

LOCATIFY UWB GUIDE

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OVERVIEW OF THIS DOCUMENT

This document explains how *LOCATIFY UWB GUIDE* is developed by the use of UWB chip DW1000 from Decawave connect with Bluetooth in smartphone apps and Locatify's Content Management System (CMS) for localization.

1. LOCATIFY UWB GUIDE

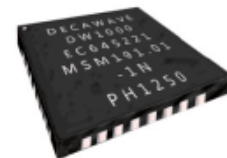
1.1 Summary of LOCATIFY UWB GUIDE

Locatify has been developing a micro-location detection technology for indoor use by providing a complete UWB solution that works with smartphones. Antennas and tags are provided by Locatify and use the Locatify CMS to make guided indoor tour apps and treasure hunts. The Decawave DW1000 chip is not part of the smartphone hardware, so Locatify has had to manufacture the tag and a proprietary protocol for now to be able to offer this solution to potential customers. In the future, smartphones may well have the DW1000 chip built in and then the extra tag hardware from Locatify will not be required.

2. Locatify development

2.1 Problems with existing technology

Existing location detection technology for smartphones in an indoor setting utilizes mostly signal strength of WiFi antennas and Bluetooth antennas to approximate location. The fundamental problem with these solutions is the fact that all measurements are based on the signal strength. The strength can be affected by various environmental factors and is reasonably accurate within 6 meters from the antennas. The smartphone receivers also differ in quality and each device type has to be calibrated for signal strength and distance ratio. Ultra Wide Band (UWB) provides much more accurate measurements for indoor location detection.

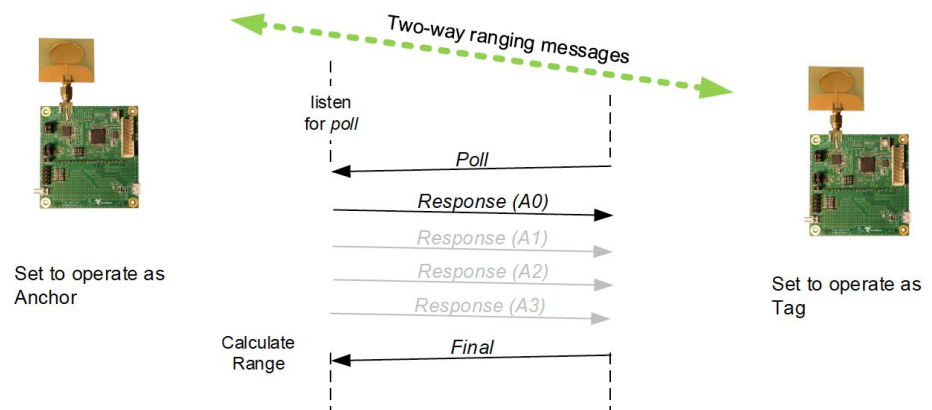


2.2 Using the UWB technology

The UWB technology has not been brought to the masses before because it has required an expensive infrastructure and cumbersome equipment, but recently a company called Decawave, released a small UWB chip, called DW1000, which handles the UWB communication between antennas and tags in the field with low power consumption and

economically feasible
for smaller scale
deployments.

Decawave utilizes UWB
so that the distance
between an antenna
(anchor) and a tag
(moving object) is
calculated based on the
time it takes the signal
to travel between the
entities. This allows for
much more accurate measurement down to 15 centimeters accuracy.



2.3 How Locatify utilizes the technology

Locatify utilizes the DW1000 chip and has developed a circuit board with the DW1000 chip and a microcontroller to coordinate the UWB activities and deliver the location information to the smartphone app via a Bluetooth controller. Locatify will offer the solution to current and future customers allowing for a location detection to within 15 centimeter accuracy in 3D with direction and acceleration and therefore revolutionize the ways that automated smartphone guides can be built. The solution is being integrated with Locatify's existing Content Management System and white label app solutions. The antennas are mounted on walls and the tags fit into a small peripheral that can be fitted with a headphone and feeds the location information via Bluetooth to a smartphone app.

2.4 What is special about Locatify's utilization of the technology

Locatify uses existing components to build the solution, such as the DW1000 chip, Bluetooth radio chip, accelerometers and an ARM microcontroller. The ARM microcontroller is the heart of the Locatify component, controlling the DW1000, the communication protocol between antennas and tags, distance calculation based on the signal timestamps collected and such. The tag component is equipped with a Bluetooth radio signal peripheral for communicating the location information to the smartphone.

The code for the microcontroller is based on Decawave's open source code library that comes bundled with their demo setup, TREK-1000. Locatify has extended this code to fit these needs and changed the protocol to handle more than 8 tags which is the limitation of the current protocol provided in Decawave's demo. Locatify's goal is to be able to correctly locate at least 128 simultaneous tags that receive location updates every second. A demo has been set up using the technology as a proof of concept without the 3D and acceleration, which is still under development. Locatify received Research and Development grant from Rannis in Iceland to develop this project.