

A Battery-free Passive Localisation System Using Visible Light

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CONTEXT

- ✓ Most existing localisation systems are battery-powered
 - Change in RF environment, receive light beacons
- ✓ Passive localisation desirable. No need to carry sensor
- ✓ Battery-free system practical. No need to change batteries
- ✓ Location and size of shadow predictable
- ✓ Existing work using shadow limited to gesture detection



Figure 1: Battery-free localisation scenario

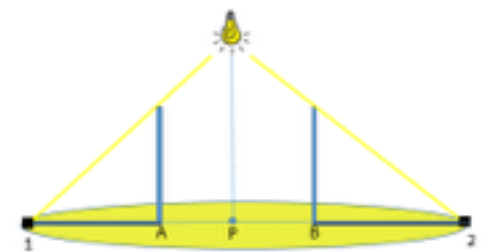


Figure 2: Area of interest is divided into many "light-zones"

We use cast shadow to passively localise

BATTERY FREE

- ✓ Battery-free operation using WISP 5 CRFID platform
- ✓ Photodiode attached to WISP. Allows to sense shadow
- ✓ RF-powered. RFID reader to power and communicate
- ✓ Lamps positioned overhead to cast shadow predictably



Figure 3: WISP 5 battery-free CRFID platform equipped with a photodiode

INITIAL RESULTS

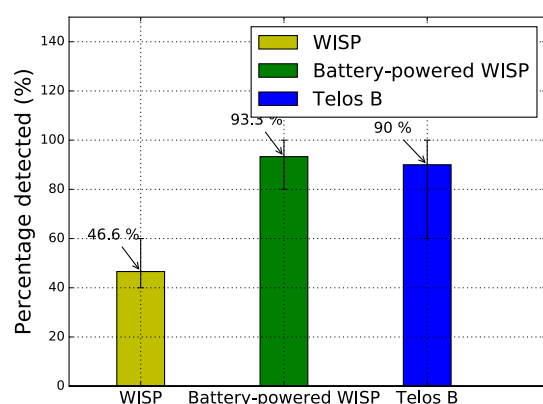


Figure 4 : Fast walking speed

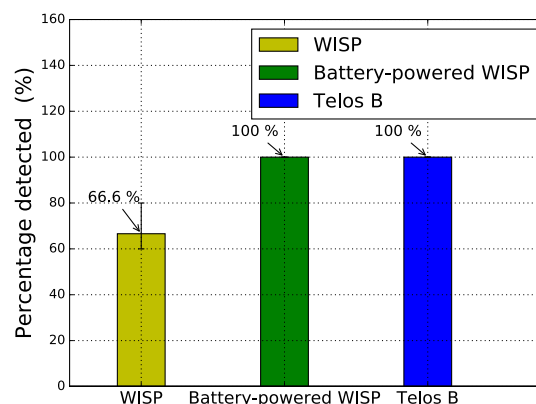


Figure 5 : Slow walking speed

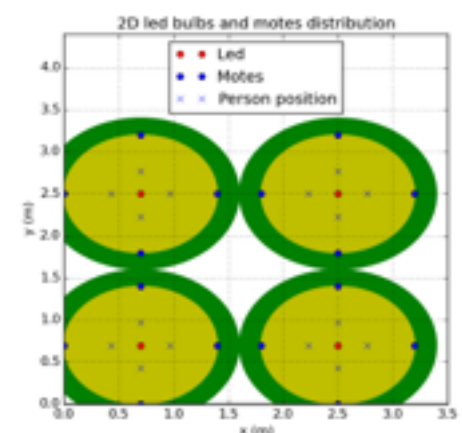


Figure 6 : 2D localisation scenario

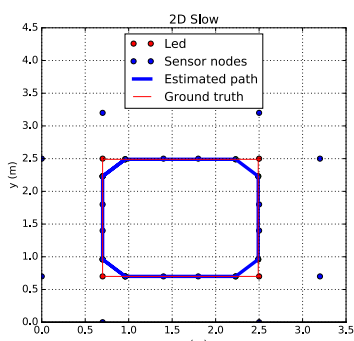


Figure 7 : 2D localisation, slow walking speed

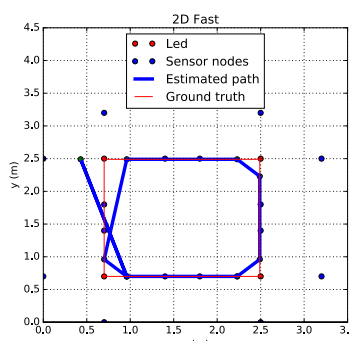


Figure 8 : 2D localisation, fast walking speed

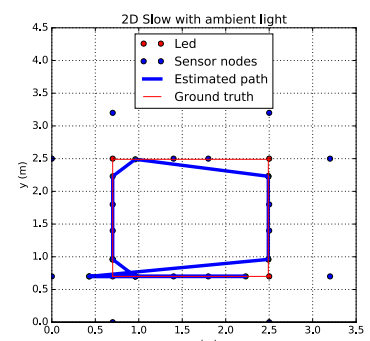


Figure 9 : 2D localisation, fast walking speed with ambient lights on