UP ELECTRICAL AND ELECTRONICS ENGINEERING INSTITUTE

irclab

UP DILIMAN
QUEZON CITY, PHILIPPINES

CaRE

CARDIAC REHABILITATION EQUIPMENT

CaRE is an exercise bike with a dynamic and adaptive heart rate-based load control and Pulse Oximeter, Blood Pressure Monitor, real-time ECG and arrhythmia detector. CaRE is also equipped with LCD screen and Borg rating of perceived exertion buttons to monitor the condition of the patient

Researchers: **Shanelle Grace Recheta** and **Jemuel Bryan Vergara**
Adviser: **Dr. Luis Sison**

LEADING CAUSE OF DEATH

Ischaemic heart diseases are still known to be the leading cause of death in the Philippines.
Studies show that **only 35% of cardiac failure patients live within 5 years after diagnosis** and that more than half of the patients have accepted that they could have no physical activity or care of themselves.

CARDIAC REHABILITATION

After a surgery, doctors advise heart failure patients to undergo **cardiac rehabilitation** to encourage fast recovery, healthy lifestyle and avoid future events.

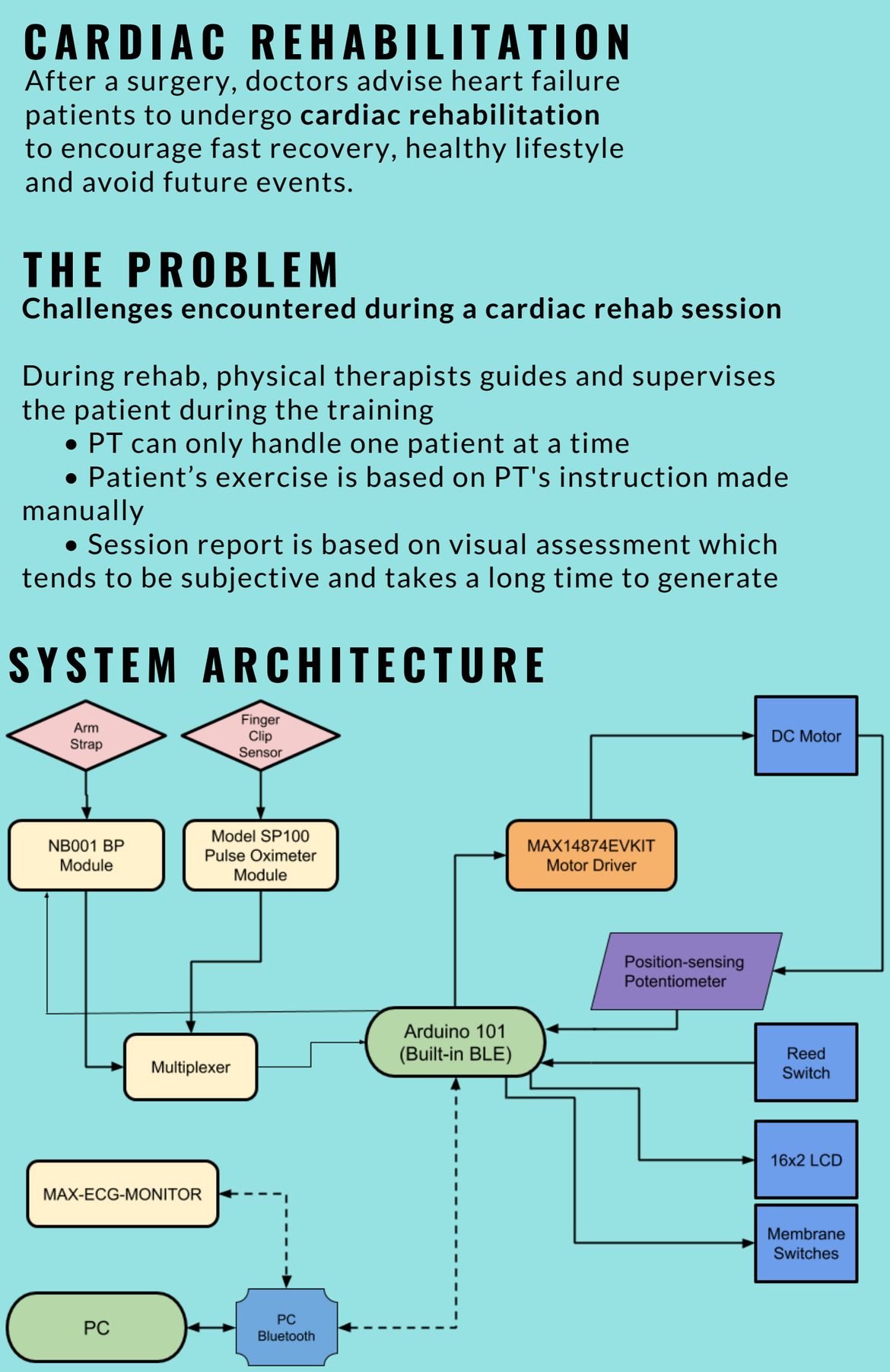
THE PROBLEM

Challenges encountered during a cardiac rehab session

During rehab, physical therapists guides and supervises the patient during the training

- PT can only handle one patient at a time
- Patient's exercise is based on PT's instruction made manually
- Session report is based on visual assessment which tends to be subjective and takes a long time to generate

SYSTEM ARCHITECTURE



DESIGN OBJECTIVES

1. To develop a pre-clinical grade equipment that will provide accurate measurements of the patient's vitals and analysis of the measurements to ensure a safe and effective cardiac rehabilitation training
2. To integrate an ECG module for adaptive load control, real time display of ECG tracings and arrhythmia event detection
3. To integrate the blood pressure and pulse oximeter module with an added capability for aerobic exercise contraindications necessary to alert medical officers when the patient's vital signs are out of the normal range
4. To implement a Borg RPE-dependent load control override
5. To upgrade hardware configuration and design to meet preclinical grade product standards

MARKET VALIDATION

""We still haven't encountered any training device with more than just a heart rate monitor. It will definitely make patient monitoring easier and give accurate progress reports. Most importantly, it will make the patient's training safe and effective."

Dr. John Michael Mendoza
Rehabilitation Medicine, Philippine General Hospital
Taft Avenue, Manila

CONCLUSION

The team designed and implemented a training bike with a dynamic and adaptive heart rate-based load control and Pulse Oximeter, Blood Pressure Monitor, real-time ECG and arrhythmia detector. CaRE is also equipped with LCD screen and Borg rating of perceived exertion buttons to monitor the condition of the patient in real-time. The data from the session can be stored to a .csv file for review of the rehab doctor.