

Development and Testing of Ventricular Fibrillation Detection Software Module

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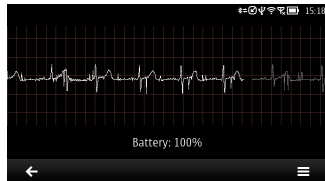


Cardiovascular diseases

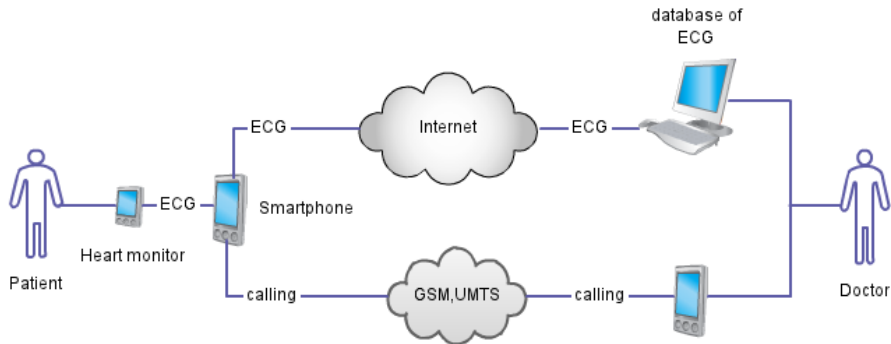
- Major health problem
- Greatest risk group
- Constant monitoring



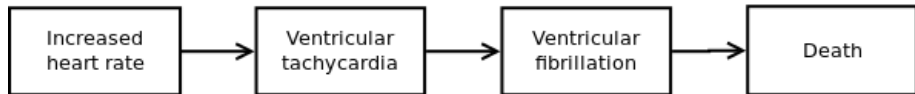
- Smartphone
- Application
- User-friendly
- Customizable ECG viewer
- Analyzer
- Emergency call



How it works?

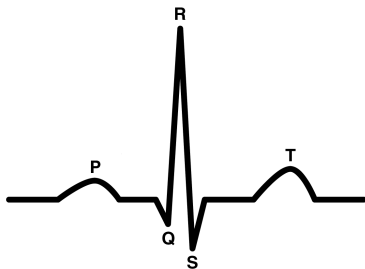


Sudden death

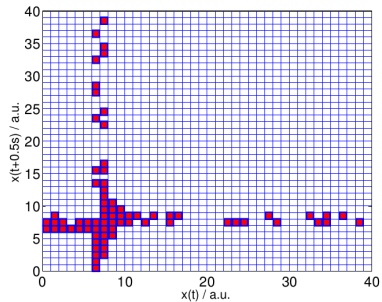
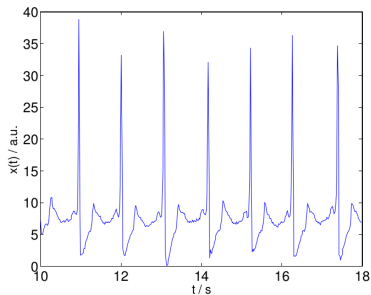


Requirements for the algorithm

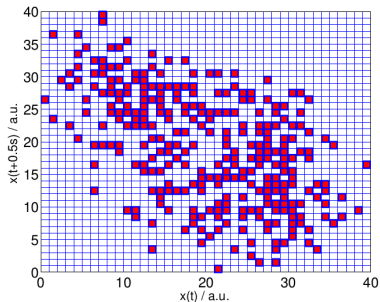
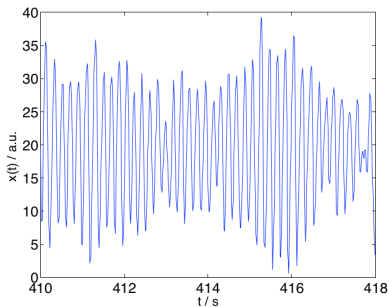
- Real-time
- Reliability
- High speed
- Simplicity



Phase Space Reconstruction



Phase Space Reconstruction



Arrhythmia detection

$$d = \frac{\text{Number of visited boxes}}{\text{Number of all boxes}}$$

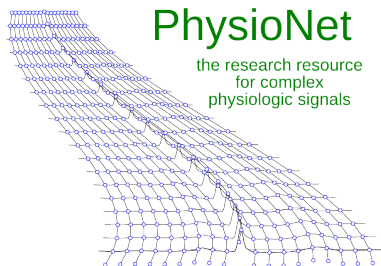
If $d > d_0$, then classify ECG episode as VF,

$$d_0 = 0.15$$



Testing of the algorithm

- MIT-BIH
- PhysioNet
- Open-source software
- WFDB-library
- WFDB-applications
- ECG records



Testing: Normal ECG record

The screenshot shows an IDE window with an "Application Output" tab. The output text is as follows:

```
TestingSystem
count = 90
d = 0.05625
NORMAL
interval # 188
count = 99
d = 0.061875
NORMAL
interval # 189
count = 88
d = 0.055
NORMAL
interval # 190
count = 67
d = 0.041875
NORMAL
```

Overlaid on this is a "TestingSystem" dialog box titled "Select Dir". It contains a list of files:

- /TestingSystem/records/200.txt
- /TestingSystem/records/207_V1.txt
- /TestingSystem/records/207_MLII.txt
- /TestingSystem/records/203.txt
- /TestingSystem/records/114_V5.txt** (highlighted)

Below the list is a "Check record!" button. At the bottom of the IDE, a tab bar shows: 1 Issues, 2 Search Results, 3 Application Output, 4 Compile Output, 5 QML/JS Console.



Testing: VF ECG record

The screenshot shows an IDE window titled "Application Output" with a sub-window "TestingSystem". The output contains the following text:

```
count = 288
d = 0.18
WARNING! Ventricular fibrillation!
interval # 222
count = 256
d = 0.16
WARNING! Ventricular fibrillation!
interval # 223
count = 296
d = 0.185
WARNING! Ventricular fibrillation!
interval # 224
count = 296
d = 0.185
WARNING! Ventricular fibrillation!
```

Overlaid on this is a "TestingSystem" dialog box titled "Select Dir" with a list of files:

- TestingSystem/records/222_MLII.txt
- TestingSystem/records/210_MLII.txt
- TestingSystem/records/210_V1.txt
- TestingSystem/records/samples106.txt
- TestingSystem/records/222_V1.txt
- TestingSystem/records/200.txt

The file "TestingSystem/records/210_V1.txt" is highlighted in orange. Below the list is a "Check record!" button. At the bottom of the IDE, a tab bar shows "Issues", "Search Results", "Application Output", "Compile Output", and "QML/JS Console".



Thanks for your attention!

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