

# Problem of high-tech cheating with “bugs”

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**Abstract** High-Tech development and miniaturization of devices in telecommunications, make serious problems of citizens privacy. The problem of mobile phone use on places where their use is forbidden, such as exam, is also increasing. The device that is mostly used for this purpose is mobile phone with miniature headphone called “bugs”. This combination presents High -Tech ideal solution for cheating on exams. Problems of cheating with wireless communications are increasing due to low cost, easy handling, impossibility of seeing with eyes and great popularity. This problem started in high schools and colleges with high possibility of expansion into elementary schools. The goal of our project was to make small portable devices that can detect mobile phone activity for detecting a rate of cheating on exams at Faculties in Serbia. Results of these activities are presented in this paper.

*Keywords* - mobile phone, bugs, detection.

## I. INTRODUCTION

In the world of modern technology there has always been an aspiration to send information wirelessly to long distances. Nobody ever thought that mobile telecommunications and mobile phones would have so much popularity. Today the mobile phone is one the most used devices for communication. However, this kind of communication appears with increasing frequency in the areas where it is not allowed, especially in the areas of education where information is received by cheating by using mobile phones on the exams and other kinds of testing knowledge. Therefore it was necessary to find a way to prevent spreading of such kind of degradation of our school system and education in general.

## II PROBLEM OF CHEATING

The problem of cheating by using wireless communications with micro earphones has rapidly increased, as a consequence of price decrease of those systems, their easy use, impossibility to detect them with the naked eye and their great expansion on the market. The price of renting that equipment is 20-30€ per day, what in fact represents the price of passing an exam.

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Nowadays, the price of the whole system of wireless communication is from 80€ to 300€, so that more and more students can afford to buy that system, and later rent it and share with their friends. That conditioned the real expansion of using those systems in cheating in the school system. First, it started at universities and higher schools, and more often it is used in secondary schools. There is a real danger in spreading of this phenomenon in primary schools as well. Cheating on the written exams (Fig. 1) is the easiest (pass rate 90 %), while some sellers claim that there is also great pass rate on the oral exams (over 80%). Many professors are under the misapprehension that they will prevent smuggling the test out of the room if they forbid students to take the test with them out of the classroom or to leave the room during the exam.

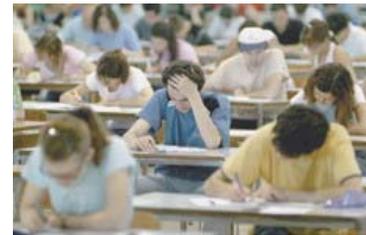


Fig. 1. Students on an exam

There are many ways of smuggling the test out of the exam room:

1. Smuggling the exam questions out of the exam room
2. Dictating questions in the miniature microphone
3. Taking photo of the test by using mobile phone and sending that photo to a colleague outside the building
4. Shooting the exam questions by using a camera of a button size or by using a micro camera in a pen (Fig. 3), and after that the questions are instantaneously on some display (or PC notebook) outside the building.

Using the system for cheating is quite easy (Fig. 2):

1. It is necessary to connect a receiver (in most cases it is a mobile phone) to an adapter with antenna (which is put under the clothes, most often around the neck)
2. There is a wireless communication between the antenna and the invisible micro earphone in the ear. Nothing can be noticed from the outside.
3. The colleague on the other side of the phone line dictates the solutions, and these can be only heard by the colleague with the micro earphone.

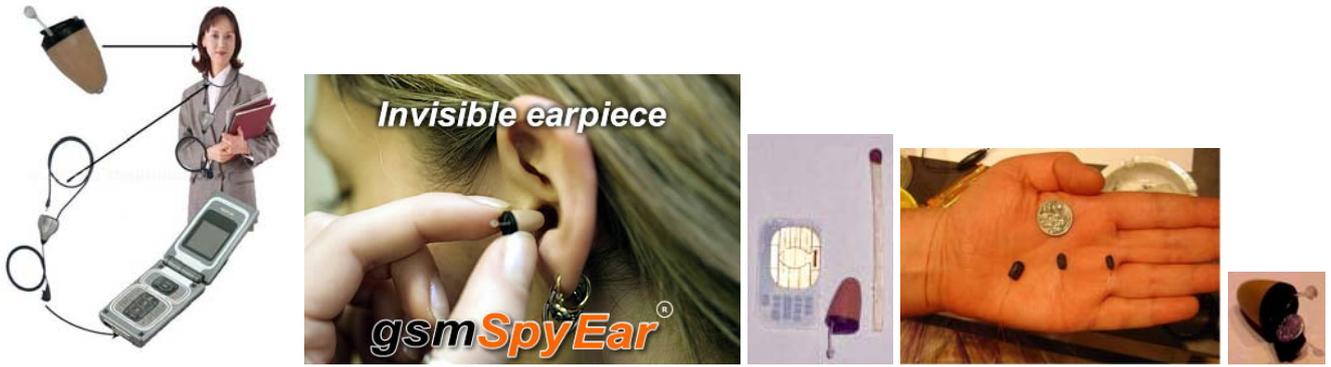


Fig. 2. A system for cheating on exams

### III RESULTS AND DISCUSSION



Fig. 3. Micro camera in a pen

Mobile phones operate on three frequencies levels 900MHz, 1800 MHz and 1900 MHz, but it is still possible to detect such device despite its small dimensions and relatively low radiation.

The device for detection of mobile phone should be of very little mass and small dimensions because of its easy portability [1]. If the device was tied to every object individually it would not be payable to use it for the intended purpose. In other words, there would have to be one device in each classroom and amphitheatre and that is really not payable. Using this device must be simple because it is not only intended for people who work in the field of electronics, but for wide population of people at the faculty and in education in general, and even for some competitions (for example chess matches).

Because of its wide application it was decided to use the visual representation of detection in order to provide information in the simplest way about the location of the mobile phone for the user of the device. The visual representation is given through a number of light diodes (three green, three yellow and three red). The diodes flash when the device detects an active mobile phone, which means that the detector does not have to be put at one place if we want to see if someone in the particular building is using the mobile phone.

The device is primarily intended for using in the classrooms and amphitheatres in order to detect active mobile phones as the sources of a high-frequency magnetic field, so the way of using will be describe in the following part under the assumption that we are in some classroom and that we are looking for an active mobile phone. When we enter the classroom we put the device on the table and we turn on the switch on the left side. When we see that the red diode is turned on that is the sign that the device is working. On the basis of length of the classroom we adjust the device sensitivity [2]. The device sensitivity is adjusted on the band switch (Fig. 4). On the scale under the band switch there are marks: MIN-2-3-4-5-MAX. Distances that correspond to these marks are respectively 0.5m-1m-5m-10m-15m-30m. These values are not strict because the radiation of a mobile phone depends on its distance from the base station and type of mobile. More it is distant from the base station, more it radiates.

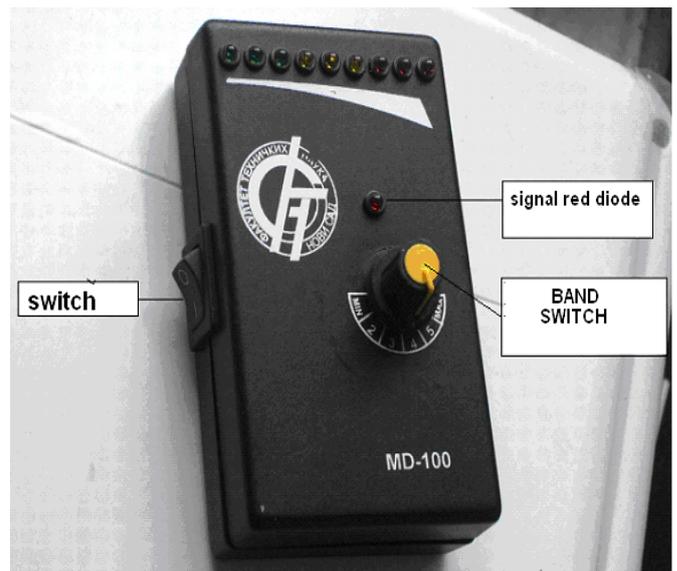


Fig. 4. Mobile detector MD-100

The question arises: “How do we come exactly to the location of the mobile phone?” Since all diodes are turned on that is the sign that one of the mobile phones in the classroom is active. Then we lower the detector sensitivity by adjusting the band switch to MIN. After that, we put the device in our hand and walk across the classroom. As we approach an active mobile phone more diodes turn on. When we come to an active mobile phone all diodes will turn on and in such a way we know the location of the searched mobile phone.

In the given description the assumption was that the mobile phone was searched for in the classroom, and of course the device can be used in other places for detection of other sources of high-frequency electromagnetic radiation.

The answer on the question why it was decided to make a detector, and not some jammer or some similar device is following:

- Using jammer is not legal because it is forbidden to block public frequencies,
- Jammers of great power have a bad influence on human organisms because of their great level of radiation,
- Jammers are not reliable for many kinds of wireless communications which are not permitted ( they only block narrow range of frequencies),
- Jammers are made of big dimensions and their transport is not simple in distinction from the detector of this kind and
- Jammers are much more expensive.

#### IV. CONCLUSIONS AND FUTURE WORK

The problem of cheating by using mobile phone in the combination with micro earphones decreases the quality of the school system and degrades the knowledge of the students and potentially secondary and primary school pupils. In order to prevent it, it is necessary to use devices for the detection of the various communication and the location from where it is made. In the following period we will follow the technical development of forbidden communication and improve the device which will be able to detect relevantly existing equipment for forbidden communication [3, 4].

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