

Technology Profile Fact Sheet

Title: Three-dimensional Microsystem and Method of Fabrication

Aliases: Ad-hoc wireless sensor networks

Technical Challenge: An area of extensive research today is the development of integrated microsystems. The integration of sensing and actuating elements with electronic control components has a wide variety of applications, particularly for remote, autonomous networks. Higher levels of integration are very desirable for these microsystems. Ultra-miniaturized microsystems need to be fabricated as economically as possible, with the desire to disperse them in large quantities. The described method optimizes the fabrication process in such a way as to minimize the cost both of acquiring the individual components and the overall fabrication and assembly process.

Description: This method describes a way to build highly integrated microsystems (comprised of sensing, processing, and actuating elements) in an economical manner. Commercially available integrated circuits can be used in order to minimize the cost of this component. Passive elements such as filters, capacitors, etc. can be fabricated using optimized substrates as opposed to more-expensive silicon. Functional tests can be performed at multiple points in the process, thereby increasing system yield. Micro-electrical-mechanical systems (MEMS) and sensing elements are packaged as part of three 3 levels of devices if desired.

The technological importance of this technique is potentially very high. It provides an opportunity for micro-integration of optical and mechanical devices with electronics while allowing micro-integration of COTS components. This is a cost-effective approach to miniaturization that should be of significant interest to industry.

Demonstration Capability: No

Potential Commercial Application(s): Remote environmental sensors; Networked control systems within industrial facilities

Patent Status: A patent application has been filed with the USPTO.

Reference Number: 1398