Title:	MULTI MODAL APPROACH FOR INDOOR POSITIONING SYSTEM USING SMARTPHONE
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Abstract: Nowadays, the requirement of location based services in indoor environments is increas- ing rapidly. This motivates us to develop a personal positioning systems. Due to massive advancements in technology, billions of users operate every task with their small computing power in their hand called a Smartphone, which is indispensable in their day to day life. Even though various indoor positioning systems use ultra-wideband (UWB), radio frequency identi cation (RFID), bluetooth low energy beacons (BLE) and other similar technologies, these systems need more infrastructure installations for their implementation, leading to sig- ni cantly increase their costs and complexity. Therefore, a solution to decrease the cost and complexity, using micro electro mechanical systems (MEMS) based sensors in a smartphone, called the IMU and robust Aruco markers are used in this thesis for implementing a low cost indoor positioning system. An Aruco marker is used to achieve better accuracy for pedestrian navigation by compensating the errors caused by IMU in a smartphone.
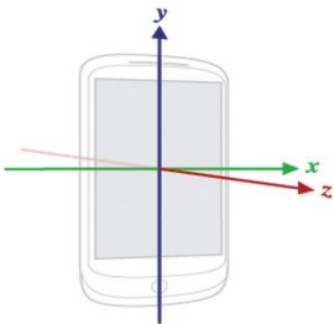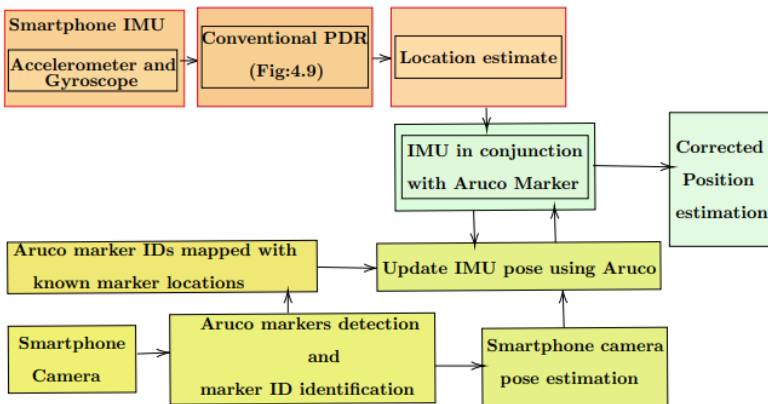
Figure 3.3: Calibration with Chess Board

Figure 4.10: Block diagram of Proposed Integrated PDR and Aruco Markers Indoor Positioning system