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Abstract

We were very curious about whether the aircraft will suffer lightning damages during flight, so we tried to search the answer on the internet. According to the searching results, we realized that during flight departure, passenger planes can suffer lightning damage. As a result, there will be lightning strike points, which needs immediate solutions for safety concerns. Besides, we found out that the exterior aircraft components, such as aircraft body, wings, tail, turbine engine and other areas, are vulnerable to corrosion, which also needs immediate solutions.

Luckily, we came across a chance to chat with the engineer who works in the airport. Through that meeting, we knew that the maintenance of the aircraft is very important. However, the maintenance of the components depends on professional technicians, weather, the surrounding noise level, and other environmental effects.

As a result, we think that it is initial for us to develop a device that can automatically complete the missions of aircraft maintenance. Below are two objectives that we need to complete:

1. Complete a non-destructive testing for aircraft damage, including corrosion and lightning strike points. Assessment areas include: Aircraft body, airplane wings, tail of the aircraft and the turbine engine.
2. Engage in scanning results to analyze and predict for flight readiness. The collected results will proceed to the aviation company for inspection and maintenance.

Based on these two objectives, we designed an automatic platform for aircraft maintenance. Below are four innovations of this platform:

1. we developed a method to replace the current stage based on the manual operation of the aircraft maintenance, the use of AGV (Automated guided vehicle) and the robotic arm combination.
2. Design a modular platform based on this method, including telescopic four-wheel independent rotating chassis and locking mechanism, scissors lifting mechanism, double sided synchronous belt forward detection telescopic mechanism, etc. The platform can shrink at the minimum height of A320, convenient access to the machine abdomen.
3. The positioning algorithm of the platform relative to the aircraft is proposed.

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The project is done by 2 authors who are excellent at implementing the electrical and mechanical systems as well as the software development. The project as a whole is a complete system which has good practical functions for air craft maintenance, particularly for lightning induced cracks on airplanes.