Margaret Hamilton

Brief Overview Of Her Early Life

Margaret Hamilton was born Margaret Elaine Heafield, on 17 August 1936, in Paoli, Indiana. She later moved to Michigan with her family, where she graduated from Hancock High School in 1954. She enrolled at University of Michigan to pursue a degree in mathematics in 1955, but later transferred to Earlham College where her mother was an alumna. She graduated with a BA in mathematics, with a minor in philosophy in 1958. She then moved to Boston, Massachusetts with her first husband, where she intended to pursue postgraduate studies in abstract mathematics. This was not to be the case. Instead, she began working in the meteorology department at MIT, where she developed software for predicting weather. Her next software engineering project, was working on the SAGE project, where she developed software for the AN/FSQ-7 computers used by the U.S. Air Force. SAGE was originally meant to be a project to create a computer system that could predict and track weather patterns, but then developed for use in anti-aircraft air defence during the Cold War. It was her work on this project which made her a desirable candidate for the position of lead software developer for the Apollo missions at NASA.

Work on the Apollo Space Mission and 1969 Moon Landing

In 1963, Hamilton began working at the Charles Stark Draper Laboratory at MIT, which was working on the Apollo space mission. She lead the team credited with developing software for Apollo and Skylab. Her team had various disciplines in developing in-flight software, including algorithms specifically designed for the Apollo command module, and the lunar lander, as well as designing systems software, including error detection and recovery software systems. Hamilton herself designed and developed the Display Interface Routines, also known as the Priority displays. This software would become pivotal during the Apollo 11 1969 moon landing. During the mission, just minutes before the lunar lander was due to reach the moon's surface, several computer alarms were triggered, causing the flight software to capture these alarms and interrupt the astronauts with priority alarm displays. These displays warned them that there was an emergency which gave them a "go/no-go"

decision to make, i.e., should they land or not land. According to Hamilton, the on board computer system was being overloaded with tasks. Her priority alarm displays meant that the computer was warning the astronauts that it was only going to perform the important tasks – the ones needed to land on the moon. In other words, the computer was programmed to recognise error conditions and run recovery programs. Hamilton herself says that, when designing the software for the Apollo mission with her team, she had though of scenarios where, in her own words, "the computer would slip out of sync when it mattered most", hence had designed and implemented the priority alarm displays, without which, she says, the Apollo 11 mission would not have been the success that we know it as today.

Coining the term "Software Engineering"

At the time of the triumph of the Apollo 11 mission, computer science, and all its disciplines, such as Software Engineering were all but non-existent. There were no computer science or related courses available to study at university, and anyone looking to explore more about these disciplines had to do with hands-on experience and learning as they went, something which, Margaret Hamilton, as a holder of a BA in mathematics, had to do herself. Software engineering, in particular, was not a field that was taken seriously, compared to other forms of engineering, and wasn't even regarded as a science. Hamilton herself, is credited with coming up with the term "software engineering" in order to try legitimising it's existence as both an engineering and science discipline. Hamilton recalls when she first started using the term describing it initially as "an ongoing joke for a long time", and noting how hardware gurus agreed that the discipline should be recognised "not because of their acceptance of the new term per se, but because we had earned the acceptance of others in the room as being in a n engineering field in its own right".

Notable Awards and Honours

1986 – Awarded Augusta Ada Lovelace Award by Association for Women in Computing.

2003 – NASA Space Act Award

2016 – Presidential Medal

As an Inspiration and Role Model

It is a well-known fact that women are very sparse in computer science and its related disciplines. As a female studying a computer science related field, it is quite comforting and refreshing to see that in a field that has been dominated by men since its inception, women are still able to make progress and headlines. Especially in an era where women were still in some disciplines, considered subservient to their male counterparts. It is quite humbling that it was in fact, a woman, who first coined the term 'software engineering'. As someone who is looking to pursue a career in the software engineering sector after university, I find myself looking up to people like Margaret Hamilton to remind me that anything is possible, and that without her, the moon landing would not have occurred as it did. When looking at people in the software engineering field to write about, the majority were male. As a female, I decided to write about a female software engineer that changed the world, at a time when men were the ones expected to do so.

References

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