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Altitude measurements for model rockets

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Subject Area	Mobile Communications
Project Partner	Rocketware

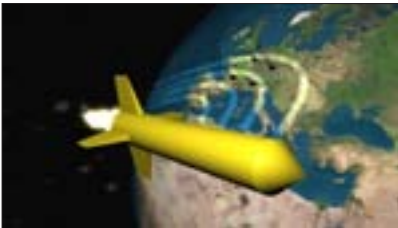
Task: In model rocket contests nowadays, where the winner is determined by the altitude reached by his or her rocket, a uniform measurement system is needed. At present, measurement is based on an optical system that depends on the weather, with measurement uncertainties exceeding 10%.

Project Goal: A more accurate measurement system should be evaluated, which overcomes the disadvantages of the optical system. It should be weather independent and achieve a precision within at least 10% of the altitude reached. Fur-

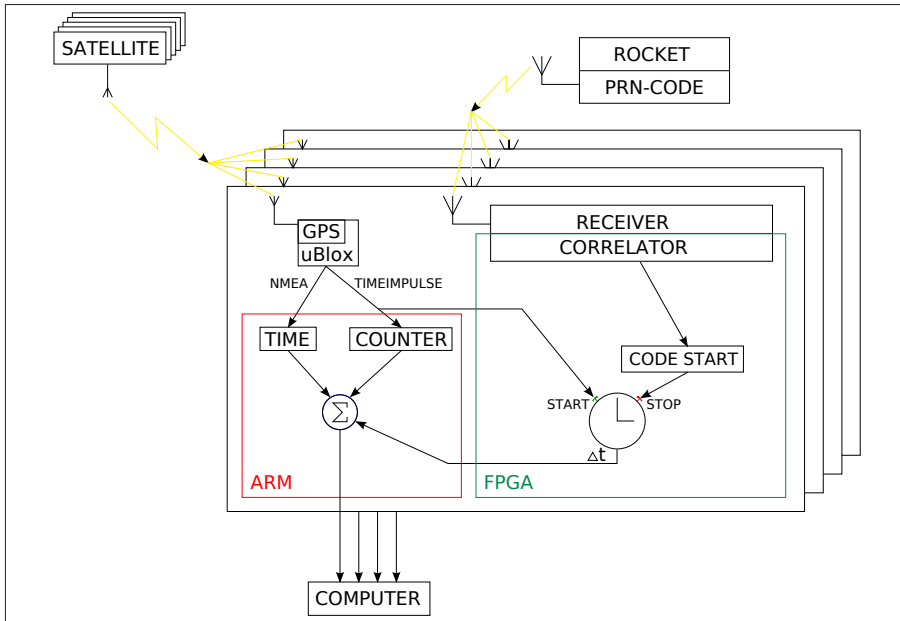
thermore it is recommended that the measurement should take place on the ground, to reduce the possibility of cheating.

Once the evaluation of the system has been completed, a prototype should be built to verify the evaluation.

Solution: Through calculations and research, it has been shown that the task of the system is very similar to GPS measurement. As this was the most promising technique, it was implemented in the evaluation. The technique includes



Artist's impression of a model rocket



Conceptual drawing

the measurement of transmission times from a transmitter to a receiver, also called TDOA (time difference of arrival). This makes it possible to calculate the distance between the receiver and the transmitter. But whilst GPS works with several transmitters (satellites) and one receiver (GPS device), the system evaluated should work with one transmitter (the rocket) and at least four receivers (base stations).