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# Open-source electronics for quantum key distribution

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## Abstract content <br>   (Max 300 words)

Quantum Key Distribution (QKD) requires an optical link between the transmitter, called Alice, and the receiver, called Bob. QKD is a method to share a secure key between Alice and Bob using the quantum states of the single photon, each state represents a bit of the key.
In free-space systems we consider the polarization as quantum state. The detectors of the receiver must be aligned with the transmitter. To align the system the laser beacon is used. Due to the turbulence effect, the laser beacon undergoes wondering, scintillation and the expansion of the spot [1]. The change of the polarization of the single photon and the laser beacon in free space can be neglected. However in mobile systems such as an aircraft, satellite or boat, the relative orientation of the polarization between the source and detector may vary due to the motion of the vehicle. It is necessary to build the appropriate detectors and actuators able to resolve the relative motion and orientation of the system. Initially the problem can be resolved using the classical analogical circuits and we compare the solution using an open source programmable logic unit. The open source electronics provides a powerful method to design a quantum key distribution system at low cost. We use open source electronic platforms together with open source software such as Scilab and python that use openCV package for tracking the laser beacon spot using the camera.

[1] R. L. Fante, Proc. IEEE, vol.63, Electromagnetic Beam Propagation in Turbulent Media, 1669-1692, (1975).

## Apply to be<br> considered for a student <br>   award (Yes / No)?

Yes

## Level for award<br> (Hons, MSc, <br>   PhD)?

PhD

## Main supervisor (name and email)<br>and his / her institution

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## Would you like to <br> submit a short paper <br> for the Conference <br> Proceedings (Yes / No)?

Yes

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