

# Indoor Positioning with FDM Coded RGBLEDs and Smart Phones

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**Abstract**—With the rapid proliferation of camera-equipped smart devices (*e.g.* smart phones, pads, gearings), visible light method as a novel way to suffice indoor positioning at mega malls or airports is appearing to be a reliable one since it provides high precision and with hardly additional peripherals excepts existing indoor LED luminaries compared with existing indoor positioning systems exploiting radio-frequencies that may defective at precision or RFID and other hardware-based approaches which needs rich deployment costs.

To achieve this goal, existing methods exploits the frequency domain to convey distinct landmarks. However, this relies on conditioned controlling of several rolling shutter camera parameters such as exposure time and is strictly limited to the highest exposure frequency since a camera can only identify different blink frequencies with sufficient small intervals parting them apart.

We describe our solutions that to address challenges mentioned above by exploiting a FDM coding mechanism to indicate multiple landmarks. After we determine the landmark, we can find a coarse positioning result collected from a digital map. We can introduce Angle of Arrival positioning algorithm to get a precise location as the result. Our prototype implementation demonstrate that our solution can offer an obviously promotion in the number of location landmarks compared to existing VLC based indoor positioning system under similar circumstances.

## I. INTRODUCTION

This demo file is intended to serve as a “starter file” for IEEE conference papers produced under  $\text{\LaTeX}$  using IEEE-tran.cls version 1.8b and later. I wish you the best of success.

mds

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## II. BACKGROUND AND MOTIVATION

## III. SYSTEM ARCHITECTURE

## IV. BASIC DESIGN

- A. *Encoding*
- B. *Decoding*
- C. *Positioning Algorithm*

## V. IMPLEMENTATION

- A. *Encoded RGBLED Board*
- B. *Decoding and Positioning Server*
- C. *Smart Phone Tracker*

## VI. PERFORMANCE AND EVALUATION

## REFERENCES

- [1] H. Kopka and P. W. Daly, *A Guide to  $\text{\LaTeX}$* , 3rd ed. Harlow, England: Addison-Wesley, 1999.