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APPLICATION OF PDA DEVICES TO THE MACHINE OPERATION OF NEWSUBARU

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Abstract

The handheld devices or PDAs are applied to the machine-operation of the NewSUBARU storage ring. In order to watch the operation status of the storage ring, the system based on the wireless network and PDA devices has been developed. The operation staff and synchrotron radiation users with handheld devices can watch the current status of the ring from anywhere in the facility.

INTRODUCTION

Recently the information technology has been making tremendous progress. In particular the wireless technologies such as IEEE 802.11 and *Bluetooth* are very useful and applied to many kinds of fields in our daily life. Such technologies should be introduced also to the accelerator facilities, especially to synchrotron radiation facilities.

At the NewSUBARU facility, the storage ring is usually operated with the top-up mode during 1.0 GeV user-time [1]. It is important for the operation staff to monitor whether of not the top-up operation is normal, that is, the stored current is kept almost constant without any failure of the beam injection nor reduction of the beam lifetime due to beam instabilities. We can already watch the machine status by either a web browser or the standalone application in PCs [2]. However we are not always working in our room nor in front of display monitors, thus the handheld devices or PDA (Personal Digital Assistant) devices such as Windows Mobile or Palm would play a very useful part.

In this paper we show the application of PDA devices to the operation of the accelerator. We developed the system based on a wireless network and PDA in order to monitor the operation status from anywhere. And as a labour saving instrument, PDA is also used to setup equipments with RS232C and the *Bluetooth* technology,

WI-FI NETWORK AT NEWSUBARU

In the NewSUBARU facility, the wireless network system based on Wi-Fi (IEEE 802.11g/11b) has been constructed for radiation users to access the local area network from their note PCs. The users can access to the wireless network through access points from anywhere of the facility (Fig. 1). For the network security, the wireless system uses TKIP (Temporal Key Integrity Protocol), WPA-PSK (Wi-Fi Protected Access / pre-shared key) and MAC (Media Access Control) address filtering.
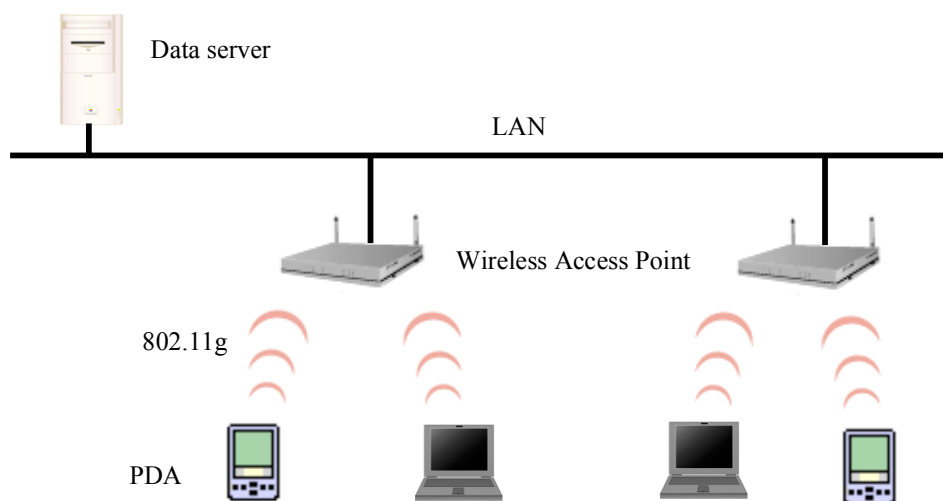

Figure 1: Wireless LAN

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PDA DEVICES FOR MONITORING OF THE MACHINE STATUS

As PDA devices for machine-monitoring, Microsoft Windows Mobile 5.0 for Pocket PC platform is adopted (Fig. 2). We developed the application software on PDA using National Instruments [4] LabVIEW 8.0 PDA module. This developing application adopts a graphical programming environment and can save time and cost for making the system, especially at small facilities where there is no expert for control system or network. The source code is developed, compiled and tested in the PC with Microsoft Windows OS and is downloaded to the PDA device.

Figure 2: PDA device

The graphical user interface on the device is shown in Fig. 3. The PDA users can get some information about the machine operation such as the stored current, the lifetime, the beam injection efficiency, etc. and look the time charts of the stored current and the lifetime on their device. All data, which is updated every one second, is sent from the data server to the PDAs with UDP (User Datagram Protocol) and presented on these devices with a graphical user interface. Although UDP dose not check if every packet actually arrived and not provide the reliability in compared to TCP (Transmission Control Protocol), UDP is faster and efficient for such a lightweight purpose as this case. There is almost no received data loss even if a person having a PDA walks in the facility.

The great thing about PDA is that the person who has such a device can check the status of the ring operation anywhere at any time.
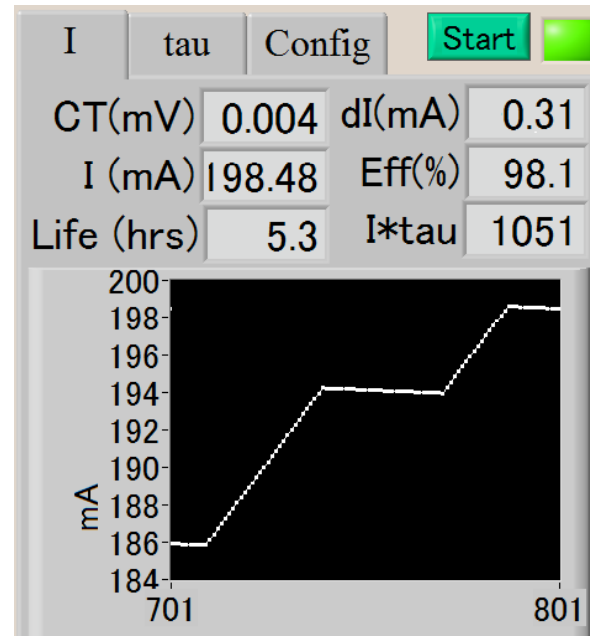

Figure 3: Graphical User Interface on the PDA device. The vertical axis in the graph is the stored current in mA, and the horizontal is time in second.
CT: Peak value of Current Transformer of Transport.
dI: Increased current per beam injection.
I: Beam current stored in the ring.
Eff: Injection efficiency.
Life: Beam lifetime.
I*tau: Product of the current and the lifetime.
Graph: Stored current vs. time (sec.).

HARDWARE SETTING USING RS232C AND BLUETOOTH

Another useful utilization of PDA devices for machine operations is for setting of the hardware such as SIP (Sputtering Ion Pump) controllers. It is a great bother to manually set or read parameters for several tens of such equipments. Such a device usually has a RS232C port. By equipping *Bluetooth* adapter to RS232C port, the PDA with *Bluetooth* module can communicate with external devices through *Bluetooth* instead of a RS232 cable (Fig. 4). Once writing the application software, which can automatically set or read parameters, it is good only to run the software. It is a labour saving instrument for maintenance of these equipments.
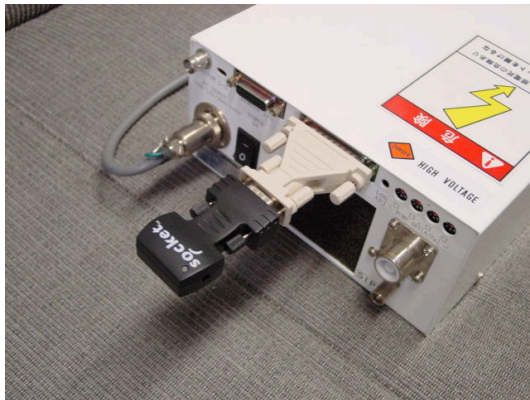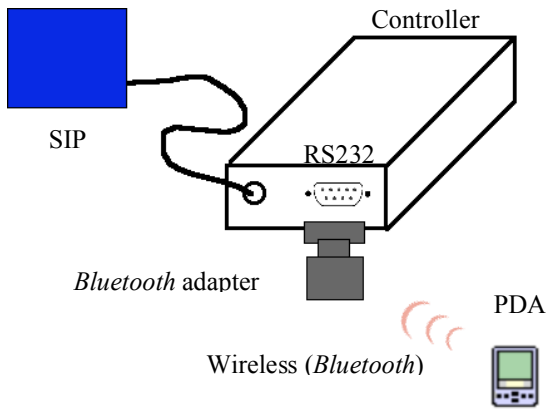
Figure 4: Communication with *Bluetooth*.

SUMMARY

At the NewSUBARU, PDA devices are successfully used for the operation of the storage ring. Using the wireless network, the operators and experimental users can look the present operation status of the ring with the graphical user interface on the handheld devices anywhere of the facility at any time.

PDA is also used as a communication tool for equipments with a RS232C port such as SIP controllers. By use of the *Bluetooth* adapter, PDA can communicate with external devices through *Bluetooth*. The bothering tasks can be simplified, and it becomes a great saving of time and manpower.

REFERENCES

[1] A. Ando, "NewSUBARU storage ring", LASTI Annual report vol. 6, 2004, p. 1

[2] S. Hashimoto and A.Ando, "Development of real-time beam injection monitor system using PXI and LabVIEW RT OS", LASTI Annual report vol. 5, 2003, p. 11

[3] S. Hashimoto and A. Ando, "Beam injection efficiency monitor in NewSUBARU", PCaPAC2005, Hayama, March, 2005

[4] http://www.ni.com