Visible light positioning (VLP) is a very promising solution for indoor positioning. In VLP, LED luminaires act as positioning beacons by transmitting information about their position, as shown in Fig. 1. The receiver must be able to receive the signals, separate them, and then determine its position. The most promising method for VLP uses the angle of arrival (AOA) of the light.

QADA-plus is a two-stage AOA receiver for VLP created by combining the quadrant angular diversity aperture (QADA) receiver, shown in Fig. 2, with an imaging sensor, such as the camera found in a smartphone.

**Figure 1** Typical VLP scenario

**Figure 2** QADA prototype

### Features
- Smartphone compatible
- Frequent position updates
- Cheap to manufacture
- Supports high data rates
- Tolerant to variation in transmitted power
- No synchronisation needed

### Stage One
- QADA separates and demodulates the high speed signals from multiple luminaires simultaneously.
- The AOA for each luminaire is estimated.
- The decoded data, detailing the luminaire positions, along with the AOA estimations, is passed to stage two.

### Stage Two
- Image processing is used to locate the luminaires in the image from the camera.
- The information from stage one is used to determine the identity of the luminaires.
- The high resolution image can then be used for accurate position estimation using triangulation.

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**Publications**


**Provisional Patent**

J. Armstrong, A. Neild, S. Cincotta, ‘Visible light positioning receiver arrangement and two stage positioning method’, 2018902351, 2018