



Automated Electrocardiogram Management System for Emergency U-Healthcare Service



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INTRODUCTION

- Proper medical care in cardiac emergency at the pre-hospital stage is crucial for a patient's survival
- Fast and correct ECG diagnosis is mostly required especially for the ventricular fibrillation and ST elevated myocardial infarction
- An automated electrocardiogram(ECG) management system was developed for providing pre-hospital care to patients in cardiac emergencies

METHODOLOGY

- The developed system is composed of
 - a mobile ECG device with a wireless communication function
 - a data server
 - a communication protocol between the device and the server
 - an automated ECG analysis program running on the data server.
- System Operation
 - Patient's ECG is acquired in an ambulance
 - The ECG is transferred to the data server in hospital through a lossless protocol especially designed for various wireless Internet connections
 - Then, the automated analysis program displays, saves and analyzes the ECG waveforms to provide the final diagnosis

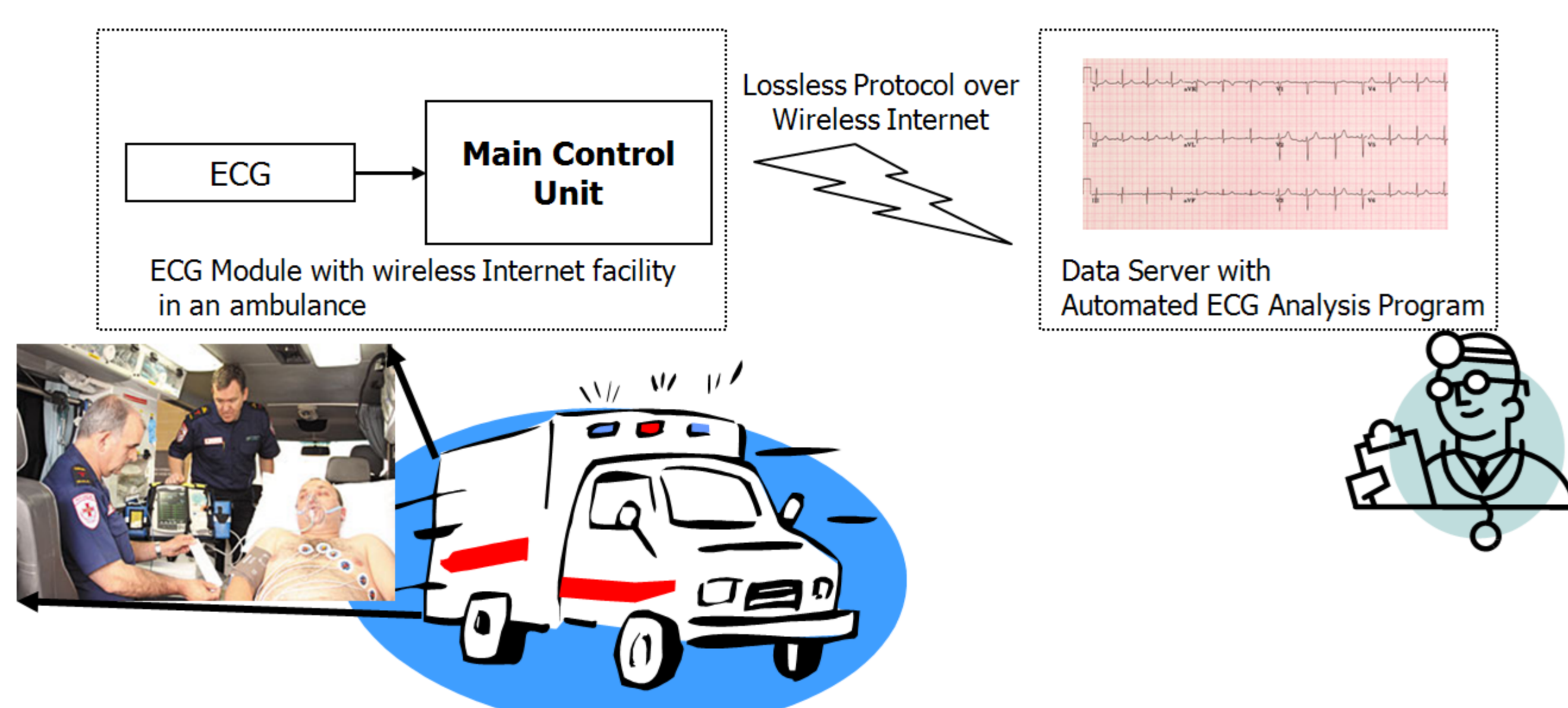
RESULTS

- The lossless communication protocol between the mobile ECG and the data server
 - tested and verified in multiple semi-real as well as simulated situations
 - confirmed to provide a 100% lossless transmission for ECG and randomly generated simulation waveforms
 - even in simulated conditions of network disconnection during data transfer, the protocol guaranteed perfect transmissions after the network recovery
- The automated ECG analysis program
 - tested for the records of ventricular fibrillation and ST elevation generated using a commercial ECG simulator (medsim300B, Fluke Biomedical, USA), where the same diagnostic results were achieved as a typical commercial patient monitor (Dash4000, Gernal Electric, USA)
 - also tested for 522 myocardial infarction records in the PTB diagnostic ECG database and resulted in the sensitivity and specificity as 74.4% and 86.8% for septal infarction, 7.2% and 98.4% for lateral infarction, 52% and 95% for anterior infarction, 63% and 88% for inferior infarction, and 45% and 82% for posterior infarction records

DISCUSSION

We believe that the proposed system in this paper will contribute greatly to the emergency u-healthcare system after performance verification in real cardiac emergency situations as well as improvement of diagnostic accuracy

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<System Overview>