

# Simulation of Control System Based on New Electric Intelligent AN Toothbrush

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**Abstract:** This paper mainly introduces the simulation and Simulation of the processing effect of the new electric intelligent an toothbrush terminal based on ENBF156 chip. The system can detect the health of teeth in real time, connect their teeth with the Internet or GPRS network, and correctly transmit them to the toothbrush simulation control system and app. This simulation system gives full play to the data processing and real-time control functions of ENBF156 chip.

**Keywords:** Intelligent Toothbrush, ENBF156, AN, AD574, Simulation, Control, Detection, App.

## 1. Introduction

With the popularity of electric toothbrush, the teeth are cleaned and whitened by vibration. At present, the most commonly used instruments for detecting tooth conditions are mouth glasses, probes, tweezers and some auxiliary tools, which can only observe tooth health through manual cooperation with eyes, which is not conducive to people checking their teeth anytime and anywhere. In this project, the chip of vibration detector is installed in the electric toothbrush, and a series of data analysis is conducted to compare the tooth health data through the vibration data obtained from the vibration of the electric toothbrush, so as to obtain the tooth condition analysis in the mobile phone app, which is

convenient for people to understand their own tooth condition while caring for their teeth. The project uses vibration and mobile phones to detect and analyze tooth conditions, which has the advantages of fast and convenient. After the implementation of the project, it can be converted to detect the user's teeth, and timely give the user the method of caring for teeth and the modified treatment scheme in the mobile app.

Note:

- (1) Micro piezoelectric sensor meter (measuring system)
- (2) Force hammer (excitation system)
- (3) Dynamic signal analyzer (analysis system min, STM32)
- (4) App receiving data (GPRS)
- (5) A/d converter (AD574 chip)
- (6) Data processing (ENBF156 chip)

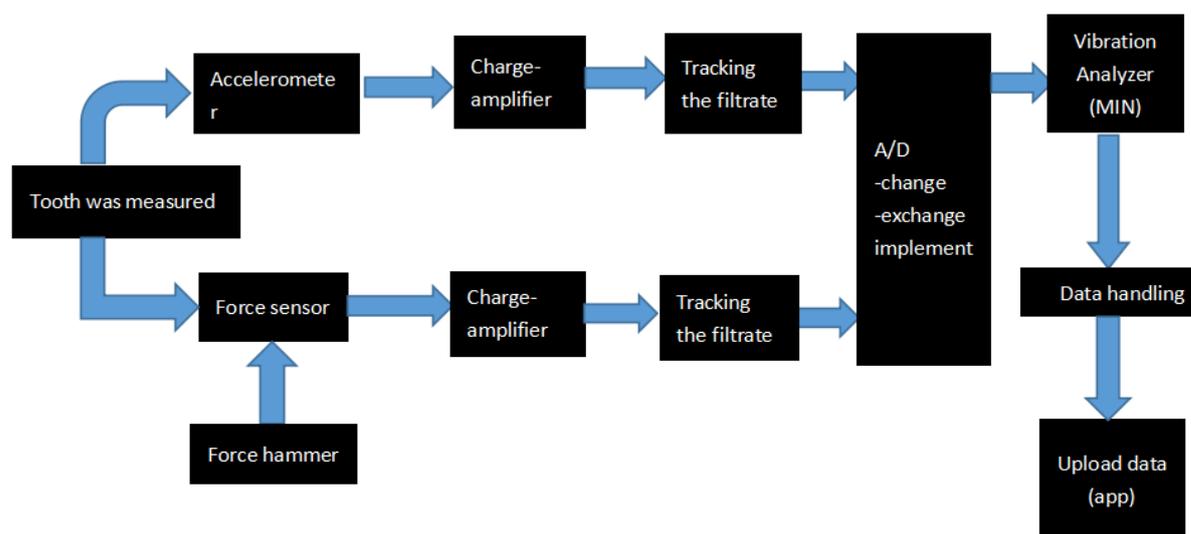


Figure 1. Overall structure of AN, EN8F156 system combined with app

This figure aims to study the simulation implementation of the intelligent electric an toothbrush control system based on ENBF156 chip.

## 2. Toothbrush Control System Design

In this system, the main hardware chip adopts semiconductor ENBF156 chip, which is the core of the whole system. As an embedded software, it connects the external network with the internal controller of the toothbrush to

realize the control of the system. In terms of the detection system, min scans the teeth. STM is responsible for transmitting the scanned information to the MIS vibration analyzer. Through analysis, ENBF156 chip processes the received data, and then uploads the execution results to the mobile phone app through Bluetooth and Ethernet. Finally, the user reads the data through the app. This process includes hardware device driver layer, operating system layer, application program interface layer and application software layer.

### 3. Min Structure Design

The Min hardware equipment adopts the infrared scanning technology, and the single-chip microcomputer passes the built-in timer outputs A and B signals, which are added to both ends of the acoustic vibration motor through the single channel DC driver chip STM32, so as to drive the motor to achieve the corresponding vibration frequency and force.

### 4. Power Supply System of An

The an guarantees to supply power for it, then reads the last saved toothbrush working mode, and then enters the normal working state, while waiting for the key signal or charging signal. When the key is pressed for more than 1s, the system switches the working mode. When the key is pressed for a short time, MCU stores the current working mode, then uploads the brushing data to the upper computer through the Bluetooth module, and then the on pin is set low to power off the whole system. When there is a charging signal, MCU will stop driving the acoustic vibration motor and enter the charging mode. After the charging signal is completed, MCU will immediately power off and shut down.

### 5. A/d Converter

A/d converter is the core of data acquisition system, which is responsible for converting analog signals into binary codes suitable for digital processing. A/d converter can be selected according to conversion accuracy, speed, etc. Due to the high speed requirement of experimental measurement, AD574 chip a/d conversion principle is selected. The common methods of a/d conversion are: counting a/d conversion; Successive approximation transformation; Double integral

a/d conversion; Parallel a/d conversion has a slow string rate, so it is rarely used now. Double integral a/d conversion has high precision, and is mostly used in data acquisition systems and occasions with high precision requirements. Parallel a/d conversion and serial / parallel a/d conversion are fast, and are mostly used in radar and image processing systems requiring fast conversion. Successive approximation a/d conversion not only takes into account the conversion speed, but also has certain accuracy. It is the most widely used one at present.

### 6. Conclusion

This paper designs an intelligent an electric toothbrush based on ENBF156 chip, which has low power consumption and rich functions. The intelligent electric toothbrush is embedded with a clock module and a Bluetooth module, which can transmit the brushing data to the app through the Bluetooth module, so that users can easily master their own teeth.

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