Iva Letilović graduated from the Faculty of Architecture in Zagreb in 1997. In 2003, she cofounded an architectural office with Morana Vlahović, where she practiced until 2007. Since 2007, she has collaborated with architect Igor Pedišić on various projects. In addition to her professional practice, she serves as an associate professor at the Faculty of Civil Engineering, Architecture, and Geodesy in Split.

Active in the architectural scene since 2000, she has contributed to numerous realizations, competitions, exhibitions, and lectures in the fields of architecture and public space. Her work has gained recognition through multiple professional awards both in Croatia and internationally.

Some of her significant awards include the Piranesi Award in 2003, the Vladimir Nazor Annual Award for 2003, and the Drago Galić Award for the most successful achievement in residential architecture in 2003. She received a special Piranesi Award at the Piran Days of Architecture in 2004 and recognition at the international competition "Das Erste Haus," organized by Bauwelt magazine in 2004. In the same year, she was honored with the Silver Plaque for outstanding works by young European architects at the European Architecture Award Luigi Cosenza, along with the third prize at the 41st Zagreb Salon of Architecture.

She has received recent nominations for the Bernardo Bernardi, Drago Galić, and Viktor Kovačić Awards. She won the Bernardo Bernardi Award in 2011 and received an international award at the Triennale of Eastern and Central Europe in Bucharest in 2016. She was also awarded the Bernardo Bernardi Award again in 2018 and the Drago Galić Award in 2020.

In 2022, she was awarded the Viktor Kovačić Annual Award for the reconstruction of the Providurova Palace in Zadar, recognized as the most successful achievement in architecture by the Association of Croatian Architects. Additionally, the Ministry of Culture honored her with the Vladimir Nazor Annual Award for her exemplary artistic contribution. She also received the Oris Award for the same project.