# Alice - A Digital Home Optimization System

## The School of St Jude

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## Introduction

The research questions "how can we improve the level of science and technology in our community?" and "how can we use science and technology to solve various problems and challenges facing our community?" led us to designing of a digital home optimization system. The system is mainly controlled by a microcomputer known as raspberry pi and a micro controller known as arduino.

The project was then successful tested on 21st march 2019 and worked really fine. The system was then presented on school science fair 2019 and we became the first overall winner

Our project is composed of three modules namely; home automation, personal assistance and security module. Home automation module enables the system to automatically perform tasks basing on the readings from the sensors such as light sensors (LDR) and motion sensors (PIR). The report further shows the design of a personal assistance module controlled by a raspberry pi board. This module picks up voice command from the user through a built in mic webcam, converts the spoken words to text through a speech to text engine (STT) and finally executes the command said and gives a response to the user in a natural sounding voice through a text to speech engine (TTS).

## Method

### The Raspberry Pi:

The Raspberry Pi is a series of small single board computer developed in the United Kingdom by the Raspberry Pi Foundation It is a very cheap computer that runs on Linux but it also provides a set of GPIO (general purpose input/output) pins that allow the user to control electronic components for physical computing.

## Procedure

The digital assistance Module is a module designed to help the human beings perform different tasks and carry out tasks based on voice command. the system is programmed to listen for a wake word "ALICE" then actively listens for a voice command, converts the spoken words to texts via speech to text engine (STT) and evaluates the command spoken through a series of if-else statements and respectively executes the command said and gives a response to the user inform of natural voice via a text to speech engine (TTS).

## Results

The digital assistance module was able to help the user to perform different tasks through a voice command such as telling time, playing music, playing videos, controlling of the doors, surfing the web, and reading of bible verses, telling jokes and also reading out news. All those tasks were controlled through a voice command from the user. Moreover the system was found to accurately listen for a voice command on a quite environment than a noisy environment.

## Conclusions

Digital assistance module was experimentally found to assist disabled people especially people having problems on hands and legs to perform various tasks in the house. The system can also be used in various ways such as home automation by controlling lights and doors using your own voice. The whole system was coded using a powerful language python 3.The digital assistance module has an enormous scope in the future , the advance of this technology will base on making it fit in so that we don't really even notice it, it will be a part of our everyday life.



PICTURES:
Left: the picture of the whole digital home optimization system
Right: the picture of an enclosing case used to mount all the system components



SCREENSHOTS WHILE WE WERE WORKING ON THE DIGITAL ASSISTANCE MODULE:
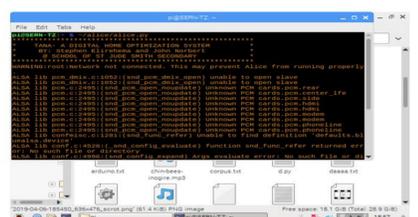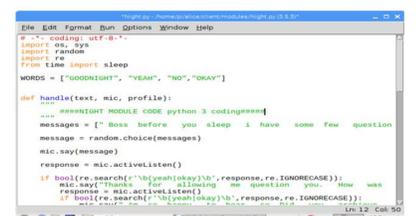


Top: screenshot while we were programming the digital assistance module
Bottom: screenshot while the digital assistance module was running on raspberry pi



RADAR SYSTEM

Picture: model of the house mounted with radar system

## References

https://pythonprogramming.net/introduction-raspberry-pi-tutorials/
https://www.raspberrypi.org/documentation/usage/python
https://www.maxbotix.com/articles/how-ultrasonic-sensors-work.htm

Exploring Raspberry Pi
Interfacing to the real world with embedded Linux by Derek Molloy (2016)
Coding Raspberry pi & python. Learn coding easily by Kevin Spencer (2018)

## Acknowledgments