

FLIGHT TRACKING & MESSAGING SYSTEMS (FTMS):

DEVELOPMENT AND FUTURE DIRECTION

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Problem Statement:

Outside radar range, small planes flying in remote locations must be tracked by other means. Emergency relief, humanitarian development and missionary organizations need to follow such flights, for safety and management. The Automatic Flight Following System (AFFS) owned by JAARS has been safety tested and used extensively for this purpose, but has been replaced in many cases by new options. Thus, the FTMS team has been working with stakeholder Cary Cupka on redesigning AFFS for more advanced technology modes to increase its value in the field.

This Year:

This past year, the FTMS team designed and tested a functional display board prototype for the Aircraft Control Unit (ACU). This prototype unit was tested and verified on a breadboard using an Arduino Microcontroller (simulating the ACU) to send information to the display. The team has also milled the prototype display board on a double-sided copper printed circuit board (PCB). Successful transmission of GPS and critical flight data from aircraft grade GPS and flight data units to the ground-based monitor (running AFFSWin software) was verified using a wired RS-232 serial connection (to bypass the wireless modem for test purposes).

Clients

Avionics consultant Cary Cupka represents organizations involved in Emergency relief, Humanitarian development & Missionary support, who need to fly small planes into remote locations. Carman Frith serves as an avionics consultant for JAARS.

Conclusions

FTMS has taken significant steps toward a new, and more versatile version of the AFFS ACU, to enhance the safety of pilots flying small planes in remote locations. The new ACU will be able to communicate messages with the ground station and support a more user-friendly interface. Future work will include integrating the new microcontroller and programming the new ACU.

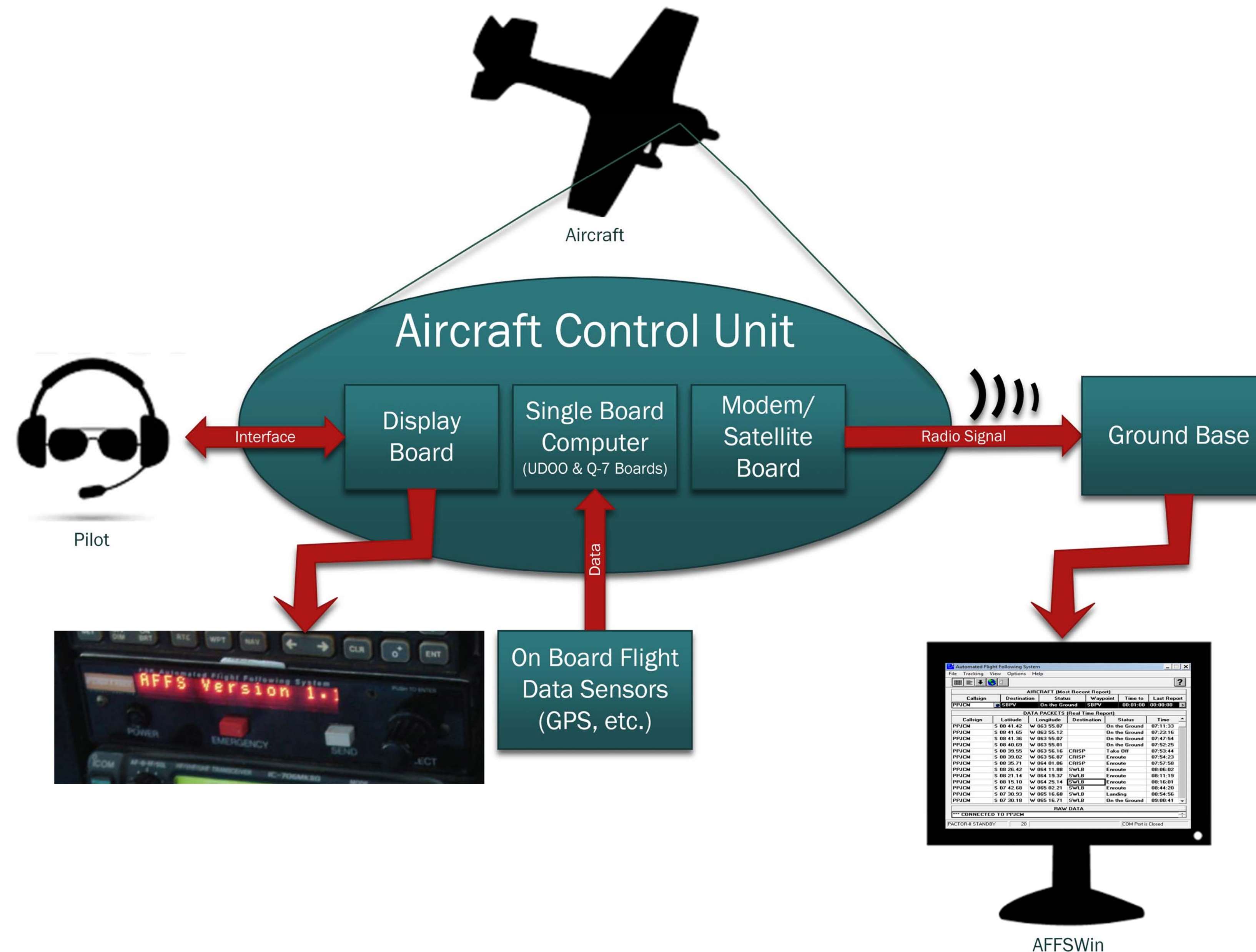


Figure 1. Overall Block Diagram of the Automatic Flight Following System (AFFS) from the pilot to the ground-based monitor running AFFSWin (a Windows-based software which logs and displays the milestones of a flight).

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Future

Next year, the FTMS team will take necessary steps to develop a working prototype (AFFS 2.0) to be tested by Summer 2019. GPS and flight critical data sent by AFFS 2.0 will appear in the AFFSWin ground-based monitoring log correctly formatted. The FTMS team will also need to program the prototyping SBC (UD00 Quad) and the industrial grade SBC (Qseven 928) so that the ACU demonstrates functional equivalence with AFFS 1.0.

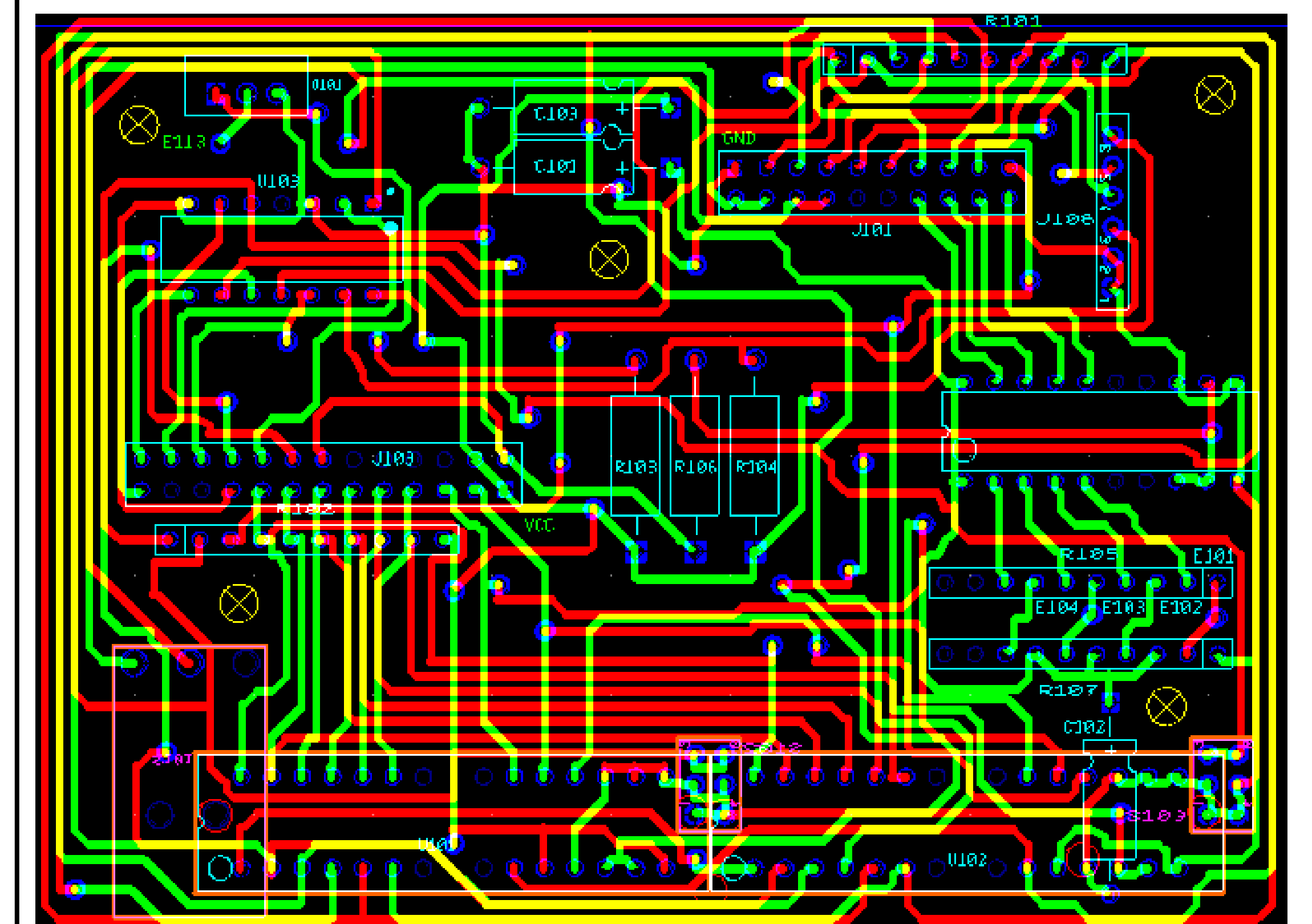


Figure 2. Layout artwork in Ultiboard of new Display Board Circuit.

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