NETRA- Indoor Navigator for Visually Impaired

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Abstract

In India, it is very difficult to navigate in indoor public places for Visually Impaired persons.

NETRA - Indoor Navigator for Visually Impaired allows them to navigate at unaccustomed venues.

Our solution will be more energy - efficient, cost-effective, reliable and convenient than the existing methods as there is no necessity for internet, dedicated sensors, location beacons or GPS to triangulate the location of the user.

Introduction

To navigate around an unknown public place such as a bus depot there will be a data transfer center at the entrance which will send the data about the location to the device and act as a start point for the navigation.

Once the user enters the building, he/she will be guided to predetermined places such as reception desks through audio instructions turn by turn navigation.

The location is computed in real time using the on-board IMU and 'dead reckoning' methodology which eliminates the need for internet thus making it accessible to people without internet.

Flow Diagram

IMU

Sensor Data

Beaglebone Black

Navigation

MSP430FR5994

Signal

BOOSTXL-AUDIO

Mono Earpiece
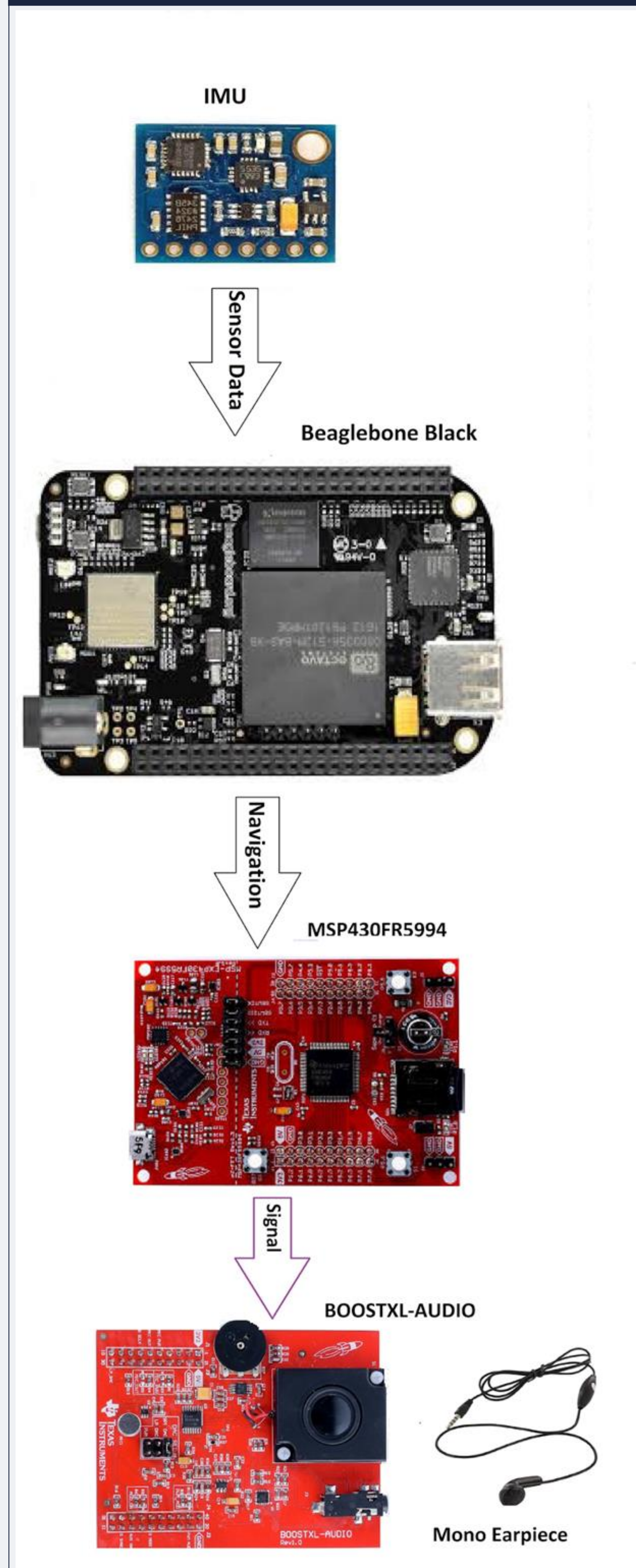
Methods and Materials

1. The first task is getting data from 9 axis IMU(Inertial Measurement Unit) and filter it to compare with existing path. For this purpose we will use BeagleBone black and GY80 - 9 DOF IMU.

1. After comparing with original path we will send path data to embedded microcontroller-MSP430FR5994.

1. The microcontroller will change path data to voice data and send it to audio booster- BOOSTXL-AUDIO.

1. Then audio will be heard will the help of mono earpiece

Budget

9 axis IMU – 1200/-
Other parts are funded by Texas - instruments

Further Work

We will implement this proposed solution in real world for next round of competition named IICDC-2019 funded by Texas – instruments and Government of India.

As this solution has many different processor like beaglebone black, MSP430 and boostxl-audio device we will make single ASIC for these specific purposes which may have inbuilt IMU this step will reduce cost of our product.

We will try to implement our product to business level.

References

1. Beaglebone black : http://beagleboard.org/Support/bone101

1. MSP430FR5994 : http://www.ti.com/lit/ds/symlink/msp430fr5994.pdf

1. Boostxl-Audio : http://www.ti.com/tool/BOOSTXL-AUDIO