School of Computer Science
University of Lincoln

CMP2805M User Experience Design

Report

The Design Process of a Student Companion Robot

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Submitted as part fulfilment of the requirement for

BSc/MComp Computer Science

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Contents

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Introduction & Concept

The following is a study of the design of a potential student companion robot "AcademyPal 9000". The robot personal assistant will aid students with life at university and help them achieve their academic goals whilst enhancing their lifestyle.

Core Features

AcademyBot will act as a quick link to access university resources; state timetable information, answer frequently asked questions, book library rooms and find available university PCs.

The bot will Inspire creativity. It will contain a randomised feature which will pick random colours and words that may help students needing a creative approach to a project.

AcademyBot will partake in trivial social interaction to aid conversation flow.

The bot will contain a notify feature which will make the user aware of university announcements and incoming emails.

AcademyBot will integrate a suggestion algorithm which suggests university club/society events as well as popular seasonal attractions in the area.

AcademyBot will provide a link to friend's bots to chat using voice.

The bot will have a programmable aspect which will allow students to practice programming skills.

AcademyBot will include customisable parts to add personality.

Technologies Required

- Microsoft 365 and Blackboard integration for announcements and email notifications.
- An online basic bot social media platform which allows users to add other bots as "friends".
- University database and system access for accessing timetabling, bookable room, and available pc information.

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- A simple randomise algorithm that chooses from a database filled with entities such as colour, miscellaneous nouns, and verbs.
- A cloud-based frequently asked question database with question-answer pairs, along with a natural language understanding service e.g., Microsoft Azure QnA Maker & "LUIS" (Microsoft Azure 2021). This will also help gain user 'intent' from their 'utterances' (understanding the intention of their phrases).
- A list of common small talk phrases also known as "chit-chat" (Microsoft Azure 2021).
- A source of information for local and university society/club events.
- A Web based interface which allows the user to create scripts for the robot via their PC. This would be separate from the core services as to not allow corruption of the system.
- A plastic robot body.
- Computing Circuitry
- A microphone and speaker.
- An LED screen for added personality.
- A USB port with a power cable.
- WiFi capabilities.
- Cardboard slots for customisable parts.

Requirements

Core Requirements for all students

- A program on boot which will allow the user to give personalised consent for certain features and choose a voice and personality.
- The ability to access university information on resources quickly by asking the robot questions.
- The ability to receive notifications for University Announcements and incoming emails.
- The ability to book rooms in university buildings for meetings.
- The ability to find relevant literature in the Library or online.

Personas & Scenarios

1. David, 19, Computer Literate student
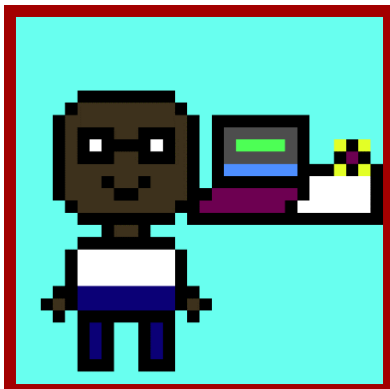
David is studying Computer science at university (a technological course). He has grown up with using various technologies and has been introduced to a wider range whilst studying his

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degree. He is confident at using a computer and smartphone and a high percentage of their available features. In addition to the core requirements, David would like:

- The possibility of extending the usability of the robot by creating their own bot scripts.
- A creative response when they need inspiration for a software project idea.
- The ability to chat to course-mates to help solve university and assignment issues.

2. Rebecca, 22, Social student

Rebecca is studying a Marketing Degree. They wish to partake in activities around campus to network and fulfil their extroverted lifestyle. She wishes to partake in extracurricular activities to develop her soft skills and learn new talents and cultures. In addition to the core requirements, Rebecca would like:

- To be suggested events, local or university based in the surrounding area.
- To chat to friends via the robot's calling system.
- To show off their bot on their bot social media and share it to other social media platforms.
- To be notified of changing Government guidelines regarding the Covid-19 Pandemic.

3. Sally, 26, Creative student
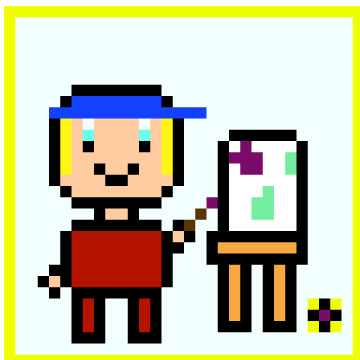

Sally is studying art at university. They have recently moved from Poland. They enjoy creating new forms of artistic media for their portfolio. In addition to the core requirements, Sally would like:

- The ability to speak to the robot in her native language.
- A creative response from the robot when they need inspiration for a project idea.

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- To be notified of opportunities to share her work and discuss other's.
- To be reminded of the University's art gallery events and open times.
- Customizability of the robot, such as customisable extensions and LED colour control.

4. Harry, 35, Digitally inept student
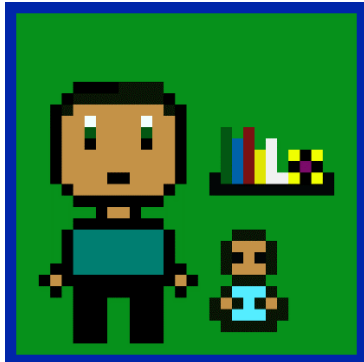
Harry is studying for his history degree and does not have that much experience with technology. Harry has family caring duties and work alongside university and feels as if he does not have time to learn about a new device. He considers himself "technophobic" and needs encouragement to use a new platform. In addition to the core requirements, Harry would like:

- A manual to describe the setup procedure for a robot.
- Instructions written in non-technical terms and in a concise format to help bypass possible learning curve constraints.
- An installation process that is automatic after connecting to a power supply.
- Configuration of the bot via a smartphone.
- Enhanced small talk to lead conversational choices.
- A personal assistant feature which helps with scheduling tasks around his busy lifestyle.

Lo-Fi Prototype

Design
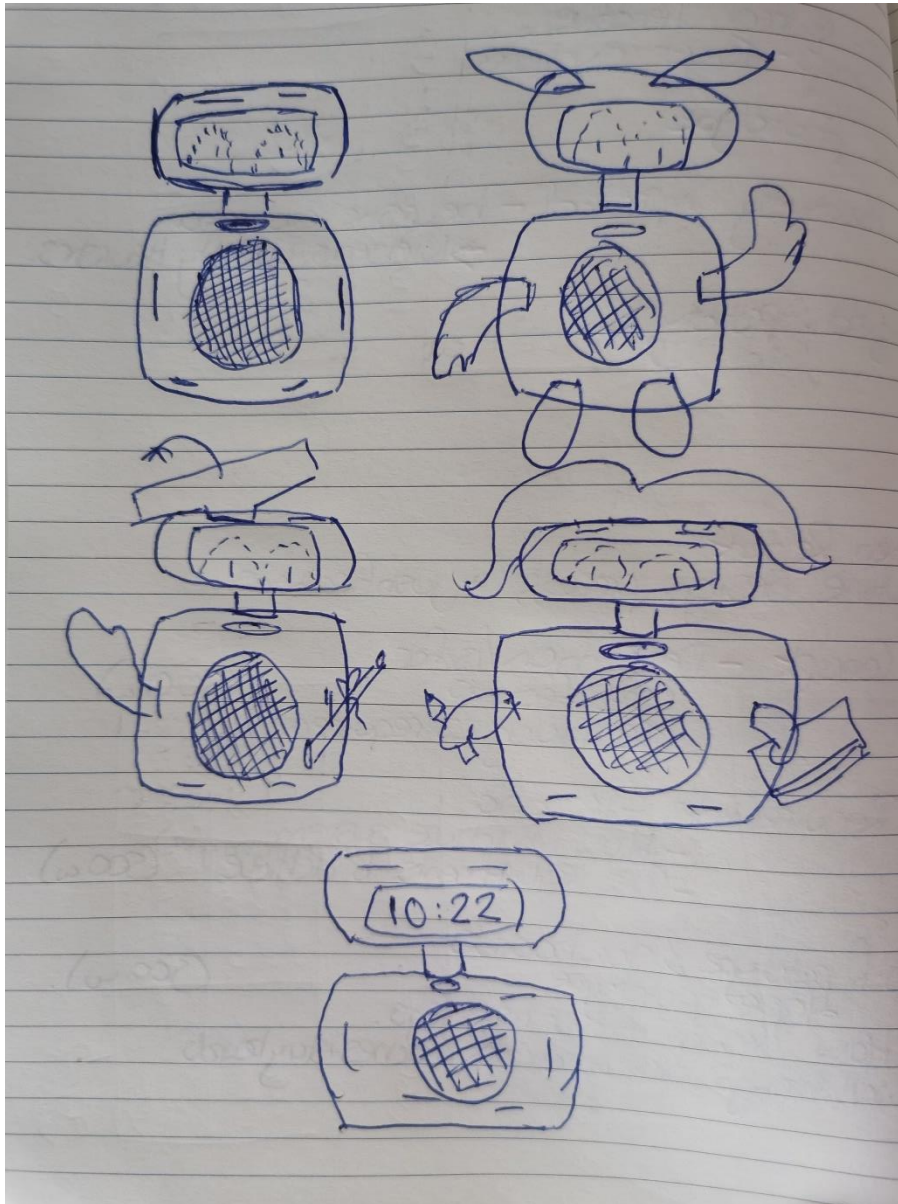
Mock-up designs of the bot, including possible customisations.

Lo-Fi Prototype

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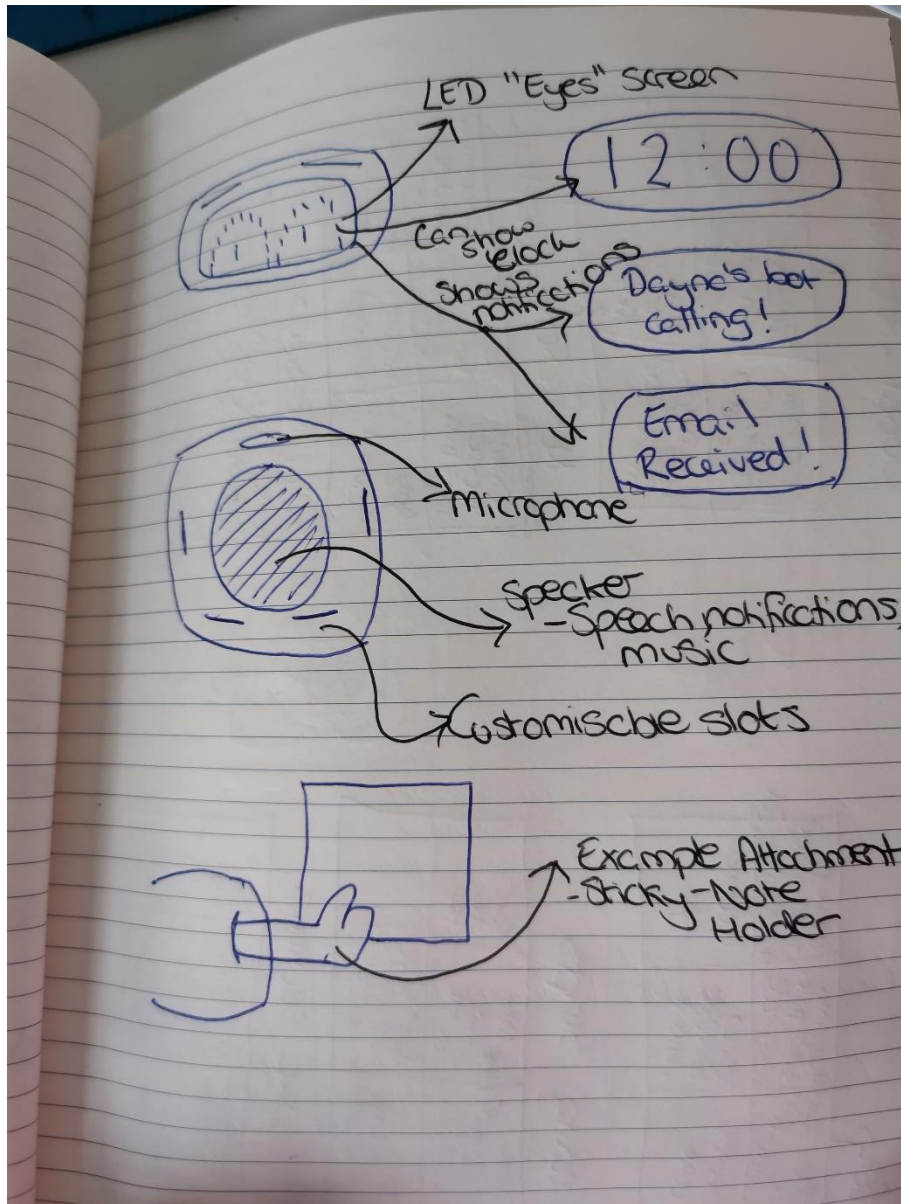
The basic bot parts. This includes the LED display screen "eyes", built in speaker and microphone, and slots for customisable extensions.

Storyboards

Setup

1. The box includes the bot hardware, instruction leaflet, USB cable and plug socket.
2. On plugging in the bot, configuration mode is entered. Users can configure using voice or the app.
3. The setup includes choosing a language, wake word and asking for consent for voice information to be submitted to the bot.
4. Voices can be personalised.
5. The bot can be given a name, and a university email links the bot to a student and their resource allocations.
6. Setup is complete.

Storyboards
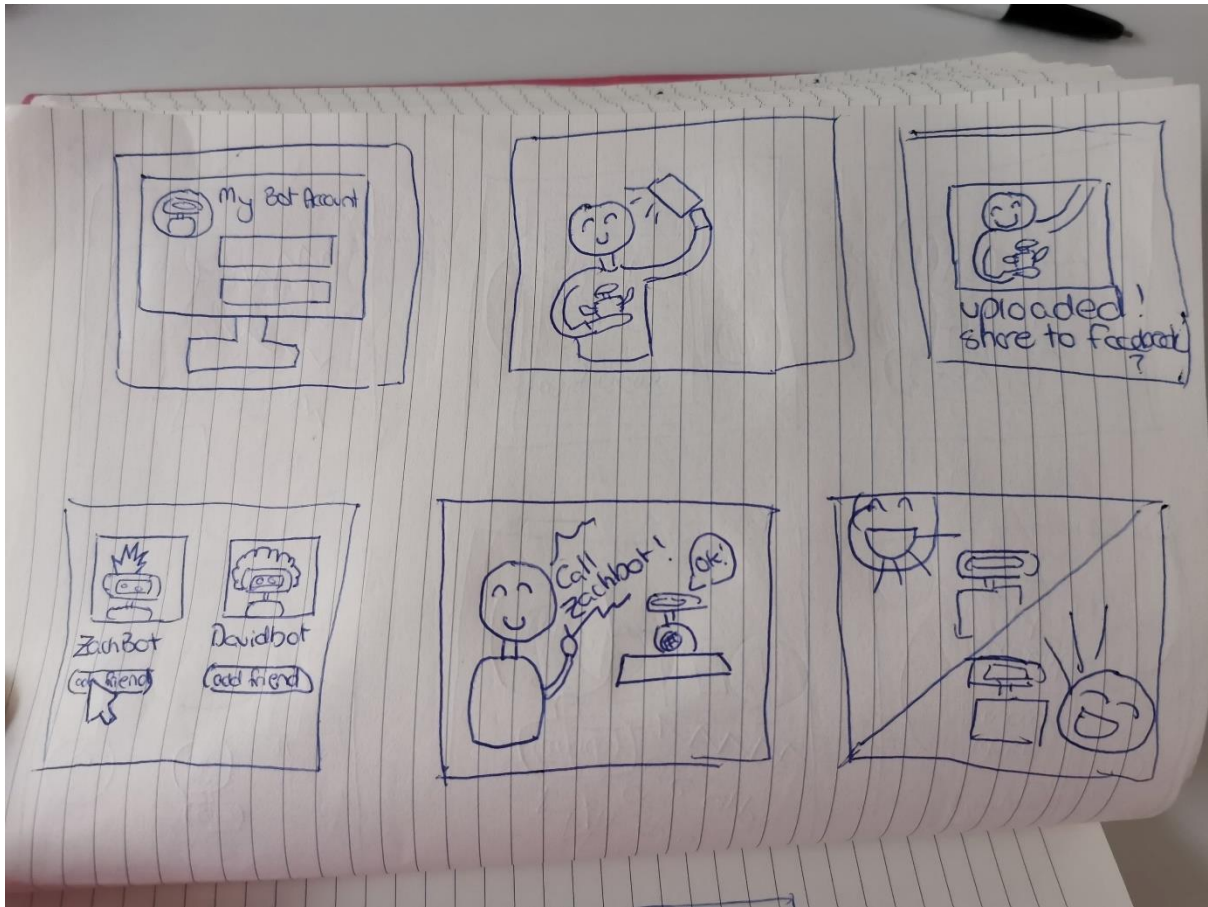
Social

1. Students have the option of creating a bot social media on a platform, linked to their university email.
2. Students can take pictures with the bot and its customisations and upload them to their bot story.
3. Bot media posts can be shared to mainstream social media platforms such as Facebook.
4. Students can add other bots to their bot friends list.
5. Once a bot has added another as its 'friend', calls can be made to connect student to student for easy communication.
6. Students can talk freely from bot to bot using its built-in microphone.

Social

Notifications
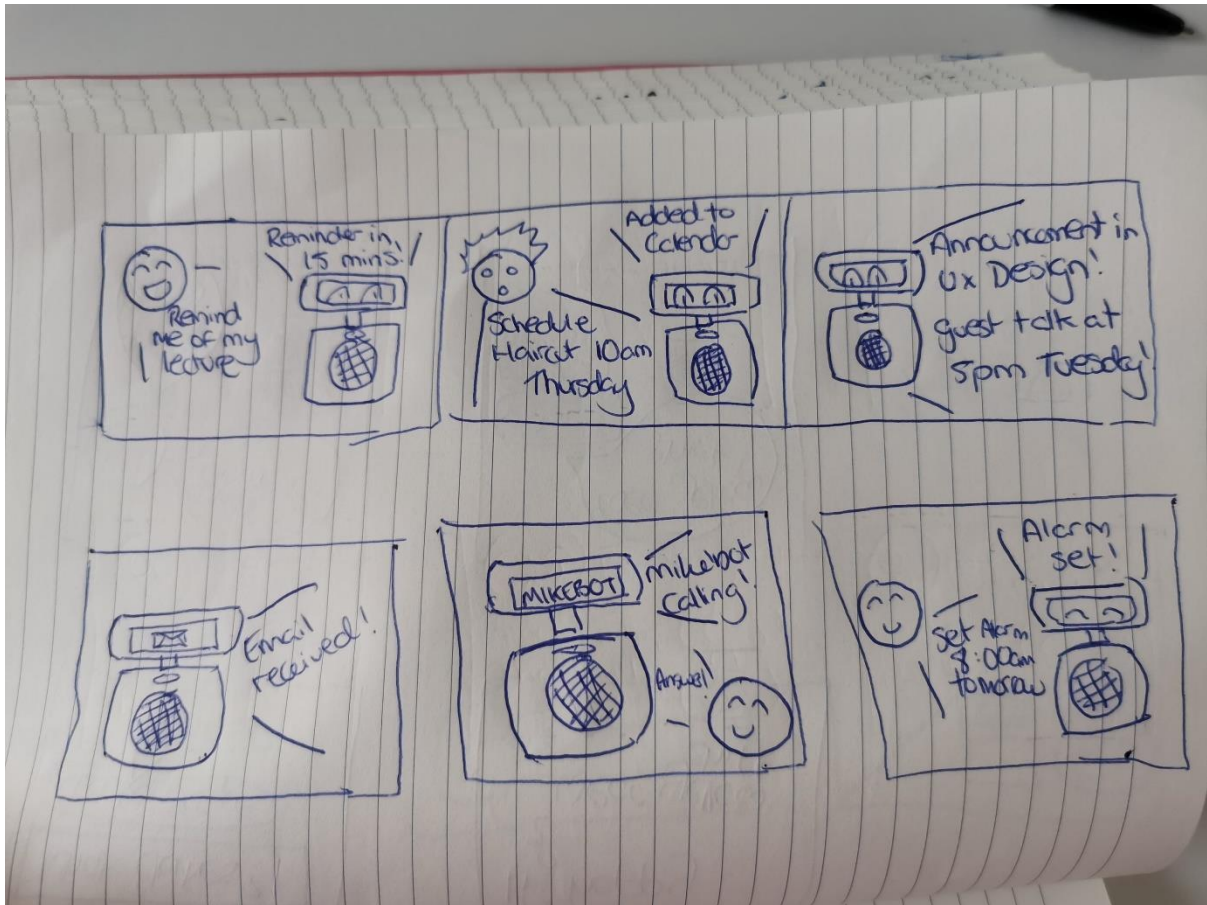
1. Students can set reminders for the bot to alert at the relevant time.
2. The bot can write event requests to the student's calendar, to be alerted at the time.
3. Announcements from blackboard modules are echoed by the bot as they are posted.
4. Students are notified of incoming emails.
5. The bot will ask the student whether to accept or decline incoming bot friend calls.
6. Students can set an alarm for scheduling or waking purposes.

University Resources – Book and query
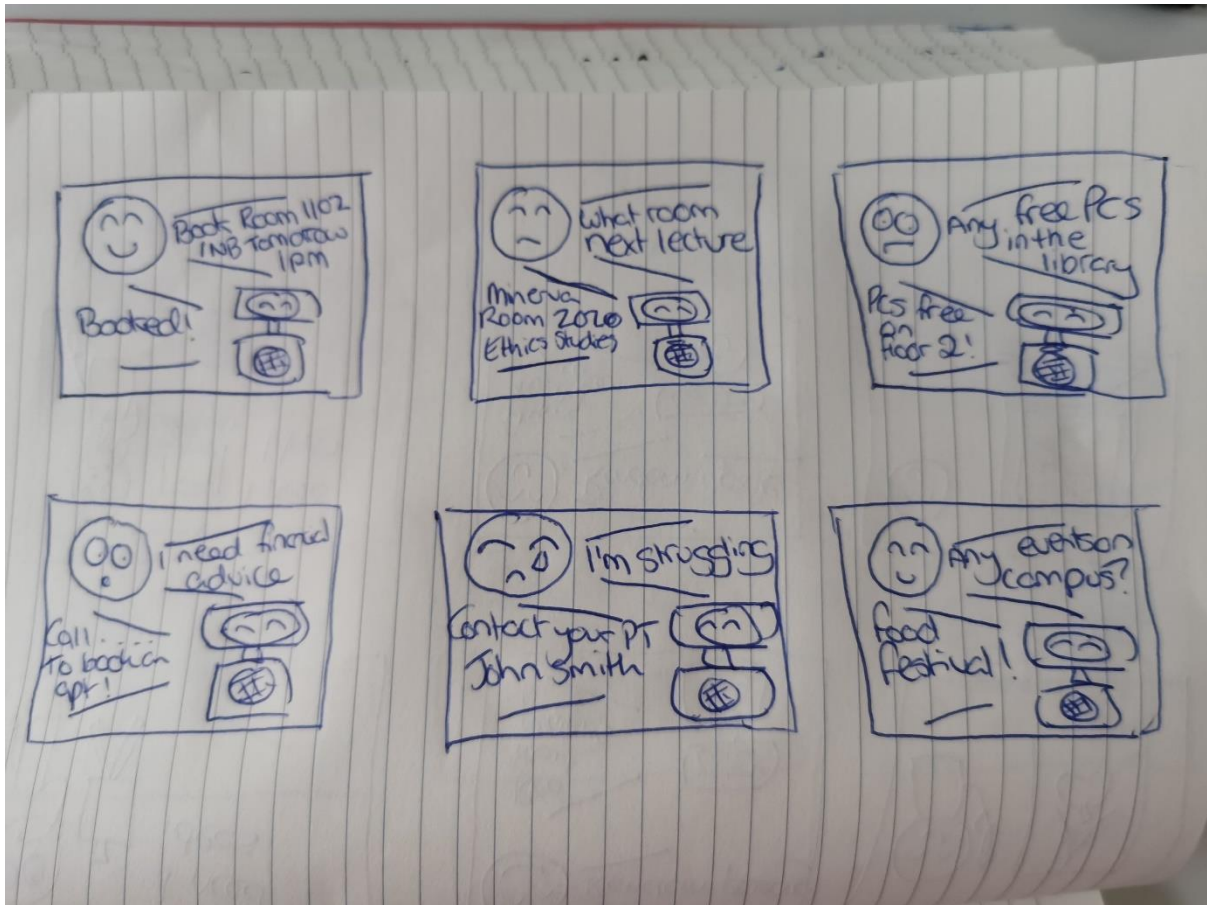
1. Students can book University rooms by asking the bot.
2. Students can query the timetable, such as ask the location of their next lecture.
3. Students can ask for PC availability in specific buildings.
4. Students can ask for specific resources, such as medical or financial supplied by the university. The bot will echo where to reach them, such as their phone number.
5. If the student admits that they are struggling in any way, their personal tutor is alerted by email to contact the student.
6. The bot can be asked if there are any events, university-related or otherwise in the nearby area.

Creative Random Algorithm
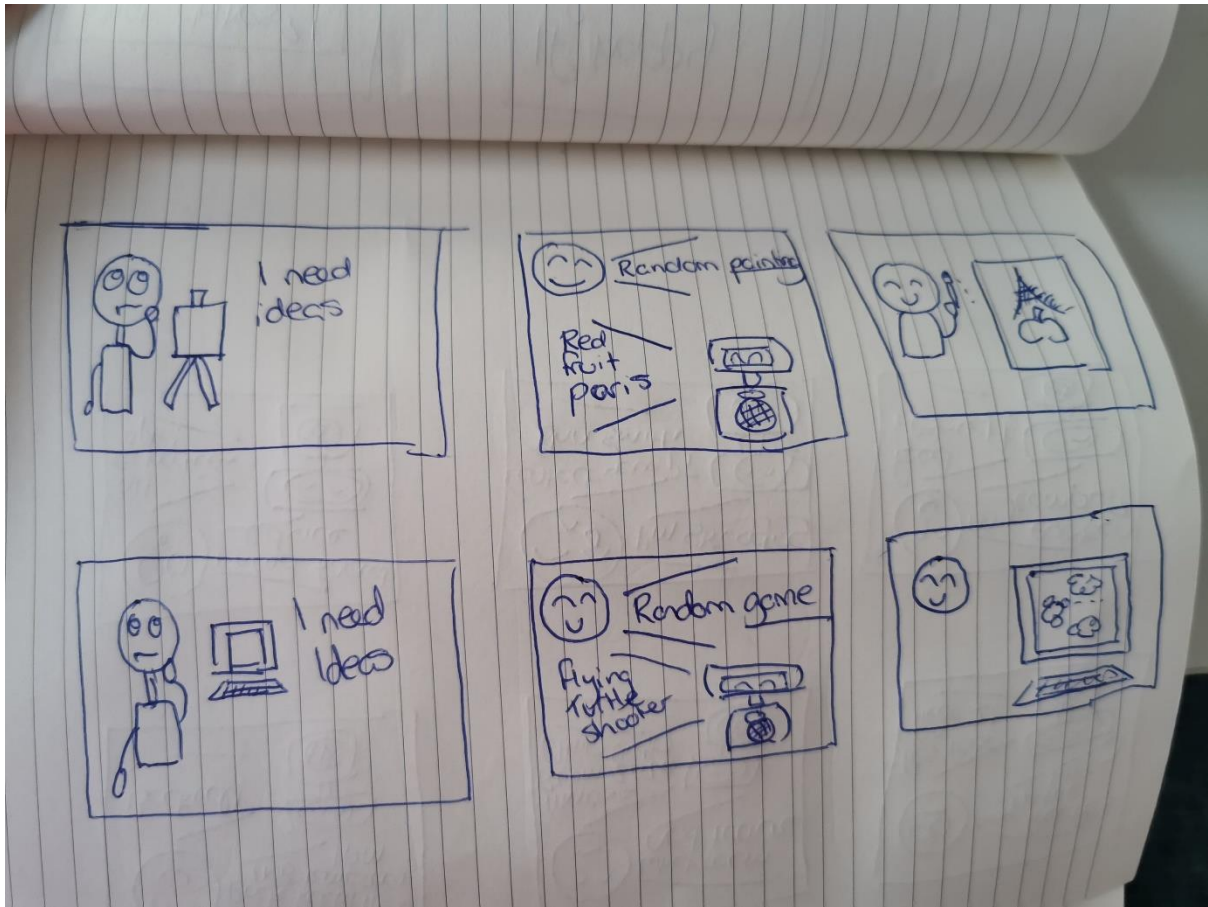
Students can query the bots randomise creativity service. Depending on whether the query is related to art or software, the bot replies with words including colours, nouns, genres, and actions. The reply can act as inspiration for a university project.

Creative Random Algorithm

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Creating Scripts
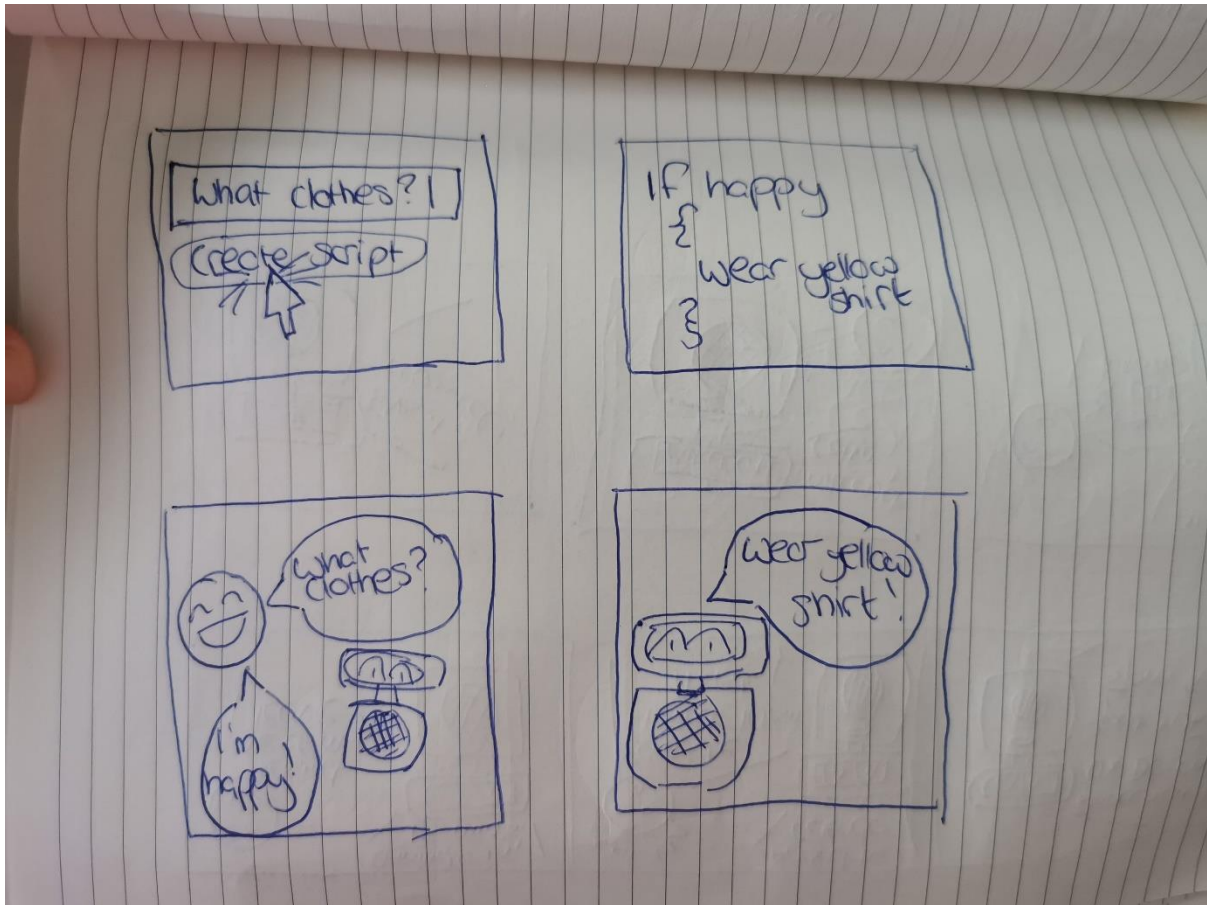
1. The web app, apart from bot social media, includes a script making environment.
2. Logic can be created and saved as scripts, along with an intent name.
3. The bot loads the script over WiFi and can be asked the scripted question.
4. The bot responds with the relevant coded dialogue.

On creation of the storyboards, there are six key goals for AcademyBot; an easy setup, a social system, a notification system, the ability to book and query university resources, a creativity encouraging system and a means to create your own scripts. These satisfy the requirements for all students.

Heuristic Evaluation (Nielsen 1995)

Visibility of system status
The robot sometimes keeps the users informed about what is going on. The LED screen and voice notify the user which mode the robot is in (configuration or ready). The system notifies incoming emails, announcements, or calls. The LED screen could change colours depending on system warnings, such as system errors.

Match between system and the real world
The ability to set a language at config mode increases accessibility. The inclusion of common greetings and phrases allows for better flow of conversation between robot and user. A

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language understanding system learns from and recognises common speech. Researching how students speak could aid the robot's understanding through new learned utterances.

User control and Freedom

Robot configurations can be changed at any time via the companion app. Robot social media posts can be edited and deleted. Control could be improved with the ability to cancel a conversation by the user stating, "never mind". Bot scripts are separate from the main dialogue and can be removed using the web/phone app.

Consistency and standards

The robot follows common personal assistant conversational tropes. The robot uses a set wake word, like others; Siri (Apple) Google Home (Google) and Alexa (Amazon). Upon asking for consent for the user during configuration, there should be a link to terms and conditions which state that any information gathered is for the sole use of system improvement.

Error prevention

Errors have not been considered. The LED screen should notify if an error has occurred, with a voice message stating the error if possible, and links to helpful resources. Mistakes due to a mismatch between the user's mental model and language design can be solved by the robot stating misunderstanding. The robot could also send a phone notification stating an error and asking if diagnosis information can be sent to developers for continuous integration/development.

Recognition rather than recall

The starter leaflet contains common phrases to help users understand how AcademyBot functions. Conversational dialogue has a waterfall type approach such that if a user only gave part of the information for a query, the robot will confirm the rest (e.g., when booking a meeting room, the bot should ask for the building if the user has not spoken it).

Flexibility and efficiency of use

Shortcut quick dialogue options could be included on the phone app, for learning the robot uses or quickly accessing resource information. The adding friends via the website could be a long process. Knowing someone's bot name could be enough to start a call, so long as they attend the university and are registered. An alternative method could be adding friends via the phone app instead.

Aesthetic and minimalist design

The robot is small enough to fit comfortably on a busy desk or shelf. The customisation options might be unnecessary for students focussed on other priorities. The website could be removed with most of the functionalities being added to the mobile app instead. Focus on the phone app as an alternate controller would be a natural mapping. Script writing could be done in a simplified web app.

Final Prototype

Physical Design
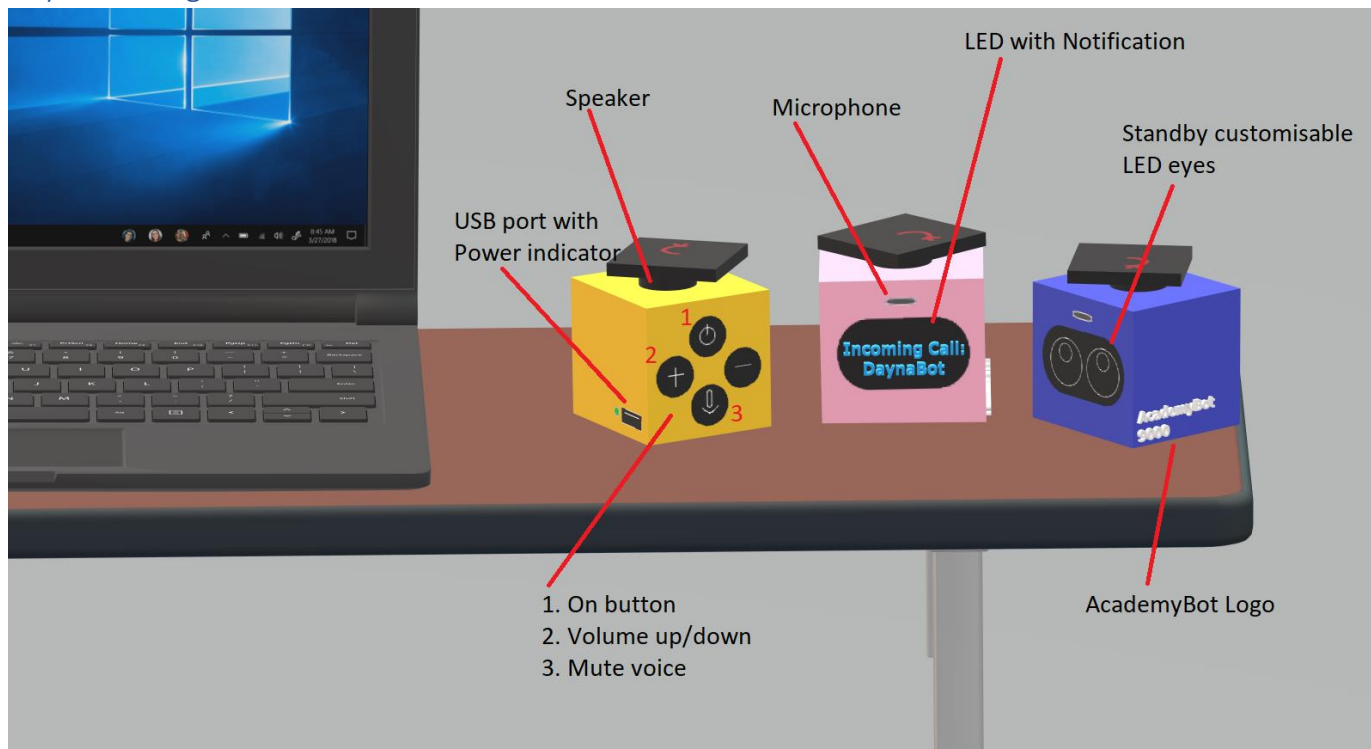
"Inspire me" Random Algorithm prompt

[Created with Paint 3D]

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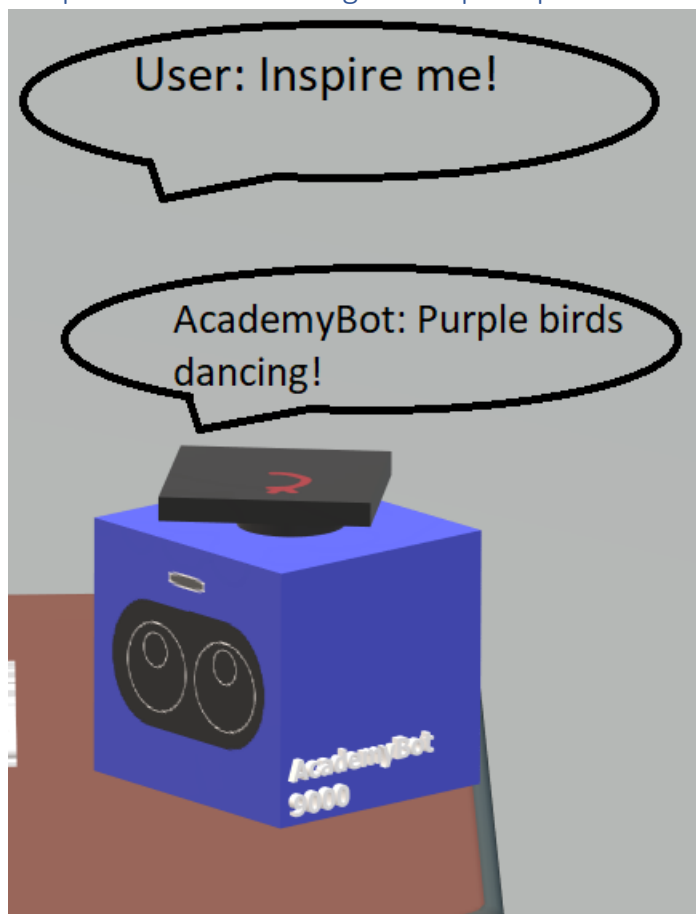
CMP2805M User Experience Design Assessment 1

Companion App

Companion App draft using Fluid UI

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Quick leaflet (English)

AcademyBot 9000

Instruction Leaflet

Setup

1. Plug in your bot, connect phone to wifi
2. Download the AcademyBot900 app
3. Set botname, wake word, language
4. Read the terms and consent if happy
5. Link your university account
6. Enjoy your new friend!

Change settings anytime via the app, or tell bot "config me!"

Example phrases

What lecture do I have next?

Who is my personal tutor??

What time is the library open today?

Schedule Ux Design study for 4pm to 5pm

Change eyes to purple

Any events on campus?

Instruction Leaflet (English) Sample created with canva.com

Quick leaflet (English)

Value

AcademyBot acts a means to access university resources quickly, removing barriers such as navigating websites and pages. Students can benefit from reminders and announcements, making emails more difficult to miss. Their university life will be enhanced, with being able to access event and extracurricular information with ease. All the user requirements have been reached. A usable product design has been produced that supports the way that people communicate (which AcademyBot has learned through language understanding) and the way they interact (through speech at home) in their everyday lives (Sharp, Preece, Rogers 2019). On heuristic evaluation and student surveying it was found that a "bot social media" did not have much value, as people are loyal to their current social platforms having all the same functionality. Instead, the mobile app contains a friend system for calls but is now missing the posting feature, as students can use their preferred platform instead.

Usability

Once the bot is setup via the app, most of the navigation can be made with voice and guided conversations. Buttons were introduced to the bot as a shortcut from using a linked phone or using trivial conversation. The removal of the website and increased reliance on voice also allows increased accessibility for those with disabilities (Findlater, Pradhan, Mehta. 2018). Scripts can now be created in python using a conversation template from within the user's app, where they can be managed also. This means that users with beginner's programming knowledge can use this feature to help learn as the function is more accessible. Errors now flag up on the app as a notification, and the user is asked if they want to send the diagnostic information to the developers.

Desirability

The AcademyBot's final design is simpler, more minimalist, and comes in a small variety of colours. The design takes inspiration from digital toy "pets" that were marketed at the time when students were younger, such as "Cube World" (Radica Games, 2005). It has a customisable screen, language and voice which helps personalise the bot for a specific student. After obtaining feedback from students, it was found that customisable attachments are not desirable to those who have little time for them. They were removed to focus on the bot's conversational functions.

Adoptability

Automation, content quality, and visual attractiveness are important factors in promoting the virtual assistant bot's adoptability (Lee, Yang 2019). The bot's new relatively small design allows it to fit into almost any environment and not take up space. "Familiarity is the understanding and appreciation of how to use most of the features and functions of a [device] based on prior exposure and experience" (Idemudia, Raisinghani, 2014. Pg.75). The bot uses tropes such as general chit-chat, wake words, and mobile app setup which users may be familiar with from the use of other personal assistants. The adding of bot friends via the app to enable calling is based on popular social media systems. An included leaflet allows users with little technological experience to become familiar with AcademyBot's functionality. A new microphone mute button allows the user to have more control over

what the bot can hear, which allows the user to intervene and increases their trust with the technology (Barnes, Chen, Harper-Sciarini 2011).

Conclusion

A university-related student assistant bot has successfully been designed, with the aid of conceptualisation, heuristic evaluation, and some student feedback. The final prototype has had features added and removed from the 'Lo-Fi' version to benefit the user. The next improvement cycle will occur after production, where feedback from active users may encourage the creation of an AcademyBot successor version.

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