

# A SURVEY PAPER ON HALF DUPLEX COMMUNICATION DEVICE

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## ABSTRACT

Walkie talkie is a kind of communication system which provides services one-to-one and one-to-many. A walkie-talkie is a half-duplex communication device; several number of walkie talkies use a single radio channel, at a time only one radio can transmit signal on a channel, even though any number can listen. Normally the transceiver is in receive mode; when the user wants to talk he presses a "push-to-talk" (PTT) button that turns off the receiver and turns on the transmitter. They communicate with each other using wireless frequency band. Typical walkie-talkies correspond to a cellular phone, possibly slightly larger but still a single unit, with an antenna mounted on the top of the unit. Where a phone's earpiece is only loud enough to be heard by the user, a walkie-talkie's built-in speaker can be heard by the user and those in the user's immediate neighboring. Walkie-talkie transceivers may be used to communicate between each other, or to vehicle-mounted or base stations. In our system we increases the communication distance between two devices.

**Keyword:** - Arduino UNO, Potentiometers, Touch Switch, Speaker, Sound Sensor, Mike Module.

## 1. INTRODUCTION

This is basically a wireless communication device, it refers the concept of a half-duplex communication that means you can either transmit or receives signal at a time. In our model we will be designing a transmitter section, a receiver section and a switching section. The switching section will let the user decide whether he or she wants to listen or talk. We will be using a switch here and it acts as a push to talk button. This means it will normally behave like a receiver, one will need to push the switch at the time of transmission. It works on frequency modulation (FM) range (88 MHz to 108 MHz). The reason why we have chosen FM and not AM (Amplitude Modulation) is because of some advantages FM has over AM. To receive the FM signal we have used a FM receiver, which is normally known as the FM radio. As the FM range is very busy, there may be interference of strong signals like Radio Mirchi (98.3 MHz) or Big FM (92.7 MHz) or other signals produced by government services, which also operate on the FM range. Thus this device works only for a short range of 10 to 20 meters. As the distance between the transmitter and the receiver increases, the signal strength weakens and other stronger signals are locked in by the receiver. The main reason behind choosing this small range for the transmitter is that for transmitting on FM for more than 20 meters we will have to take permission from Telecom Regulatory Authority of India (TRAI). In our module we design walkie-talkie with Arduino Uno for emergencies and safety purpose. General walkie-talkie covered near about 200meter distance. In our module we increased the distance up to 500meter.

### 1.1 Objective and Aim of Work

The walkie-talkie can be used in any activities such as playing, business purposes, security purpose, and educational purpose. It can be used as an Interactive Voice Messaging for Heterogeneous Groups in Delay-Tolerant Networks.

For the Implementation of push to talk services in ad hoc VoIP network used for such as battle field and earthquake, disaster relief situations.

## 2. LITERATURE SURVEY

Canadian inventor Donald Hings was the first to create a portable radio signaling system for his employer CM & S in 1937. He called the system a "packet", although it later became known as a "walkie-talkie". In 2001, Hings was formally decorated for the device's significance to the war effort. Hings' model C-58 "Handy-Talkie" was in military service by 1942, the result of a secret R&D effort that began in 1940. Alfred J. Gross, a radio engineer and one of the developers of the Joan-Eleanor system, also worked on the early technology behind the walkie-talkie between 1938 and 1941, and is sometimes credited with inventing it.



The first device to be widely nicknamed a "walkie-talkie" was developed by the US military during World War II, the backpacked Motorola SCR-300. It was created by an engineering team in 1940 at the Galvin Manufacturing Company (forerunner of Motorola). The team consisted of Dan Noble, who conceived of the design using frequency modulation; Henryk Magnuski, who was the principal RF engineer; Marion Bond; Lloyd Morris; and Bill Voge. The first handheld walkie-talkie was the AM SCR-536 transceiver from 1941, also made by Motorola, named the Handie-Talkie (HT). The terms are often confused today, but the original walkie-talkie referred to the back mounted model, while the handie-talkie was the device which could be held entirely in the hand. Both devices used vacuum tubes and were powered by high voltage dry cell batteries.

### 2.2 Talkies - Handie and Walkie

[Noble](#) joined the company in early September 1940. He began by working on the possibility of adapting many of the AM systems common in that time to FM. He had no responsibility in the development of the "Handie-Talkie" radio but went to Fort Monmouth, New Jersey, with Don Mitchell to make the presentation of the unit to the Signal Corps. Among the Signal Corps officers present at that time were two, Col. Colton, and Major J.D. O'Connell, who would play important roles in the development of a longer range portable unit than the "Handie-Talkie" radio. Sometime after the United States had gone to war, on a visit to Washington, Noble was told by Col. O'Connell that the Signal Corps had let a contract for the development of a new AM portable transmitter-receiver. Noble told him bluntly that he felt this was a grave mistake, and that the area of development should be for an FM portable unit. Noble felt strongly such a unit could be developed and that Motorola could do it. As a result of this conversation, and Noble's confidence in the company's ability to meet the challenge, Col. O'Connell issued a Signal Corps contract for the development of an FM portable transmitter-receiver to Motorola.

A series of meetings were held with Signal Corps Engineers at Fort Monmouth, and engineering meetings at Motorola were attended by Noble's team which included Henry Magnuski, Marion Bond, Lloyd Morris, and Bill Vogel. Working furiously against time, this brilliant team developed a design which included a single tuning control to tune both the transmitter and the receiver simultaneously and an automatic frequency control to insure clear communication without the need for critical precision tuning on the part of the operator. They also overcame the

primary problems of establishing an adequate power supply, a minimum number of crystals, and the fungiciding of the unit to allow it to withstand tropical temperatures and humidity. The final critical acceptance test took place at Fort Knox, Kentucky, where Col. O'Connell had set up a conference for the testing of a variety of portable and mobile communications equipment. Members of the Infantry Board, always highly critical of the application of communications equipment to battlefield conditions, had been invited as observers. Bob Galvin accompanied Dan Noble and Bill Vogel to Fort Knox for these crucial tests. Since they only had two working models, each night was spent in the hotel checking them over carefully to make sure they were ready for additional tests the following day. The performance of the SCR-300, Walkie-Talkie, during those tests, its capacity to communicate through interfering ignition noise, and the rugged quality of the design, met with unusually enthusiastic response from the hard-headed Infantry and Signal Corps officers.

Motorola was to produce nearly 50,000 of these famed SCR-300 Walkie-Talkie units during the course of the war, the first units transported by air for use in the invasion of Italy by the Allied Forces. A sizeable quantity went to the Pacific. Perhaps their greatest contribution was in the European invasion, where their role in re-establishing order at the conclusion of the Battle of the Bulge gained Motorola tremendous recognition and a general feeling that perhaps the Walkie-Talkie was the single most useful piece of communications equipment employed in the invasion.

Noble was awarded a Certificate of Merit from the Army for his part in the development of the Walkie-Talkie. Noble, accepting the award, stressed the major contributions of Magnuski, Vogel, Morris and Bond. He went on to say that the development of the Walkie-Talkie was an academic exercise compared to the contribution of the men on the battlefields, the men fighting the war.

### 2.3 Prior Inventions

One of the biggest steps in this journey was made by [Reginald Fessenden](#) who began working with radio in 1897, and also taught Marconi. He invented the receiver in 1900, which allowed machines to better receive incoming radio waves and also expanded the distance within which these machines could communicate. He also designed the first wireless telephone but at first could only send Morse code. Later he improved his designs which soon allowed voices to be transmitted. He sent the first voice transmission on December 24, 1906 on a device known as a "[radio telephone](#)." He also sent the first two way telegraph across the Atlantic from Scotland.

In 1933 an American inventor named Frank Gunther invented a two way dispatch radio for use in police cars in [Bayonne, New Jersey](#). Unlike what would soon become the walkie-talkie these devices required an operator to send messages out to other receivers. While these receivers could talk to the operator they could not talk to each other. Also these devices were mounted in cars, and could not yet be carried around easily.

### 2.4. The Walkie-Talkie [Al Gross](#)

Therefore the next step was to make wireless communication like this portable and usable without an operator. However the invention of the portable two-way is generally credited with the American inventor Al Gross. (There are some claims that a Canadian named [Donald Hings](#) may have also invented it, but it is more probable that he just developed a different kind a few years later. There is little conclusive evidence showing him as the inventor of the walkie-talkie. Alfred Gross was born on February 22, 1918 in Toronto, Canada. He and his family moved to Cleveland, Ohio not long after his birth. When he was nine, he and his family took a trip on Lake Erie. He was amazed by the ship's radios and asked the captain to explain how they worked. What started as curiosity seemed to develop into a lifelong pursuit. By the time he was 16, he had reportedly built a radio station, called W8PAL, in his basement using materials from the local junkyard.

## 3. CONCLUSION

Hence we can conclude that Arduino Uno can be programmed such a way that it can be used to transmit and receive the radio frequencies. By interfacing RF Transreceiver speakers and microphones with Arduino Uno, sound (voice) signal can be transmitted over a selected frequency range to the other module having a Transreceiver interfaced with another Arduino board. So this particular system can be used by the security agencies, industries. To communicate with the respected persons.

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