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The automated assembly of stacked detector modules.

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The CMS phase II upgrade outer tracker is built from modules each consisting of two silicon sensors and associated electronics and mechanics. One module type, known as the "PS" module, contains one pixel sensor and one strip sensor that must be assembled to a relative rotational alignment of 800 micro radians. An automated module assembly system is proposed as an alternative to a manual, jig-based, approach. The automated system is based on the integration of a high-precision motion stage with vacuum handling tooling and a vision system. A dedicated software control application obtains images, performs pattern recognition to deduce component positions, and controls the motion stage to arrange components. The current status of the system is discussed with particular emphasis on the pattern recognition techniques and quality of the prototypes produced thus far.

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