



# Indoor Positioning System (IPS) with Bluetooth Beacons

Kyle Bailey  
Michael Feinstein  
Chris Gary  
Arinze Umenyiora

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## Abstract

The use of the Global Positioning System (GPS) has revolutionized outdoor location services utilized by many of today's smartphones inside of mobile applications. However, this poses a problem to users indoors, as buildings have little to no reception of GPS signals from satellites [?]. Furthermore, current indoor positioning systems are expensive and rely on proprietary hardware. The proposed solution will be readily scalable using iOS device independent methodologies as long as the user's device supports Bluetooth. The system will be built on the principles of simplicity to build, implement, and minimize cost using Bluetooth beacons. The prevalence of Apple devices was the motivation for the development of an iOS application for the indoor tracking of users. The algorithm for determining the user's location is based on the instantaneous received signal strength and a database of known values. Using the database of values we can estimate the user's location on a floor plan of an indoor space. Future implementations of checks and balances on the validity of an estimate can be used such as phone orientation, accelerometer, barometer, and gyroscope data. The goal of this project was to develop a positioning system for indoor use. The results of the Bluetooth indoor positioning system tracked users with an error up to 1.5 meters or 4.9 feet.