

# The Invention of Electronic Digital Computing – Plenary Panel Summary

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**Abstract**—The main goal of this plenary panel at IEEE SERVICES 2023 is to review John Vincent Atanasoff’s revolutionary invention of electronic digital computing. It will serve as a tribute to this pioneer’s exceptional accomplishments and as a celebration of Atanasoff’s 120<sup>th</sup> birthday. Back in 1939, the first proof-of-concept prototype of electronic digital computer became operational. The plenary panel discussion will recognize the contributions of John Vincent Atanasoff for the invention and early development of electronic digital computing and computers that changed the world.

**Keywords**—John Vincent Atanasoff, invention of electronic digital computing, computer history

## I. BACKGROUND

In 1937, after significant research and practical investigations, John Vincent Atanasoff invented the basic design principles of electronic digital computing. These included the use of

- electronic components for computational speed as opposed to mechanical or electromechanical technology,
- binary arithmetic for simplicity of implementation as opposed to decimal arithmetic,
- digital calculation for accuracy instead of analog operations,
- dynamically refreshed memory for low cost and reliability.

Based on these revolutionary concepts and after further experiments, a proof-of-concept prototype, and a full-scale operational computer (the Atanasoff-Berry Computer, or ABC) for solving systems of equations using digital electronics were developed and demonstrated between 1939 and 1942 by John Atanasoff and his graduate assistant Clifford Berry. Atanasoff was the first to use digital electronics to implement arithmetic

operations. His design principles propagated via ENIAC and EDVAC to most of the modern computer designs and remain at the core of the electronic digital computing technologies today.

## II. TOPICS COVERED IN THE POSITION STATEMENTS

The expert panel members will present their views about the following topics:

1. The variety of different technologies explored and used in the early days of automatic computing.
2. The advantages of digital vs analog calculations.
3. The importance of binary arithmetic for electronic digital computing.
4. The engineering challenge for the design of dynamically refreshed memory.

## III. DISCUSSION

The second part of the session will be a lively discussion with questions from the audience including the following.

1. How the main principles of electronic digital computing invented by John V. Atanasoff propagated to most of the IT designs today?
2. Does the invention of electronic digital computing mark the beginning of a new information revolution in human history?
3. Why the recognition of John V. Atanasoff’s invention has taken so long and what was the impact of the 1973 federal court decision on this process?
4. When and in what circumstances the name Atanasoff-Berry Computer (ABC) was first used and how many ABC machines have been built so far?