Construction of a Smart IC Tester Using an Arduino Board

Manuel Vera

Abstract

IC testers are devices that allow to identify and verify the functionality of integrated circuits. While ICs are widely used, their testers are typically very expensive and not very accessible for everyone. Nevertheless, it is possible to build one using an Arduino Mega programmable board for a fraction of the cost of a traditional one. This project consisted in replicating said IC tester. After getting all the necessary materials, the smart IC tester was constructed and consequently tested with an actual IC. Both the automatic and manual search modes worked as expected, demonstrating that the smart IC tester is a viable alternative to traditional retail devices.

Introduction

- Integrated Circuits (IC), also called microchips, are small electronic circuits placed inside a piece of semiconductor material, usually silicon [1].
- IC testers are devices that send specific signals to these microchips in order to verify if they work in the way they were designed to [2].
- Even though ICs are widely used in electronics, IC testers are traditionally very expensive devices that not everyone can afford.
- However, using an Arduino Mega programmable board, it is possible to build a smart IC tester that is cheaper and potentially more capable than retail models [3].

Methods and Results

The project consisted in recreating the smart IC tester model detailed in [3].

The materials needed for it were the Arduino Mega board, a 2.4” LCD touchscreen, an SD card, the PCB whose design was found in [3], and a 20-pin socket [Fig. 1].

After assembling the device, the Arduino sketch from [3] was loaded into the board, and the IC database file was loaded into the SD Card.

The tester has two modes: auto search mode and manual input mode.

In order to verify the IC tester that was constructed, two tests were performed: an auto search with the IC 7447 [Fig. 3], and a manual search of one of the ICs in the database, IC 40161 [Fig. 4].

The IC tester worked as expected, indicating that the design from [3] is an appropriate substitute for a typical retail IC tester.

Fig. 1. Components needed to build the smart IC tester. From left to right: LCD touchscreen, PCB board with the socket already soldered, and the Arduino Mega board.

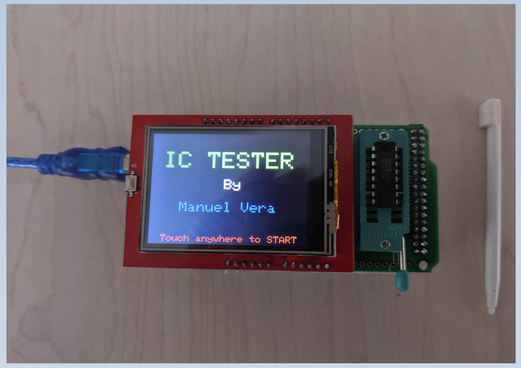

Fig. 2. The smart IC tester already assembled and turned on in the main menu screen.

Fig. 3. The smart IC tester after performing a successful auto search. Note that the IC that is connected in the socket has the same number displayed in the screen.

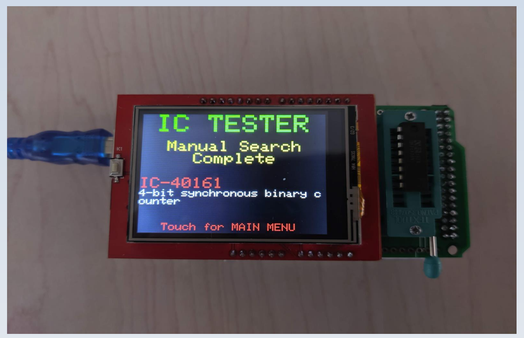

Fig. 4. The smart IC tester after completing a successful manual search. This type of search can be completed without connecting the IC into the socket.

Discussion

- Although this version is somewhat limited compared to a top-of-the-line retail IC tester, it is a great alternative for those who cannot afford a traditional device.
- Having said that, since this IC tester works almost purely through computer programming, it is possible to improve it exponentially just with coding: it could have a better user interface, more types of ICs can be supported, and the database can be further expanded.
- This smart IC tester demonstrates the power of technology and computer programming, allowing to replicate with very few materials a device that is traditionally very expensive and not accessible to everyone.

References

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[3] A. Baweja. “Smart IC Tester.” Instructables. https://www.instructables.com/id/Smart-IC-Tester/ (accessed April 16, 2020).

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