

PHYSICS EXPERIMENTS WITH INTERNAL OR EXTERNAL SENSORS USING SELF-MADE APPS FOR THE SMARTPHONE

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INTRODUCTION

Low-priced smartphones with physics sensors have become widespread. Anyone can easily use a smartphone as a measuring device for physics experiments anywhere, not just in school laboratories. If one can make self-made apps using the sensor built into the smartphone, it is also possible to build an original measuring device. We have therefore developed apps (“Diracma” series) with functions that are not available to public apps for physics experiments.

WHY SELF-MADE APPS?

Physics experiments using smartphone apps, which have been open to the public, have been reported. Using these smartphone apps, experiments can be performed not only in the laboratory but also in other locations. These public open apps are useful, but there were no apps with functions that we needed for specific experiments. For example, there was no function to convert acceleration data to velocity data immediately. Furthermore, there were also no functions to generate and record sound waves at the same time, and to connect an external sensor. Therefore, we started to develop self-made apps to include the aforementioned functions and to make them easier to use since 2013. Using the practice cycle as shown in Fig. 1, we have done a new scheme of physics education.

APPS “DIRACMA” SERIES USING SENSORS

The first app “Diracma 1” (current app “DiracmaA”) using an internal acceleration sensor was released to the public in 2015. There are several apps, which are “DiracmaS” for an internal audio sensor, and “DiracmaM” for an external sensor (Adachi, 2021). There is a possibility that these smartphone apps can be effectively used in online classes by using students’ smartphones.

The “DiracmaM” app can connect an ultrasonic sensor unit to a smartphone by a USB cable (Fig. 2) and there are many related experiments for physics classes (the HP site, “Mobile Physics Education Lab” <https://sites.google.com/view/diracma888/>). This mobile ultrasonic sensor unit can be purchased from the “Mobile Education Lab”. This sensor unit is inexpensive and ready to use in class.

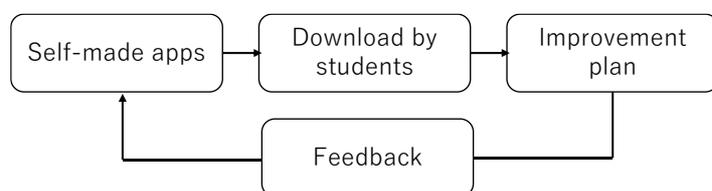


Fig.1 New scheme for physics education cycle



Fig.2 Mobile ultrasonic sensor unit

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REFERENCE

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