

New paper/digital book hybrid wins European printed electronics competition

- The **bitBook project**, by Greek startup Amphilab, has won an Open Call competition to kickstart entrepreneurial projects in Europe.
- The winning proposal will enable readers to access **digital content** by touching 'links' or inked buttons **printed directly on a book's paper** pages.
- The contest is organised by the **H2020 project INN PAPER**, a research and innovation consortium developing new electronic technology based on paper.
- Amphilab will gain privileged access to INN PAPER's **printed electronics pilot-line** to boost the innovative bitBook project.

San Sebastián, July 1st, 2021 — The [bitBook project](#), an analogue and digital book hybrid, is the winner of the one-off **Open Call competition** organized by the European Project **INN PAPER**. This technology has been designed by the Greek startup **AmphiLab**, whose founder is the mechanical & aeronautical engineer and industrial designer Manolis Kelaidis.

Interactive paper books already exist in the market, mostly as children's books, but they are primitive in function. Most of them consist of cardboard-like pages or use systems like plastic buttons or QR-codes which require external devices to perform the task.

bitBooks look, feel and smell identical to regular books, avoiding any cables or large plastic components, making the technology almost invisible and allowing for a **multi-sensory reading experience**.

These devices let readers access any digital content by simply **touching 'links'** printed with **conductive ink** on the book's pages. They have a low-profile, **wireless** electronic module connected to nearby equipment, like screens or speakers, which perform the output placing the old traditional printed book in the emerging **Internet of Things (IoT) ecosystem**.

They can also be autonomous books with all the digital data stored and incorporated within **memory chips**, using integrated speakers or **paper screens** to avoid the need for external equipment.

Also, these hybrids are **inclusive**, since the actions are intuitive and can also be used by children and people who are not tech-savvy.

In the Open Call, INN PAPER asked for new ideas within the printed electronics sector that would benefit from using the **integrated electronic platform** that the project has been developing over the last three years using paper and conductive inks. The application period ended on 31st August 2020 and, following an evaluation process by reviewers, bitBook has been chosen as the winner, gaining **privileged access** to INN PAPER's **printed electronics pilot-line** to boost its technology, along with an elaborate report on its **technical viability**, its manufacturing process flow, a roadmap to reach Technology Readiness Level (TRL) 7 and estimated cost.

The technology from Amphilab is a great innovation especially for **music books** and for **children's educational** and **entertainment** books. This approach will allow to create digital books specifically for children with **learning difficulties**, such as dyslexia or those from the autism spectrum, which currently are not available.



Using INN PAPER's printed electronic devices, which include paper batteries, antennas and paper (electrochromic) displays, this technology can be boosted while retaining the great environmental benefits of paper electronics.

Additional Information

What is INN PAPER?

INN PAPER is a European Research and innovation project, funded by the European Union, that is developing a new electronic technology based on paper: a recyclable, reusable and renewable material. To do it, the project modifies the cellulose nanofibers that compose paper, producing tailored papers and inks that are then used to manufacture electronic items such as batteries, displays, antennas and circuits.

Altogether, the technology conforms a configurable electronic board including three printed items (battery, display and NFC system), ready to be used in a broad range of industries. To demonstrate its potential, INN PAPER is developing three use cases for different industries: a smart label for the packaging industry, drug and caffeine detectors for the security and food industries respectively, and bed-side diagnostic tests for the medical industry.

More information available through the [website](#).

Why use paper and inks as an alternative to traditional electronics?

Discarded electric and electronical devices receive the name of e-waste. It is a growing concern that affects environment as well as human health. Recycling and collecting this e-waste endangers the people in charge of these tasks, who usually live in developing countries. According to a United Nations report, the world produces 50 million tonnes of electronic and electrical waste a year, of which only 20 % is formally recycled.

To face the e-waste problem, developing alternative systems to traditional electronics is one of the possible solutions. These systems require less plastic and metal in their manufacture process. Due to its high recyclability, paper arises as an ecological alternative. Its internal composition, based on cellulose fibres, allows to modify its properties to deliver multiple applications: paper that conducts electricity, that absorbs or repels water or that withstands high temperatures without burning.

To evaluate the environmental impact of the materials and devices developed by INN PAPER, the partners Vertech Group and GuarroCasas will study their life cycle along the whole project, assessing the environmental footprint and the reusability and recycling possibilities.

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