Supplementary Information

Patient-Provider Interaction System for Efficient Home-based Cardiac Rehabilitation Exercise

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A.  EXERCISE RECORDS IN SMARTPHONE APPLICATION

For the summary of the exercise, a patient can click “summary” in Fig. 8(c) to show the average of THRR, exercise trials, and accumulated exercise time for a certain time period such as week, month, and year as shown in Figs. A1(a) and (b). In addition, a patient can schedule the CR exercise by clicking the top third panel in Fig. 8(a). Figs. A1(c) to (e) show the scheduling page where a patient can set up the regular exercise schedule with date and time. The patient can also set up the alarming time and alarming type (sound and/or vibration).

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|  |  |  |  |  |
| (a) | (b) | (c) | (d) | (e) |

FIGURE A1.  Smartphone application: (a) exercise record summary for a week, (b) exercise record summary for a month, (c) exercise scheduling set up the date and time, (d) and (e) alarming date and time setup.

B. EXERCISE RECORDS AND NEW PRESCRIPTION IN MEDICAL STATION

Upon completion a CR specialist prescribes new CR exercise, the information is sent to the patient’s smartphone application which pops up a message for the alarming. Then the notice of “New Prescription Received!” is popped up when the smartphone application is activated as shown in Fig. A2(a). Once the “OK” button is clicked, the new prescription is automatically set up as shown in Fig. A2(b). Simultaneously, the prescription record in the medical station is updated again with the confirmation date as shown in Fig. A2(c) (highlighted with red box). Again, the prescription information is transferred to the wearable device. When a patient performs the CR exercise, the exercise record is transferred to a smartphone application which is sent to the medical station as shown in Fig. A2(d) (highlighted with red box). In this way, interactions between a patient and a CR specialist are repeated.

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| --- | --- |
|  |  |
| (a) | (b) |
|  | |
| (c) | |
|  | |
| (d) | |

**FIGURE A2.  Medical station monitored and prescribed by a CR specialist: (a) new prescription message in the smartphone application, (b) automatically updated prescription in the smartphone application, (c) updated confirmed date in the prescription record, (d) updated exercise record.**

C. DATA SHEETS FOR ELECTRONIC COMPONENTS USED

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| **Part name** | **Description** | **Link** |
| NJL5310R | photosensor | https://www.njr.com/semicon/PDF/NJL5310R\_E.pdf |
| TSV524IQ4T | operational amplifier | https://www.st.com/resource/en/datasheet/tsv524.pdf |
| STM32F413CGU6 | microcontroller unit | https://www.st.com/resource/en/datasheet/stm32f413cg.pdf |
| LIS3DHTR | three-axis acceleration | https://www.st.com/resource/en/datasheet/cd00274221.pdf |
| BMA-4003 | speaker | https://www.icbanq.com/data/ICBShop/board/BMA-4003.pdf |
| RN4871 | Bluetooth module | http://ww1.microchip.com/downloads/en/DeviceDoc/50002489C.pdf |