



SIA „Eventech”

Registration No. 40103495910

VAT registration No. LV40103495910

Reg. office: Dzērbenes street 14,

Riga, LV-1006, Latvia

Phone +371 29118068

Fax +371 67751956

E-mail: info@eventechsite.com

www.eventechsite.com

and passing them by an electronic detection apparatus. It allows simultaneous multiparametric analysis of the physical and chemical characteristics of up to thousands of particles per second.

Flow cytometry is routinely used in the diagnosis of health disorders, especially blood cancers, but has many other applications in basic research, clinical practice and clinical trials. A common variation is to physically sort particles based on their properties, so as to purify populations of interest.

The ability of flow cytometers to evaluate cells at an extremely rapid rate (e.g. up to 100,000 events per second) makes this technology ideally suited for the reliable and accurate quantitative analysis of selected physical properties of cells of interest.

Signal processing is an essential part of systems processes, when the signals are converted from analogue to digital at an early stage and all subsequent processing is handled digitally. There are several advantages to digital processing, not least, accuracy and speed.

Eventech's idea

We are actively working with experts in field of flow cytometry and found interest in Eventech electronics from business and academic contacts from USA, at the moment we are in negotiations process to understand how our electronics should be updated to suit the application needs and are evaluating options to enter a joint funded collaboration project. Initial idea is to establish requirements for the system and then move forward to POC delivery.

Eventech's requirement

Additional expertise is welcome to join to understand requirements of the application and we are looking for collaboration partners, who are working on other system building blocks, like optics, detectors, lasers for current flow cytometry systems or are developing completely new systems. Eventech would be ready to participate in consortiums and teams for EU, non-EU funded R&D projects.

4) Positron Emission Tomography (PET)

Positron emission tomography (PET) is a specialized radiology procedure used to examine various body tissues to identify certain conditions. PET may also be used to follow the progress of the treatment of certain conditions. Technique is based on detection of annihilation (gamma) photons from electron with opposite charge after positron emission decay.

Currently, the resolving time of the detector is less than 500 ps, but as the timing resolution improves, the signal-to-noise ratio of the image will improve, requiring fewer events to achieve the same image quality, and it will be possible to obtain an image of even better quality for improved 3D visualisation with lower error probability.

Eventech's idea

We have already received feedback from several potential partners regarding their interest in Eventech technology for the application detection accuracy improvement. Even though it is not



SIA „Eventech”

Registration No. 40103495910

VAT registration No. LV40103495910

Reg. office: Dzērbenes street 14,

Riga, LV-1006, Latvia

Phone +371 29118068

Fax +371 67751956

E-mail: info@eventechsite.com

www.eventechsite.com

possible to improve accuracy till 2-3 ps range, which can be provided by Eventech, due to limitation factors of large amounts of electronics involved in the process and accuracy loses in the process, still electronics with such high specifications will allow significant improvements and measurement error minimization.

Eventech's requirement

We are looking for partners with expertise in flow cytometry field and with ideas of new developments for processes improvement, where Eventech could assist with technology provision and precise measurement expertise. Currently we are looking on possibilities of joining consortiums or creating new ones for EU funded project participation.

5) Free-Space and Deep-Space Optical Communications

Free-space optical communications (FSO) is an optical communication technology that uses light propagating in free space to wirelessly transmit data for telecommunications or computer networking. "Free space" means air, outer space, vacuum, or something similar. It is based on the principle of digital signal passing through the atmosphere (or space). It includes modulation of radiation in the unlicensed band of wavelengths (infrared or visible) and its subsequent detection optical photodetectors. Pulse of light radiation passing in the atmosphere almost feels dispersion distortion of fronts, typical of any optical fibers. This principle makes it possible to transmit data traffic at speeds up to Terrabits per second.

Deep-space optical communications (DSO) is primarily used in Space applications, to establish data transfer and communications between spacecrafts, etc. DSO is used as well for fast data collection and transmittance between data carriers, which is currently one of the topics of interest for many EU R&D projects (space debris information collection etc.)

Eventech's idea and industry

Idea is to switch to an application and technology that is called "last-mile solution". So far we have gather information about companies that manufacture such equipment:

<http://www.mrvfso.com/model/ts700100-700g/>

<http://www.canoncanobeam.com/model/dt-130/>

<http://www.lightpointe.com/freespaceoptics/airliteseries1beam.html>

<http://www.geodesy-fso.com/>

Typical specs:

Distance - up to 2 km

Data rate - up to 1.25 GHz

Most probably these companies use one of standard coding methods which entail high duty factor of the laser pulses (lasers are fired during 25-50% from the total work time). We propose to use PIM



SIA „Eventech”

Registration No. 40103495910

VAT registration No. LV40103495910

Reg. office: Dzērbenes street 14,

Riga, LV-1006, Latvia

Phone +371 29118068

Fax +371 67751956

E-mail: info@eventechsite.com

www.eventechsite.com

(Pulse Interval Modulation) with direct time interval measurements performed with high accuracy/resolution (around 10 ps). This way we can reduce the duty factor down to less than 0.5% and therefore substantially (approximately 100 times) increase the instant laser pulse power for the same amount of the average laser power (that meets the safety requirements). We suggest that such approach would allow to increase the distance/reliability roughly 10 times. However, using our present timing technology, the expected data rate cannot be more than approximately 100-155 Mbit per second.

Eventech technology is also compatible with stronger laser systems, which are more suitable for DSO due to much longer distances and due to less obstacles like weather conditions.

We are willing to find a collaboration partner, who is engaged in laser systems manufacturing to create a POC system for FSO or DSO applications, where from existing timing circuitry we could develop a PPM / PIM modem, that would support laser pulse width of the order of 3 – 4 ns, laser PRFs of up to 1 MHz and sustained data rate of up to 10 Mbps. A second step in collaboration would be development of picosecond lasers suitable for support of our existing high-performance timing circuitry for better result achievement and further system development.

Eventech's requirement

We have established contacts with several experts in the field of FSO and DSO and have positive feedback and an offer to build a POC system, so this is our primary application of interest now. We have a team of experts, who would support us in FSO application POC development and construction. We are looking for collaboration partners, an FSO manufacturer, to elaborate a POC system for FSO/DSO application. We are also willing to join in research projects to get additional funding for R&D activities to deliver a product.

6) Machine to Machine Communications

Machine to machine (M2M) refers to technologies that allow both wireless and wired systems to communicate with other devices of the same type. M2M is a broad term as it does not pinpoint specific wireless or wired networking, information and communications technology.

Today, M2M data modules are extremely sophisticated and come with an array of features and capabilities such as onboard global positioning (GPS) technology, flexible land grid array surface mounting, embedded M2M optimized smart cards (like phone SIMs) known as MIMs or M2M identification modules, and embedded Java, an important enabling technology to accelerate the Internet of Things (IOT).

Eventech's idea

We are sure that between all M2M applications there is a definitive time interval measurement process while registering signals, this is the field, where Eventech could use their highly accurate technology to provide extremely accurate results as approved by NASA and all our customers at SLR



SIA „Eventech”

Registration No. 40103495910

VAT registration No. LV40103495910

Reg. office: Dzērbenes street 14,

Riga, LV-1006, Latvia

Phone +371 29118068

Fax +371 67751956

E-mail: info@eventechsite.com

www.eventechsite.com

field. We have also checked that recently Tektronix performed acquisition of Picosecond Pulse Labs, whom we considered as potential competitors in the field of measurement equipment production. Tektronix has already used their technology to sell under their brand name, but now this is just a daughter company. Picosecond Pulse Labs offer a variety of equipment especially for M2M uses, to detect errors and 100Gb Ethernet Testing equipment.

Committee

<http://www.tiaonline.org/all-standards/committees/tr-50>

Industry

<http://m2m.gemalto.com/products-and-services/services-and-solutions/m2m-security.html>

<http://m2m.telekom.com/vertical-industries/security>

<http://www.smi-online.co.uk/security/uk/conference/m2m-security>

<https://m2m.telefonica.com/>

<http://www.korewireless.com.au/>

<http://www.picosecond.com/applications/content.asp?AppID=12>

Eventech's requirement

Eventech are sure that with appropriate help, industry expertise, funding and collaboration we can get into the market, which is now held by several large manufacturers. At the moment we require industry expertise of our opportunities and suitability for M2M applications. We also have a new OEM product in development, with which we hope to have success with in M2M applications.

7) Terrestrial and Space LiDAR's and 3d scanning technology

LiDAR is a remote sensing technology that measures distance by illuminating a target with a laser and analysing the reflected light. Although widely considered to be an acronym of Light Detection And Ranging, the term lidar was actually created as a portmanteau of "light" and "radar."

Lidar is popularly used as a technology to make high-resolution maps, with applications in geomatics, archaeology, geography, geology, geomorphology, seismology, forestry, remote sensing, atmospheric physics, airborne laser swath mapping (ALSM), laser altimetry, and contour mapping.

Eventech's idea

A laser scanner collects billions of measured distance points (a pointcloud), this pointcloud data is used to create precise 3D visualizations and models for a wide variety of spatial and volumetric tasks. Laser scanning enables to survey (or to collect the data) at lightning fast speed of up to hundreds of million points per second with centimetre or millimetre accuracy 3D survey data results.

Eventech partnering idea is to develop a next generation 3d scanner with only recently available detector, laser and scanning technologies, which will outperform current existing systems at a



SIA „Eventech”

Registration No. 40103495910

VAT registration No. LV40103495910

Reg. office: Dzērbenes street 14,

Riga, LV-1006, Latvia

Phone +371 29118068

Fax +371 67751956

E-mail: info@eventechsite.com

www.eventechsite.com

significantly lower manufacturing cost. The scanner will be scalable for a very wide range of applications and price points using a single design and production. Partnerships have already been forged to have embedded data processing capabilities. Current scanners deliver only discrete point clouds which require considerable post processing. The SII devices will be more adept at delivering information along with the raw point measurements, if required. SII has exclusive rights to proprietary high speed timer devices in the survey and laser imaging markets, allowing measurements of events as short as 2-3 picoseconds, corresponding to better than 1cm spatial resolution.

Eventech’s requirement

We are ready to continue collaboration with interested parties both for terrestrial and space LiDAR applications, because one of the target applications for Eventech product in terms of current ESA contract is space LiDAR. We are looking for partners, who would be ready to deliver other parts of the whole system and a consortium for a EU/ESA funded project, so that delivered joint system could be tested and idea proven with the results.

8) Time Correlated Single Photon Counting

Time-Correlated Single Photon Counting (TCSPC) is a technique to record low level light signals with picosecond time resolution.

TCSPC applications:

- Ultra-Fast Recording of Optical Waveforms
- Fluorescence Lifetime Measurements (FLIM)
- Detection and Identification of Single Molecules
- DNA Sequencing
- Optical Tomography
- Fluorescence Lifetime Imaging

Eventech’s idea

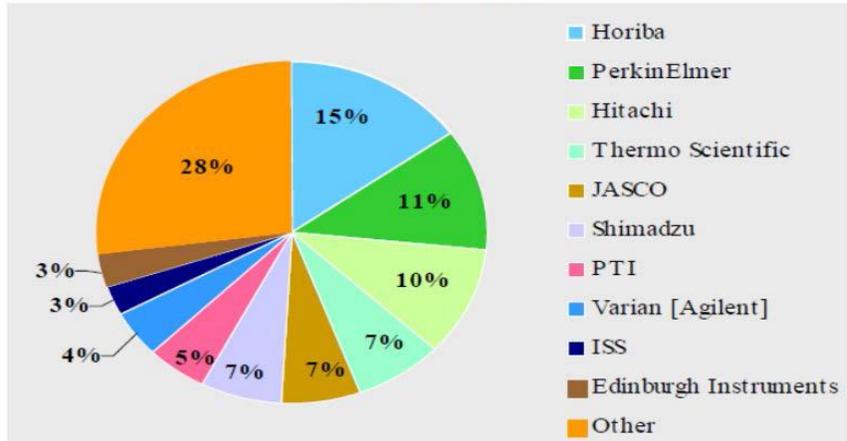
Eventech can offer a module for TCSPC needs, with the help of which the photon signal recording would be performed, we are ready to offer the same accuracy as is present at the market – by Becker&Hickl company. The main restriction factor for Eventech is that Becker&Hickl hold a monopoly on these specific modules’ production for all small TCSPC market needs and we received a straight answer, that we will just deliver quite the same product, so there is no interest in the collaboration between us and Becker&Hickl, which consider us as competitors.



SIA „Eventech”

Registration No. 40103495910
VAT registration No. LV40103495910
Reg. office: Dzērbenes street 14,
Riga, LV-1006, Latvia
Phone +371 29118068
Fax +371 67751956
E-mail: info@eventechsite.com
www.eventechsite.com

Vendor Share



Above you can see a market share by vendors, which use TCSPC technique and proposed modules for measurements.

Eventech’s requirement

We have full understanding that there is a market limitation factor, that’s why we cannot enter it, because of the larger players. It means, that if we find a collaboration partner, which plans to deliver all equipment and component manufacturing within exact number of collaboration partners’, then it would be a chance for Eventech and other collaborator companies to deliver competitive equipment for TCSPC and probably other needs.

Please be so kind to provide this information to all interested parties. Eventech is always ready for participation in new R&D projects and establish new partnerships for further application and business development. Please feel free to contact us regarding all above mentioned applications to discuss information and development plans in further details.

For further information, please contact:

Katrina Krivenko
Chief Operations Officer
Eventech Ltd.
E-mail: katrina@eventechsite.com
Phone: +371 29118068
Skype: k.krivenko
Web: www.eventechsite.com