



# Phone Usage Time Monitoring System Personal Computer Based

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ARTICLE INFO	ABSTRACT
<p><b>Article history:</b> Received Sep 26, 2022 Revised Sep 09, 2022 Accepted Oct 30, 2022</p> <p><b>Keywords:</b> DTMF Method, Monitoring System Models, DTM method.</p>	<p>The telephone is a practical, easy, fast, and reliable means of communication. However, when using the telephone, problems often arise in terms of costs. The lack of control over telephone users in using pulses is one of the obstacles, because then telephone pulses do not feel a dramatic increase from the initial calculation. Telephone data recording technology that uses the DTMF (Dual Tone Multiple Frequency) method and PPI 8255 as an interface can be used to overcome this. We can use this technology application to create a tool that can monitor telephone usage time through a Personal Computer. So that by doing so, home telephones or government and private institutions are protected from spikes in credit usage. From this final project obtained a monitoring system for telephone usage through a Personal Computer both for incoming and outgoing calls in terms of data recording and usage time. This system can also limit or block unwanted outgoing telephone numbers at any time without having to stand by the phone.</p>

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## 1. INTRODUCTION

The telephone is a practical, easy, fast, and reliable means of communication. Long-distance conversations are not a problem with telephones, so telephones are needed everywhere, both at home and in government or private agencies, and it is as if the world of communication is dead if there is no telephone. (Hendrastomo, 2008)

However, on the other hand, when using the telephone, problems often arise with the cost of using it. The lack of control over telephone users in using pulses is one of the obstacles, because then telephone pulses do not feel a dramatic increase from the initial calculation. This is often caused by telephone usage to long distance numbers or numbers that the telephone user does not want. Very few telephone sets circulating in the market are equipped with facilities that can notify or display incoming or outgoing numbers and the duration of the conversation, so that telephone users cannot monitor the time of telephone usage.

Telephone data recording technology that uses the DTM (Dual Tone Multiple Frequency) method as an interface can be used to overcome this. This technology is commonly used in telephone kiosks to record telephone credits and calculate usage fees. We can use this technology application to create a tool that can monitor telephone usage time through a Personal Computer. With this tool, we

can find out data and phone usage time and can limit or block unwanted outgoing phone numbers at any time without having to stand by the phone. So that by doing so, home telephones or government and private agencies will avoid spikes in credit usage. In this case, it can be concluded that the problem that often occurs, especially in the use of this telephone, is How to Realize Personal Computer-Based Telephone Usage Time Monitoring, often not supporting the DTMF system at home or government and private agencies.

So over time, to overcome the problem, it is necessary to make a telephone interface system to monitor telephone usage time used at home or government and private agencies and limit outgoing numbers through Personal computers. This system is useful to make it easier for users of telephone services to control so that there is no excessive use of telephones and there is no swelling of pulses. Deepen the knowledge and understanding of the author and the information technology user community about the concept of telecommunications, in this case the telephone system and time monitoring through Personal Computers and interface concepts.

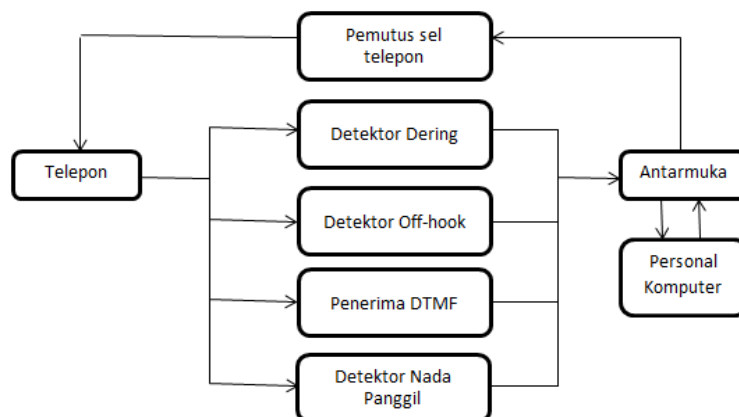
## 2. RESEARCH METHOD

The method used in recording telephone data uses DTMF (Dual Tone Multiple Frequency) as an interface that can be used to overcome this. This technology is commonly used in wartels to record phone credits and calculate usage fees. We can use this technology application to create a tool that can monitor telephone usage time through a Personal Computer. With this tool, we can find out data and phone usage time and can limit or block unwanted outgoing phone numbers at any time without having to stand by the phone. So that by doing so, home telephones or government and private agencies will avoid spikes in credit usage.

### 2.1 System Model Design

This phone usage time monitoring system consists of two parts, namely the hardware part and the software part. The hardware part is a circuit that is connected to the telephone line, so that this tool can monitor and translate signals on the telephone line and display it on a computer monitor through the PPI 8255 interface. Meanwhile the software part is a computer program used to control this system.

When we pick up the telephone receiver to make an outgoing call, the off-hook detector detects that the telephone handset is in the offhook state, then the system is ready to record the intended telephone number through the DTMF tone receiver. If the connection is connected, the system starts calculating the duration of phone usage. When receiving a call (incoming call), the system waits for the telephone receiver to be in an off-hook condition. If the condition of the handset is off-hook, the system will calculate the duration of the incoming call, whereas if the bell stops when the condition of the handset is not off-hook then the call status is a missed call. For more details, hardware design can be seen in Figure 3.1 below:



Picture 1. Block Diagram System Monitoring Phone Usage Time

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## 2.2 Hardware Design

This dtmf receiver circuit uses the mt8870 ic, which is specifically designed for dtmf purposes. This circuit will detect and translate analog signals or tone combinations resulting from pressing buttons on the phone. MT8870 is equipped with a crystal oscillator of 3.579545 MHz which is used as a standard frequency generator to recognize DTMF frequencies, coupled with several other components, namely capacitors and resistors. The component values are adjusted to the component values on the MT8870 data sheet which are in accordance with the DTMF signal characteristics in general. The DTMF receiver circuit can be seen in Figure 3.2 below.

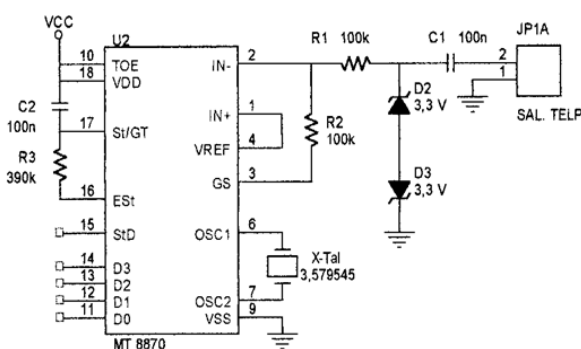


Figure 2. DTMF Receiver Circuit (MT8870)

The MT8870 circuit is connected to the telephone line via a capacitor (C1), this is to stem direct current and only alternating current can enter the MT8870 IC, this capacitor is at least able to

withstand a voltage of more than 100 V. To limit the incoming signal, it is installed 3.3 V zener diode which functions to limit the incoming alternating signal so that it is no more than 3.3 V, considering that the buzzer activating signal is an alternating signal whose amplitude reaches tens of volts and can damage the ICMT8870. (Aliyan et al., 2014) Every time the MT8870 receives a new DTMF tone, the StD (Steering Delay) goes high and the received tone pair is integrated. When there is no DTMF tone, StD will go low. Output latching in the form of a 4 bit output line with a three-state TOE (Tristate Output Enable) input control toggle to logic high. If the TOE is logic low, the output circuit will float so that data cannot be retrieved. Each tone signal that is issued contains two types of frequencies, one from the low frequency group and one from the high frequency group. If the combination of the two frequencies matches, then the frequency is declared detected and locked. The detected frequency is converted into the corresponding 4-bit binary number. DO, DI,

### 2.3 Software Design

Software design is a very important thing in making a telephone usage time monitoring system. The programming used is programming whose results are in the form of a windows-based display, namely visual basic programming. When making an outgoing connection, the program will first initialize the PPI 8255. After that, read the DTMF data and convert it to a decimal number to determine the telephone number. If the telephone number read is a non-local telephone number, the system will cut off the telephone line, whereas if the number read is local, then telephone data recording will continue. After the conversation is finished, the program records the addressee's telephone number, the length of the call and stores the data in the computer. (Indriani & Fajri, 2019)

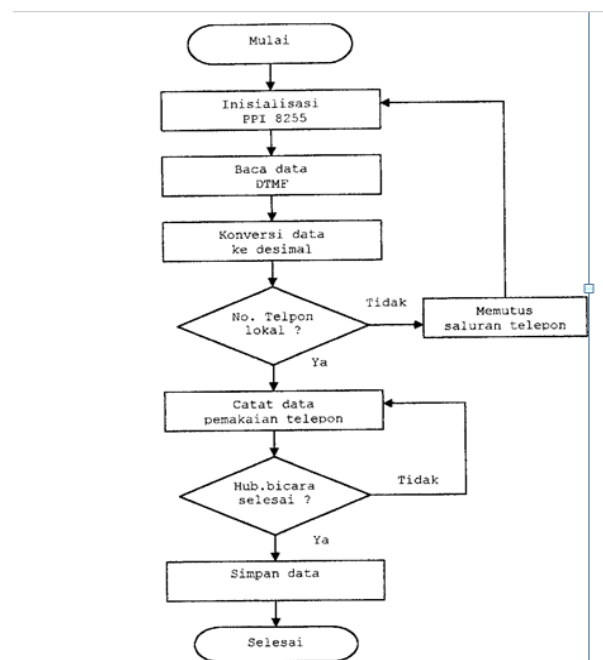
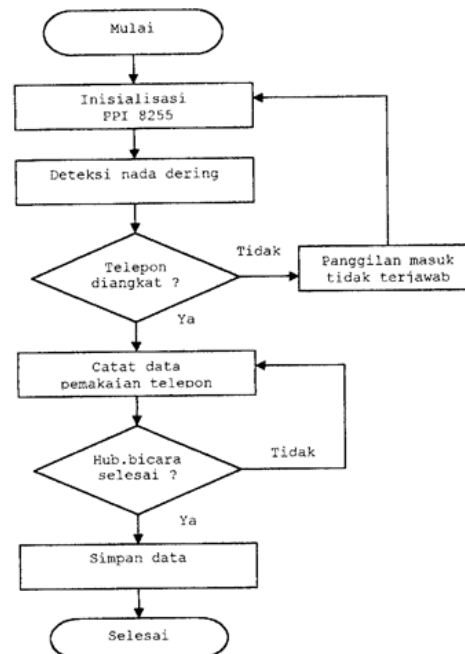


Figure 3. Usage Time Monitoring System Program Flowchart (Outgoing Call)



**Figure 4.**Usage Time Monitoring System Program Flowchart Incoming Call

### 3. RESULTS AND DISCUSSIONS

After the design is made, a test is needed to find out whether the system is running according to predetermined specifications or not. The tests carried out include hardware testing and software testing. Hardware testing is carried out on a series of interfaces with telephone lines, namely receivers

DTMF, off-hook detectors, ringtone detectors, telephone tone detectors and telephone line breaker circuits. While software testing is carried out on the main processing unit whose work system is based on the program listing that has been made.(Rejeki & Tarmuji, 2013)

#### 3.1 Hardware Testing

Measurements are made at the output pins 11-15 of IC MT8870. The binary data output on pins 11-14 and pins 15 is StD, where StD will be active(high) if the MT8870 detects the correct DTMF tone. DTMF signal is formed by a combination of two frequencies, namely low frequency and high frequency. For example, for a DTMF signal the number 1 is formed from the frequency 697 Hz (low frequency) and the frequency 1209 (high frequency). When the number 1 is pressed, the LED will form the digital format 0001, and so on as shown in data table 2.1 (decoding function).

**Table 1.**DTMF Receiver Measurement Results

Defined number	Do (Volt)	D1 (volt)	D2 (volt)	D3 (volt)
1	0	0	0	5
2	0	0	5	0

From the results of measuring the output voltage level of the circuit it can be seen that the high and low conditions are still at the TTL voltage level, so if this output is fed to the PPI there will be no problems.

### 3.4 Off-hook Detector

The off-hook detector functions to detect the condition of the telephone receiver. When the handle is lifted (off-hook) the detector output is in a low state. Meanwhile, when the handle is not lifted (on-hook), the detector output is in a high state. Measurements are made at the output of IC 4N35 leg of the off-hook detector unit.

**Table 2.**Off-hook Detector Measurement Results

Condition	V in (volt)	V out (volt)
Phone handles		
Off hook	6.95	0(love)
On-hooks	27.5	4,8(High)

### 3.5 Ringtone Detector

The ringtone detector functions to detect incoming telephone ringtones. When there is a telephone ring, the detector output is in high state. Meanwhile, when there is no ring, the detector output is in a low state. The measurement is made at the pin output of 4IC 4N35 of the ringtone detection unit.

**Table 3.**Ring Tone Detector Measurement Results

Phone Condition	V in (AC volts)	Vout (DC volts)
There is a ring	25	3,4(High)
No ring	0.4	0(love)

### 3.6 Dial Tone Detector

The dial tone detector will detect the presence of a dial tone signal with a frequency of 425 Hz. Testing of the dial tone detector is carried out by providing an input signal with a frequency of 425 Hz and measuring the output of leg 8 of IC LM567.

**Table 4.**Dial Tone Detection Measurement Results

Call Tone Condition	Output
	Detector Call Tone
Call Tone 425 H2 on	Low
Dial Tone 425 H2 off	high

## 4. CONCLUSION

The telephone usage time monitoring system can be accessed via all types of telephones that support the DTMF system and cannot be accessed via telephones with a rotary system, because the rotary system does not support the DTMF system. This system only records data and telephone usage time and does not perform calculations. phone usage pulses, because it was feared that PT. TELKOM. Telephone usage data can be viewed on a computer monitor and stored in a database so that it can be viewed at any time by the user and can be printed if needed. Users can only make calls to allowed numbers. If the user wants to make a call to a phone number that is not allowed, the usage will be blocked and the call cannot be forwarded.

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