

Results of competition: Manufacturing electronic systems of the future - Feasibility studies

Total available funding for this competition was £750k from the Technology Strategy Board.

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
Barnard Microsystems Limited	Smart Wing	£74,517	£55,888
Project description - provided by applicants			
<p>The objective of the project is to study the feasibility of manufacturing electronic and photonic components, which will be embedded within the outer skin of the wing of an unmanned aircraft ("UA"). UA are used in oil, gas and mineral exploration activities and need to be able to operate in hostile climatic conditions, including the extreme cold of the Arctic, the high humidity in the jungle in the Niger Delta and the extreme heat in the desert regions of North Africa.</p> <p>We plan to embed distributed planar antennas, interconnecting microwave transmission lines and optical fibres, together with a network of sensors, within the multi-layer (consisting of epoxy resin bonded layers of carbon fibre cross weave cloth and glass fibre cloth) skin to form a "smart wing." The embedded sensor network will be used to monitor the state of the wing. The embedded antenna array will be used for 3D electromagnetic imaging of the underlying terrain, without degrading the aerodynamic properties of the wing.</p> <p>This technology will open a new remote survey capability in exploration, and enable an improved detection performance in land and maritime border patrol and in search and rescue activities.</p>			

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Cambridge Microelectronics Limited (lead) Microsemi Semiconductor Limited	Advanced COB and 3D packaging of Lateral High Voltage IGBTs for compact medical applications - CoLPACK	£74,774	£54,593
Project description - provided by applicants			
Within the CoLPACK project we will develop an advanced Chip-On-Board (COB) packaging technique suitable for 3D PCB stacking and realisation of more compact size-sensitive electronic products in medical applications, LED lighting and portable consumer electronics. For the first time we will assemble lateral ultra-high voltage (UHV) IGBT dies directly onto the application PCB using flip-chip technique. Proprietary lateral >800V IGBTs with compelling area and switching advantages over competitive solutions have been recently developed by Cambridge Microelectronics. By using a lateral IGBT, where all terminals are on the front side of the die, UHV bondwires (used to contact UHV terminal which is on the back-side of the vertical IGBT die) will be eliminated from the PCB assembly. This is the first time bare UHV devices will be used for flip-chip, COB assembly and 3D PCB stacking.			

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Cool-Curve Limited (lead) CPI Innovation Services Limited	Cool-Curve 3D Formable Circuits	£74,734	£65,387
Project description - provided by applicants			
<p>Cool-Curve Limited has developed a range of innovative and attractive LED lamps and luminaires that require circuit boards that are formed into curves or rings. While this has been achieved for radii of 25mm and above, smaller sizes have required pre-formed boards, thus eliminating the opportunity to use standard automated assembly techniques for component mounting, making the technique uneconomic for high volume products such as light bulbs.</p> <p>Investigating alternative materials and processing techniques, this project aims to demonstrate the feasibility of forming substrate materials after component assembly to provide 3 Dimensional circuits, enabling innovative new forms of products to be manufactured at low cost.</p>			

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Eight 19 Limited	SHINE - System with light Harvester and INtegrated Electronics	£72,278	£54,209
Project description - provided by applicants			
SHINE is a feasibility project to develop a smart label with simple electronic functionality for packaging applications that is powered by energy harvesting from ambient light using a plastic solar module			

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Eltek Semiconductors Ltd	Low stress large die attach for high temperature use, using liquid solder and TLP/SLID techniques	£74,024	£55,518
Project description - provided by applicants			
<p>The project 'Low stress large die attach for high temperature use, using liquid solder and TLP/SLID techniques' will investigate the feasibility of combining liquid solder and transient liquid phase techniques to produce structured solder joints capable of operating over extended temperature ranges. By controlling the structure and materials used, an operating range of in excess of +300C to -75C should be obtainable.</p>			

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Filtronic Broadband Limited	Manufacturing innovations in ultra high frequency interconnect technology	£71,573	£46,522
Project description - provided by applicants			
<p>The rapidly increasing data-traffic in mobile wireless networks has led to very strong interest in use of spectrum between 57 and 95 GHz where wide bandwidths are available to support the high data rates required. However, such networks will not be viable unless the high frequency hardware is manufactured in a low cost, high volume environment.</p> <p>One key aspect to enable this is to maximise the manufacturing efficiency and yield. This can only be done by eliminating any form of manual processes. FBL has found that one of the largest impacts on manufacturing yield is variability of the manually formed connections between mm-wave integrated circuits and printed circuit boards.</p> <p>It is the intention of this project to innovate alternative high precision and low cost methods for interconnecting such devices. This underpins UK electronics leading position in the design of high technology electronics with an innovative manufacturing processes which will enable these designs be manufactured in volume.</p>			

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Marblar	Smart knee sleeve for continuous monitoring and analysis of range of motion and swelling	£74,772	£56,079
Project description - provided by applicants			
<p>Marblar is a London-based start-up with a mission to create products from science. At the core of our approach lies an online platform, where we post dormant academic patents. Our global community of 20,000 scientists, engineers and professionals suggest new real world uses for these, and work together to refine the most promising ideas. In this project we are focusing on the development of a wearable sensor to allow consumers to monitor and track their health.</p>			

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Microsemi Semiconductor Limited (lead) Compound Semiconductor Technologies Global Limited	ED-PCB: Embedded Die and Sensors in PCB Substrates	£74,913	£50,818
Project description - provided by applicants			
<p>This project will evaluate the feasibility of embedding semiconductor sensor die into PCBs. Embedded Die-PCB (ED-PCB) assemblies will be derived to high specifications to address applications in hostile environments, eg for operating temperatures in excess of 200C and pressure environments in excess of 2000psi.</p> <p>The primary demonstrator product is a sensor-enabled, intelligent gasket seal for fluid transport in the Nuclear, Energy and Process Industry. Its purpose is to provide continuous data on critical seals and joints and thereby prevent serious nuclear and process accidents, fugitive emissions and costly downtime of valuable plant installations.</p> <p>The key to successful exploitation of this technology is the demonstration of a flexible, generic manufacturing platform which can realise a wide variety of designs for multiple applications. Specific examples used in this study are high temperature sensing products and 3D integration market for medical products.</p>			

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Pragmatic Printing Limited (lead) Folium Optics Limited	FLEXIDISC (FLEXible DISplays Circuitry)	£74,768	£56,076
Project description - provided by applicants			
<p>The aim of this project is to exploit recent advances in printed electronics components and demonstrate the feasibility of integrating flexible driver circuitry with a flexible display on plastic.</p> <p>This project addresses three key technical innovations: printed logic circuitry to drive display modules (reducing interconnect complexity), flex-to-flex interconnections to enable robust hybrid systems integration and development of low-voltage plastic displays (<5V).</p> <p>The project outcomes will initially address the toys & games and consumer packaging sectors, with long-term opportunities for wearable electronics, healthcare, automotive and defence/military. The project also supports development of components/systems suitable for wireless sensor networks (WSN) and the Internet-of-Things (IoT).</p>			

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SensorHut Ltd (lead) G24 Power Limited	Manufacturing nano-structured photonic structures for chemical sensing	£74,725	£56,044
Project description - provided by applicants			
<p>This project seeks to evaluate the feasibility of combining chemical sensing technology from SensorHut with high-tech materials and manufacturing processes from G24. SensorHut is a micro-SME based in Cambridge with patent-pending technology for optical chemical sensors that exploits a nano-structured photonic material. G24 is a world leader in the design and manufacture of dye-sensitised solar cells (DSSC) with a manufacturing facility based in Newport. One component of the G24 DSSCs is a nano-structured layer of TiO₂ nanoparticles.</p> <p>This project will explore the feasibility of using this same layer and tuning G24's manufacturing methods to suit SensorHut's requirements. This has the potential to significantly reduce the use of toxic chemicals and cost of SensorHut's manufacturing processes while maintaining sensor performance.</p>			