

Proposal #1

Web accessibility testing framework powered by AI

Amazon

Adam Dallis

adamanti@amazon.com

At Amazon, we have the highest standards than includes our accessibility standards. We want our systems regardless if they are internal-facing or external to be fully accessible and provide an excellent user experience.

Augmenting manual accessibility testing with automation would allow our teams to address problems as early as possible. We are looking for a framework that would automate accessibility testing on web applications. The framework should provide recommendations based on the Web Content Accessibility Guidelines (WCAG) 2.1 <https://www.w3.org/TR/WCAG21/>. The framework should also be extensible to cover future versions of WCAG and having the ability to create custom rules.

Optional: The framework should also have a feedback loop to allow users to raise problems with existing pages and use AI/ML to autogenerate rules to extend the framework. And be proven from simple components to complex like a rich text editor.

Meraki Secure Remote Worker Service Portal

pnivaggi@cisco.com

The framework to be used for the Meraki Secure Remote Worker Service Portal is to be discussed with the students and can be the first step of the project. As a result, we would like to have the application available as an opensource contribution and published on Cisco Devnet code exchange as an application prototype. Cisco will provide the students with access to Meraki API as well as we will support them on the software architecture and implementation.

Proposal #3

dressCode app for parents and guardian's

Dress code

Toni Scullion

toni.scullion@dresscode.org.uk

Recent SQA figures showed a 21% drop in Computing Science Higher entries in Scotland as well as a 2% drop in Nat 5 entries, which the organisations describes as an “alarming decline” and “by far the largest drop across any subject and continues a worrying trend that has been ongoing for some time”.

We know parents and guardians have an important part to play in influencing pupils subject choice. We would like a dressCode app or mobile web that would use to promote all cool things to do with Computing Science. With the aim to inspire, inform and influence the influencers to help provide a modern, engaging and easy way to inform them that Computing Science is a viable career and hopefully as a result cause a steady spike in the uptake of the subject across the country.

We currently use WordPress website and have experience of adding content etc. Any software can be used to make this but needs to be compatible with both android and apple and must be easy for us to add content quickly.

I have created more details here and a wireframe for students:

https://docs.google.com/presentation/d/1_yX25yvijsdt9hIUoo_6Kr235CHEE7Z4LBwn0JsRXj0/edit?usp=drivesdk

Proposal #4

Dental Education Mobile App

School of Medicine

Dr David Cross

David.Cross@glasgow.ac.uk

Material: [Dental Computing Science Projects.docx](#)

I would like support to develop software to allow individual dental education teams to enhance online access to teaching material. Ideally this would be in the form of an intuitive interface to allow the team leads to develop their own apps which would be portals to online teaching and assessment material.

This would link the students mobile devices more effectively with existing online resources (moodle, Echo360, web pages, eBooks, relevant papers and clinical guidelines) and enhance the teaching experience.

Proposal #5

Suicide Prevention

Suicide Prevention

Derek Monaghan

derekmonaghan00@gmail.com

Material: [project Asist.pptx](#)

The software will be App based. The App will be for people working within the railway industry, surrounding communities all over the United Kingdom.

The main aim of the App will be for those who are trained with suicide intervention skills to be located, then contacted through the app, and quickly dispatched to people who are in a crisis situation with a risk of suicide, turning them around, making them safe and handing over to medical professionals with a follow up thereafter.

In 2018 there were 784 registered suicide death's in Scotland. That figure has risen in 2019/20. I work within the railway industry, I have set up a peer to peer mental health and suicide prevention support group within the Govan community, hopefully to be taken into other communities. Being a trained ASIST (Applied Suicide Intervention Skills Training) I see there is much need for this App within the industry and local communities and will save lives.

Proposal #6

Right Choice

Right Choice

Nailah Mohammad

wlnmohammad@glow.sch.uk

Software: there is no specific requirement for this to be built using specific software however it must be easy to add any new courses added by a university or make any amendments. This product must also be compatible with both Apple and Android.

Motivation: Whilst studying at secondary school I like other pupils has to make the crucial and difficult choice of narrowing down my subject choices. This comes with the added pressure, "am I making the right choices and are these the right subjects for the career I wish to pursue?'. This is a very stressful time for the majority of pupils. In Scotland subject choices for Higher qualifications are made in s4/5 depending on the school you attend. Most pupils at this age do not know or are not aware how to navigate university websites and look at entry requirements which include some subjects that are required to study in order to gain entry to the course. Most pupils rely on their teachers and parents to help advise them, some end up making the wrong choices, picking subjects that are not needed for the university course they wish to study. I hope to change this and ensure all pupils make informed decisions and ultimately make the right choice when it comes to picking subjects.

Product: I would like a website/app built that would allow pupils to select the career they wish to study and it would provide them with the group of recommended subjects that a pupil should take. These recommendations would tie in directly from the entry requirements of all university courses on UCAS along with the list of career options available, this would be taking from each university courses under their career section. An additional feature that would be useful as well would be a list of universities along with the entry requirements, that offer relevant courses for the pupils desired career path. For example, when a user clicks on a career, they would like to pursue there would then be 4 or more options of career pathways; university, apprenticeships, college and straight into the world of work. When a user clicks on any 4 it should provide them with the relevant information. If a user clicks on university it should have a list of recommendations including relevant universities, degrees and recommend subject to take drawing directly from the data available on each Scottish university website. The same recommendations would be provided if the user selected college or apprenticeships etc.

I believe this product has real potential and would provide a quick and easy way of helping and supporting pupils across the country make informed choices when selecting the group of subjects. Ultimately it would help pupils pick the right subjects at secondary school to give them the best start on their career path. While also preventing any pupils across Scotland accidentally receiving the wrong guidance that could potentially put a pupil on the wrong path from secondary school.

Additional features that would be great to have would be new courses being added to the app if a university add a new course etc. of the project.

Additional features but not required. It would be great to have if possible, would be the ability to run analytic reports. It would be great to be able to find out information such as; number of users who have run the app each month, career searches ranked etc. These details are not considered as part of our evaluation, but they do help us to guide you during the course.

The design would be important. The target audience would be s4 and 5 pupils. So a style that is attractive and engaging for that age group. There is potential to expand this product and interview students are in their final year of studying each course, apprenticeship etc and pupils as well as reading course descriptions at university would be able to hear first hand from students who have gone down a similar path and could hear about their experiences. Also opportunity to work with further education and industry who could provide short videos to promote the career pathways.

Proposal #7

A web app that creates an interactive Diversity & Inclusion Action Plan

Vilo Sky

Victoria Zuiderent

vicky@vilosky.com

We would like to create a free, accessible website application that assists users in building a Diversity & Inclusion (D&I) Action Plan. This service will be available for anyone interested in working with or for an organisation committed to creating diverse and inclusive working environments.

Vilo Sky (www.vilosky.com) is a social enterprise dedicated to enhancing diversity, equality and inclusion in the workplace. We believe that systems and cultures have become embedded in the workplace that disadvantage the career progression of particular groups of people within our society. Our goal is to remove those barriers and create freedom for people to reach their full potential based on merit rather than biased assumptions about their ability. In doing this we hope to support social mobility, gender equality and the progression of people from a variety of cultural backgrounds.

Co-founders Vicky and Louise have a career history in Banking & Finance and were motivated to start Vilo Sky after experiencing first-hand the effects of non-inclusive cultures. For Vicky, this was felt via the lack of emotional and practical support offered during the transition into parenthood which had significant mental health implications, and for Louise, the gender bias she experienced during the process of applying for promotion.

What we have found recently, particularly in the aftermath of the Covid-19 crisis, is that organisations have had to re-focus their physical and financial resources away from D&I activities and onto other areas that support business survival. Whilst totally understandable, this creates a real risk that progress made prior to the crisis will stall, and in some cases start to reverse. We would therefore like to build a website application that any employer or potential employee could access without any cost in order to encourage use and subsequent tangible action, and that we can then gather data from to understand where priorities currently lie and what is being done to progress equality of opportunity at work.

This application would be based on the premise that there should be no systemic barriers to anyone wishing to build and develop their career. If we take that premise, what barriers would stop, say, a woman from progressing into a senior leadership role (user would start by choosing option – “Gender: Women”). A range of potential barriers would appear in response, such as ‘Unconscious Bias’ or ‘Children’. The user would select any barriers they thought were relevant, and a range of solutions, such as “Unconscious Bias Training” or “Promoting Gender-neutral Parenting” would then appear. If the user decided to explore any of those solutions a resulting list of possible actions would subsequently appear with links to research, templates and supporting organisations that could help with the completion of that action. Such options and responses would form a pathway that would ultimately lead to the actions populating the action plan, which the user could then interactively edit. The finalised plan would then be presented in a download friendly, visually appealing format (Excel/CSV/Powerpoint/PDF?) which the user could then print or save onto their own devices for subsequent reference.

We envisage the application being available via our own website (www.vilosky.com - Squarespace hosted). Our website is on a public domain and has no restricted access, it is also mobile friendly. Current visitors to our website are from the general public and can be using any device (laptop, mobile phone, PC, Mac etc). We are open to having more restricted access for this application if necessary due our presentation and functionality requirements (mobile might be more complicated when considering the

visuals and download capability required for the final action plan for e.g.) and we are keen to have some form security if possible to ensure our intellectual property is protected, by which we mean the design of the application and the content/pathway decisions contained behind any presented options.

Our ideal user for this application is a HR professional within a mid-large sized organisation. The application needs to have a professional, attractive appearance and be quick and easy to navigate. It would probably also require help functionality and shortcut options. We imagine a low number of concurrent users initially (less than 25) but each user is likely to need at least 30 minutes to complete a plan. This may not be in one sitting so we also need an option that would allow users to save and continue at a later point, which may be best served via the creation of an account.

We would like the ability to compile data and analytics regarding how the application was being used. The data would need to show how many people had accessed the application, at which times, and as a representative of which organisations (if any). It should also allow the frequency of selected options and resulting action plans to be tracked, along with clicks through to any of the recommended services. Ideally, we would be able to edit the content ourselves once the application had been developed so we could keep it up to date with the latest terminology and advice. We would also need to amend any links to resources/services as associated organisations, templates and research changed and/or was removed. The benefit this application will bring to organisations and the community as a whole is that we will hopefully start to see more individuals being able to access roles that they would not have been able to otherwise, as employers and potential employees are able to identify specific activities needed to support them in their current circumstance. It will save time and costs for organisations in terms of consultancy, research and internal development and it will drive more focused and targeted action plans. The application will also become a central point for the resources needed to support progression at work, and we would like to start seeing real improvements in terms of the statistics of under-represented groups in the workplace as a result.

We have not made any attempts to start this project yet and so have nothing currently in development. We are at concept stage and very limited in terms of our technical expertise. Any advice or guidance about platform, design, approach and usability would therefore be much appreciated. We are hoping for some support to get this project off the ground which could simply mean developing a proof of concept using one main characteristic (e.g. gender) which we could then take forward to show future investors and stakeholders how the application could work and how it would be used. For our part we are fully committed to providing all the content required for the pathway options and also to be readily on hand to consult on the overall design and user experience.

Our vision for this application is ambitious but we are comfortable that 6 months will enable the development of a basic prototype for which our current requirements can be scaled. Such a deliverable would allow us to understand more about the potential for the application and how any future enhancements might be realised.

Proposal #8

Developing language learning games from Speech Recognition tools

Klik2learn

Ann Attridge

info@klik2learn.com

We would like to build a series of demonstrators based on a browser-based speech recognition tool. The aim of the activities would be twofold: to improve students speaking skills when learning online without a tutor and to encourage student -to -student collaboration through a leaderboard and polling activities.

Klik2learn will supply a range of potential games- based activities to be developed in partnership with our Creative Director. The activities will be piloted on our new Digital Learning Hub as an additional tool for students to use to improve their spoken skills across a range of language levels.

Proposal #9

Masters in Minds 360°Johari Evaluation Survey Assessment Software

Masters in Minds

Stephen McCann

stephen.mccann@mastersinminds.com

Material: [Glasgow university project 2020.pdf](#)

The 360 tool that is a questioned-based assessment that evaluates your own perception and the perception of you from others. The questions will be provided to the students based on our experience as business consultants and will be aimed at different levels of capability: Example: Executive/ directors, Senior leaders, Middle Managers, Managers, Team Leaders.

The purpose of the Masters in Minds 360°Johari Evaluation Survey Assessment Software is to assess one's perception and highlight any blind spots that an individual may have.

This is visualized by using a scoring system and comparing and contrasting your score and the average aggregated score for your peers.

The rules of a 360° are as follows: You must have the following people to evaluate you:

1. Senior person/manager
2. Your team that directly report to you
3. Vertical peers that you have close contact with- department to department

By receiving all answered questions, you will have a rounded evaluation of yourself and this will be documented in an automated report produced in Adobe PDF format. In addition, you will use the theory of Johari 360°. This 4-box psychological model will be used and reported on in the 360. The software must house all the mechanics and have the sense to send the automated e-messages out to the participants and be able to record their answers and aggregate them to produce a finalized report without human intervention. It must have the ability to send numerous reminders to uncompleted person. Also, the administrator must be able to see who have not completed the assessment to be able to prompt them. The emails must be secure and using encrypted computer-generated unique passwords that allow only one-person access to the tool. It must be able to record the answers and allow one-time use only.

This reports would then be circulated to the appropriate person who then would have a coaching conversation to deliver the feedback in a considerate way and use this learning to assess where they would be require to work to stretch them and help them develop personally.

Masters in Minds already have the domain name registered. www.johari360.com

Masters in Minds would own the IP of the code and the winning & runners up teams would receive prizes and potential to be offered work experience. They may be offered employment for some in the winning teams.

Proposal #10

SMART Stent Project

School of Engineering

John Mercer

john.mercer@glasgow.ac.uk

Material: [CS 2020 Pitch.pdf](#)

This project follows on from last year's success in which an App for interpretation a simple text data file from a new type of cardiovascular implant was converted into a usable App GUI via flutter.

This year the App needs to be updated to 1) integrate a cloud-based Python modulator for direct streaming of data from the device to an iOS/Android based phone. The second component is the development of an optimization algorithm that can be integrated into the GUI to process the data for detection of 2 different cell types from one impedance spectrum of data.

Proposal #11

Tower Building App

Social and Public Policy Programme

Dr Mark Wong

Mark.Wong@glasgow.ac.uk

Material:

[DT image as iphoneXspacegrey_portrait.png](#)

[DT v02 with new 1st building_iphonexspacegrey_portrait.png](#)

[screenshot stacktower.jpg](#)

[StackTower – TR – PC, Mac Linux Standalone – Unity 2019.3.15f1 Personal DX11 2020-10-02 00-37-58.mp4](#)

Create a new mobile app (for iOS and Android) that, by enabling students to create and customize representations of buildings, rewards students' physical (and online) participation in lectures, tutorials, study spaces, revising/studying, and also participation in social/student activities.

Display: Rewards will be displayed as an individual customizable building in a 3D, town-like grid on screen. Achievements would then enable the growth of that student's building in amongst the buildings of other students also shown on the grid. Users can choose whether to view buildings created only by themselves, their group or of their course, and even their whole programme/School/College. Optionally they may display the growth and increasing customization of their own with a timeline view.

User Profile: A student can use an anonymous username/alias. The student will also self-select which group &/or course they are a member of, for grouping features on displays and leaderboards. This app would incorporate a self-timer for self-recording time spent in studies or other wider university-related activities.

Group/team: Personal and team achievements will be shown. With sufficient points, a student will gain abilities to personalize the design and type of their building and add features to it (e.g. built-in garage, aquarium, logos, emojis, graphics, vegetation and canopies). Flags can also be added to reflect individuals' origins/nationalities if desired. Groups can create buildings together (e.g. for their School or College) and can jointly vote for custom features to be added.

QR code: To capture attendances, a large QR code could be displayed on a screen or in study area and a student would be rewarded by the QR code.

Technical spec: The app is to be built for iOS and Android. The app will start quickly without the need for repeated log-in. It can run offline but can sync via API with an online server database when the user has a Wi-Fi connection.

Further development: Once several buildings created, a 3D-printed model of the "town" could be created on one of the university's 3D printers and displayed on campus. We could also display a virtual model on display screens on campus, social media, and university webpages.

Proposal #12

Integrated Map and Sensor in 2D and 3D for land systems

Thales

Ian James

Ian.James@UK.Thalesgroup.com

Aims

The aim of the project is to support a sensor system with appropriate mapping information. This would start with a simple overlay on a standard map for a current target locator but would aim to increase this to a fully integrated 3D mapping and 3D sensor system. This project aims to demonstrate basic 2D map integration and then extend this to some 3D mapping with a 2D sensor. There remains a longer term aim to have an integrated 3D sensor and map with real time update capability to account for real time situations.

Outline

Map and sensors integration in 2D.

- Ability to take sensor located points and add to map
 - Sensor knows own position, pointing direction, distance to Item of Interest etc. (See NOTE <1>.)
 - Application generates Lat, Long location and places on 2D map.
- Ability to take an object on the map and point sensor at it
 - Provide manual directions to the operator to point the sensor in the correct direction, indicate distance from current position
- Display on the map the Sensor pointing direction and Field of View over the map as a cone from the sensor position

Map and sensor integration in 3D

- Map and Sensor integration: ability to take sensor located points and add to map
 - Sensor knows own position in map, pointing direction, distance to Item of Interest etc. (See NOTE <1>.)
 - Application generates Lat, Long location, inc height and places in 3D map.
 - For display purposes a map display is required (can be 2D)
- Ability to take any point in 3D map and point sensor at it
 - Direct sensor (horizontal & vertical) to correct direction and indicate item of Interest.
- Understand the concept of visibility. Is the Item of Interest visible to the sensor from its current position?
 - Display on a map the Sensor pointing direction and Field of View over the map as a cone from the sensor position.
 - Display the visible aspects of the map from the sensor or the “Dead Ground” that the sensor cannot see.
 - Indicate if an item of Interest is visible to the sensor.

Considerations

The core functionality above can be achieved in multiple ways using multiple 3D spatial technologies. There are some sources below for a couple of options. The choice of technologies is left to the project group to use and Thales should be able to make mapping and sensing experts available as required. Thales motivation includes the need to bring autonomous and manned platforms closer together using similar technologies. Much of the proposed functionality could be managed by a full 3D on board sensor suite but the aim is to consider integration of sensors and mapping which may provide

multiple solution options and a more flexible platform able to cope with multiple different situations: therefore an integrated map and sensor is preferred.

Options

The outline above is the core capability but could be extended in some of the ways given below. This is provided so that if one of the optional items is deemed to be a fairly quick and easy extension Thales would be interested in this. The following would be considered valuable:

- Provide a simple target list management function for any object/items of interest selected and then displayed on the map.
 - o In its simplest form this would allow deletion of unwanted objects and a display/reporting of the current list of objects added.
 - o It could be extended to include additional data such as classification of items or priorities and different display symbology for these data variations.
- Extending the sensor to map integration to allow for a variable Field of View camera (Zoom).
 - o If this is being considered a demonstration option will also have to be proposed.
- Provide a software system that would be suitable for use in a moving vehicle: meaning all data would be dynamic and processing may probably have to be cyclic or on-demand. The software system would become real time.
 - o This system would still be able to provide a static demonstration
 - o An understanding of the areas of change would also be useful.
- Extending the use of the concept of visibility and generate a Dead Ground map based on a given position on a map.
 - o An on demand map display of this dead ground calculation for any map position.
 - o Consideration on processing power and ability to maintain a dead ground calculation given own position for platform but with the platform on the move.
- Provide some 3D display options which provide additional understanding to the operators from the data available.

Development

This is mainly a software application project with inputs from the various sensors required. Thales is not recommending any particular data solutions, implementation strategy or target computer system or software but would make the following comments:

- The target system and language used are the choice of the team but has to be able to drive a screen big enough for demonstration purposes.
- The mapping aspects can be discussed with Thales and the use of OSS maps is recommended. Some display options are purely 2D and could be done directly but Thales would recommend the use of a GIS OSS library which may help when using the 3D data. A good 3D OSS web GIS library is Cesium (<https://cesium.com/cesiumjs/>). If a professional GIS library is being considered, then Thales believe previous experience is required. Please discuss this with Thales as we may be able to provide access and recommendations on certain software packages but in principle professional GIS packages are considered out of scope. Please discuss with Thales concerning 3D mapping sources.
- 3D Spatial information is available in many formats and the UK and Scottish governments also have 3D LIDAR mapping information available. See the following pages for more data:
<https://data.gov.uk/dataset/national-lidar-programme>
<https://data.gov.uk/dataset/50cm-lidar-composite-dsm-dtm-for-scotland>
- Thales would like to understand the proposed team software development process and tools being used in particular the methods of configuration management in terms of software release and multi team access.
- Some system component comments/assumptions which should be discussed.

- o Moving platform (vehicle) or dismounted platform (man) with video obtained from on-board cameras
- o Knowledge of platform position and orientation (and thus camera pose)
- o 2d map (Open Street Map/Google maps with contextual features eg roads/railways/waterways etc)
- o 3d map (DEM or LiDAR)

Demonstration

A demonstration of this solution can largely be achieved using a standard smart phone as a sensor although options such as range to object may have to be manually entered and a north pointing function would have to be carefully considered. The demonstration options need to be agreed at the beginning of the project but can be modified as required.

NOTE:

1. The range finding options above could be demonstrated by a manual entry of range. Real world integration is important and a real-world location for a demonstration is preferred. The location will depend on both the data available and technology used for the 3D mapping functionality. This needs to be discussed at the beginning of the project. Thales would like to have a final demonstration with a Thales target locator, likely to be a handheld thermal imager with integrated GPS, magnetic compass and laser rangefinder. The interface is a standard RS422 serial link for data transfer, a Bluetooth option may be available (TBC). An Interface Control Document can be provided and access to the target locator will be arranged for final integration and demonstration. Thales would also aim to demonstrate this capability alongside a vehicle-based sensor system. There may be an option to integrate with a vehicle system in the future: this would have an Ethernet or a CANbus interface. Thales vehicle systems are compliant to the UK Government Generic Vehicle Architecture standard which uses standard IETF protocols with some agreed standardized data and control functions.

Proposed Statement of Work for the CORE functionality:

Task 1: Establish relationship between video and 2d (ground plane) map

- o Task 1a: Populate a 2d radar plot (azimuth vs range) with detections obtained from video. Assume 2d bounding box in image, known calibration/pose of camera, and known distance to object.

- o Task 1b: Annotate a 2d ground plane map with detections obtained from video. As above, but plot on open source map based on known vehicle position/orientation.

Task 2: Establish relationship between video and 3d map

- o Task 2a: As Task 1b but remove assumption of known distance to target and plot result on 3d map (or 2d ground projection of 3d map). Distance to target should be automatically determined by intersecting bearing from known bounding box with ground plane as defined by the 3d map. Report the range to target

- o Task 2b: Project all visible rays from camera onto 3d map and display total visibility from current position. Assume knowledge of camera calibration, camera field of view, and camera/vehicle pose.

Task 3: Plot features from 3d map onto video feed

- o Task 3a: For an object positioned on the 3d map, determine and display its location in the video feed. Assume known calibration/pose of camera + known vehicle position.

- o Task 3b: Combining Tasks 2b and 3a determine whether object identified in 3d map is visible to camera, and if not highlight that it is a hidden target.

Proposal #13

VR for Senior Citizens

Viarama

Billy Agnew

billyagnew@viarama.co.uk

This project would create a VR space to be used in Viarama's work in nursing homes, hospices, and respite centers in the UK. This VR space would develop and existing treatment used for those living with Alzheimer's disease, dementia, and would also work for the general senior citizen population. The physical space counterpart of this concept has been proven to be highly beneficial to the above groups, and we envisage that the VR version would be more beneficial, more widely adopted, and consequently of significantly greater overall benefit. The concept would, if created, be the first of its kind in the world.

Proposal #14

Enterprise Simulation Game

Young Enterprise Scotland

Mark Armstrong

mark.armstrong@yes.org.uk

Material: [YES Glasgow Uni Project.png](#)

Young Enterprise Scotland is a charity that uses Enterprise to enhance learning throughout Scottish Schools and further education arenas. We would love to have an Enterprise Online Resource that we could use to have classmates competing in a virtual environment - be it within a school or across many schools.

We have used business simulation games in the past but do not have the resources to create and use our own. We want pupils to compete against other companies selling on the same virtual market and managed by friend or colleagues (s). All data (market shares, prices analysis, profit & loss statement, balance sheet) are used to predict outcomes. The goal of course is learning - but in a fun way. It could be scored on a number of outcomes such as the highest possible value of the equity - through making and accumulating profits. It could also assess teamwork, resilience, motivation etc.

Proposal #15

JMS testing tool

Avaloq

Michael Kriegel

Michael.Kriegel@avalog.com

Avaloq's banking system exchanges data with external systems through a number of different means. While REST based HTTP APIs are a popular integration choice, we also use message queues based on the JMS (Jakarta Messaging) API, especially for inter-bank payments. In such a scenario, a separate message broker application (e.g. Apache ActiveMQ) is deployed to manage queues of messages that messaging clients (both the Avaloq banking system and external systems) can interact with to exchange messages. The JMS API provides a generic way how such clients are implemented regardless of the specific message broker implementation. One main reason for using message queues is that they allow asynchronous communication. The sender can place a message on the queue even while the receiver is offline and likewise the receiver can read from the queue while the sender is offline.

When testing JMS based applications it is useful for developers to interact ad hoc with a message broker. For HTTP/REST there are many API testing tools such as Postman available that have an intuitive UI for easily crafting and modifying requests and inspecting responses. In the JMS ecosystem equivalent tools are much harder to come by. This project proposes the development of such a JMS testing tool. Ideally the tool would have a simple web-based UI as well as a simple server component which establishes the connection to the message broker. Minimum functionality should include configuring the message broker connection, listing available queues and displaying their characteristics, reading messages of queues and controlling responses (e.g. acknowledgment/failure) and placing message onto queues. The project scope could be extended with many possible advanced features such as saving connections, managing message templates, search, etc. The project could be tested and demonstrated by having two separate instances of the testing tool connected to the same message broker. The resulting tool would be very useful for developers testing their JMS based applications, be that in Avaloq or elsewhere. We would encourage the team to consider open sourcing the project.

Proposal #16

Developing a sleeping sickness surveillance app

Institute of Biodiversity Animal Health & Comparative Medicine

Walt Adamson

walt.adamson@glasgow.ac.uk

Sleeping sickness is an often-fatal disease that has been the scourge of Africa for centuries. It is caused by parasites called trypanosomes, which are transmitted via the bite of a tsetse fly. It is endemic in 36 sub-Saharan African countries, and most prevalent in rural areas. Without treatment, the disease is considered fatal. Recent control efforts have reduced the number of cases. However, outbreaks still occur: for example there is currently a significant outbreak in Malawi.

Effective surveillance of sleeping sickness is challenging: infection typically occurs in remote, resource-poor areas, therefore there can often be significant delays between the commencement of an outbreak and the implementation of treatment and control measures.

Mobile phone use is prevalent throughout Africa, and its penetration is expanding rapidly. Even in remote locations, ownership of and/or access to mobile phones (including smart phones) is relatively common. Mobile phone apps have previously been used as a health surveillance tool (examples include monitoring the presence of symptoms to track the spread of Covid-19, and monitoring indicators of mental health by geographic location or in response to environmental stimuli).

We would like to investigate the possibility of using a mobile phone app as a tool for monitoring outbreaks of sleeping sickness. If successful, it would treatment and intervention strategies to be targeted to areas that need them most: vital in a resource-poor setting. It would also open up the possibility of applying the technology to the surveillance of other health indicators in such settings (such as outbreaks of other infectious diseases, or assessments of a population's physical and mental health).

We would like to develop a mobile phone app that could be used to report sleeping sickness symptoms, and a database in which reports are collated and healthcare workers could use to analyse results and take action if necessary. On accessing the app, the user would be asked questions relevant to sleeping sickness diagnosis (such as the presence/absence of symptoms) which would mostly require simple yes/no answers. The user's location would be logged by GPS. Details that the user enters would be submitted to the database.

The app should be able to run on the most basic of smartphones. Storing the app on a phone should take up as little memory as possible and accessing the app and submitting reports of symptoms should use as little data as possible. Sleeping sickness is a disease that affects speakers of many different languages, and symptoms can vary by geographic location. As a result, the app should be developed in a way that enables sleeping sickness researchers to easily make modifications (such as altering the text, asking different questions, or translating everything into a different language) without great levels of programming know-how.

The database that the app submits reports should contain up-to-date records of all submissions, including answers to all questions and geographic location.

We would additionally like to develop a website that users of the app and other interested parties can access to find out more information about sleeping sickness (for example, what causes it, what the symptoms are, current prevalence rates, why using the app is important in combatting sleeping sickness, etc). An active website containing all of this relevant information is not essential to the scope of this project, but a basic page to which we could subsequently add relevant information would be very useful.

Proposal #17

Centralized directory service for transport

Open Transport Initiative

Hayden Sutherland

hayden@opentransport.co.uk

At the beginning of 2020, the Open Transport Initiative (a Scottish-based team of transport and mobility experts) published two Application Programming Interface (API) specifications as Open Standards.

1. Customer-account API: A standard way to facilitate peer-to-peer transport data sharing and account interoperability, allowing the customer to view all their transportation, mobility and associated data in one place. Properly implemented, this means the travelling customer has no more continual searching across various apps and websites to join-up journey, ticket and discount data.

2. Centralised Operator-info API: A design for a centralized look-up for all transport operators and Mobility-as-a-Service (MaaS) platforms. This directory service (similar to the sort code directory within the Financial Services Industry) will provide unique reference information about each mode of transport or mobility organization, including any publicly available Customer-account API locations. More recently in May 2020 the standard was updated and now aligns to PAS212, the automatic resource discovery for the 'Internet of Things' specification.

The Open Standards have been described as “the Open Banking for Transport” and are the first of their kind. We have already created a proof-of-concept for this Centralized Operator-info service: <https://open-transport.azure-api.net/operator>. However, it now needs several things:

1. A working (self-service) way to update it (e.g. a website, a form, a workflow process and a deployment mechanism to the service)

2. Industrialization (e.g. to work with our transport subject matter expert to initially populate it with a number of operator details, ensure it is stable under load, etc.)

3. Investigation into opportunities for its further / better use (E.g. consider additional data / resources it could be used for – which would actually mean a possible further update of the specification)
Note: If the student was particularly adept / keen (or as a separate project for a different individual), we would consider a second project to create an example online account that could expose transport data using our Customer-account API Open Standards.

Motivation: Why should this be done? Because the transport industry needs it – although it is a “chicken and egg” situation, where take-up / adoption of one standard is hindered because the other is not available. We want to break that cycle now.

References:

<https://opentransport.co.uk/>

<https://app.swaggerhub.com/search?type=API&owner=open-ransport>

<https://www.intelligenttransport.com/transport-news/94290/open-transport-initiative-launches-open-standard-for-transport-interoperability/>

<https://www.transport-ticketing.com/awards-shortlist>

Proposal #18

Lead Time for Change GitHub Action

RES Group

Hannah Mehravari

hannah.mehravari@res-group.com

Material: [Lead Time for Change GitHub Action.pdf](#)

Inspired by the Accelerate book by Forsgren, et al., RES would like to measure the "lead time for change" metric for releases published through GitHub (and potentially Azure DevOps) through a GitHub Action.

Lead time for change is the measure of the average age of commits since the previous release ($\text{age} = \text{date of release} - \text{date of commit}$) and is an indicator of how quickly completed work moves into production. It can flag up issues such as slow builds and stale branches.

The tool should also be able to add the calculated metric to the GitHub release description. This should be built on top of a configurable webhook that is called using the details of the release.

The Accelerate book has attracted a lot of attention in the software world. Its four key metrics are useful indicators of high performing teams and so this metric will be used as part of RES's software development KPI's.

Proposal #19

Computer vision solution to mitigate COVID-19 risks and enhance workplace and public safety

Censis

Helen Sandison

helen.sandison@censis.org.uk

Material: [CENSIS – CS Student Project Proposal 2020-21.docx](#)

We would like to develop an application that could be used to help with workplace or public safety as a response to Covid-19. This could involve a combination of technologies such as:

- 1) Facial recognition of staff member before access to building or through a barrier, potentially introducing contactless entry through barrier
- 2) Measurement of a person's temperature before access to a building or office
- 3) detection of face mask on a person.

Project themes, hardware and applications include the following:

- 1) FLIR Pro One Thermal Imaging module for human temperature measurement, to measure a person's temperature before entering a building or office.
- 2) Raspberry Pi/NVIDIA Jetson Nano for facial recognition with a machine learning model, to recognize staff member before entering the office.
- 3) CENSIS IoT2Go Kit (with Jetson Nano) to develop a face mask detection application with machine learning model, to detect and display if a person is wearing a face mask or not prior to entering a building or shop.

We would also encourage and welcome ideas for project developments along these themes using imaging techniques and hardware. Once a project or projects has been agreed on, the scope, planning, development and deliverables can be discussed and negotiated between CENSIS and the student group. These projects will require development in aspects such as: image processing, thermal imaging, embedded device development, machine learning, app development.

CENSIS can provide training in relevant areas during the project development in the form of a workshop, development activities or suggested tutorials or reading.

Proposal #20

Collaborative Interactive Story Mapping Tool (College of Arts)

College of Arts

Gordon McLeod

gordon.mcleod@glasgow.ac.uk

Many subject areas such as archaeology, history and cultural studies use maps to illustrate significant events that occurred geographically in association with a timeline. Examples of this might be the establishment of trade routes, significant journeys, cultural transmission of ideas and technologies, war & battle sequences, and migration patterns. There are existing tools that have similar functionality (eg Storymapjs, QGIS, ArcGIS StoryMaps, Google Earth, Zeemaps) however there are limitations in using them (eg licenses, steep learning curve, limited privacy of data).

The College of Arts would like to develop a bespoke online collaborative mapping tool that can be used by students and staff to create interactive overlays, allowing information and media to be linked geographically to maps. and displayed holistically (everything combined), or sequentially (step by step) through timeline), with toggles and individual interactive elements to trigger the display of embedded information/story. The working product should initially contain open source maps for present day, with optional overlays for physical terrain (e.g. mountains & rivers) and political (country boundaries). The map display should allow zoom controls to change display scale and be able to jump to set locations by keyword (eg country) or GIS Mapping / OS Reference co-ordinates. Scale should allow range from global display (1:1,000,000) to close proximity (1:1,250).

The tool should also have the capability to upload scanned maps (eg historical), with manually associated temporal and co-ordinate data, and give authors the choice from a menu of which of the available maps to use. Design interface should be accessibility compliant (keyboard/screenreader/visual elements) and aimed at being intuitive to new users without requiring experience of coding or geotagging. Clients are happy to discuss possible approaches with the student team.

Each map project should be version-control saveable by those collaborating on its development, and to have a unique URL to allow interactive viewing (not editing) of that map that can be shared. The ability to export a copy of the interactive map (e.g. for submission as project evidence) is highly desirable. Editing hierarchy roles Site Admin/Instructor/Map Editor/Guest. Access controls tbd but may include CSV file, SSO via Moodle, and LDAP Authentication. Each editable map should be considered a separate project, created/named by Admin or Instructor, and restricted (at Editor level) to named individuals, who can be assigned access to multiple projects. It should be possible to create and edit multiple layers for the same map simultaneously, and to view in-progress layers once they are saved. Auto save tbd.

Further information/functionality and any clarifications/changes to specifications will be discussed, scoped and agreed during project initiation meeting and through feedback on monthly prototypes. Additional feedback can be given on more frequent basis if requested. Named contact will be client lead on project and agree any scope changes, but additional contacts will be provided for testing and feedback on interface and functionality.

Proposal #21

Medipix

Medipix

Dima Maneuski

dima.maneuski@glasgow.ac.uk

Medipix is a state-of-the-art multi pixel detector of radiation. It found applications in many areas of science from monitoring of radiation background at CERN and the International Space Station to Computed Tomography (CT) of small animals for novel drug development. The system comprises of a silicon detector attached to a readout chip designed at CERN and fabricated at IBM facilities. The assembly is connected to a computer via a dedicated USB readout interface developed at the University of Glasgow and controlled by an open source software Micro-Manager (<https://micro-manager.org/>).

Micro-Manager (MM) is a plugin for an open source image analysis package ImageJ (IJ) (<https://imagej.net/>). IJ is written in Java while MM - in C++ and Java. Both packages have modular structure and dedicated APIs. This allows custom plugins development for functionality extension and linking the programs to hardware and other software platforms.

The proposed group project will extend existing and bring new functionality to the MM software for the Medipix detector. This can be broadly split into several avenues to have a non-linear development path and give each member in the team “their own piece of work”.

Improvement of MM Core:

- Create capability to compile MM and Medipix hardware plugin on Linux, Mac and Raspberry Pi.
- Alteration of MM core to suite particular aspects of Medipix detector.
- Improvements to existing Medipix hardware plugin.

Requirements: C++ (VS2010E), Java (Eclipse, maven).

Development of new MM functionality for Medipix:

- Plugins development for automation of various tasks: external hardware (such as motorised stages, X-ray tube, spectrometer, Arduino, etc), acquisition and data analysis related.

Requirements: Java (Eclipse, maven).

Development of external software integration capability:

- Socket connection, control, data exchange. (using default sockets or specific libraries such as ZeroMQ)

- Python integration (control MM from a python script, control python script from MM)

Requirements: Java (Eclipse, maven), Python, C++ (VS2010E).

Development of new functionality for ImageJ:

- Data analysis plugins
- Plotting tools

Requirements: Java (Eclipse, maven)

The team members are required to have working knowledge of C++, Java, Python, deployment environments and passion to learn new tricks. Basic knowledge and experience in MS Visual Studio and Eclipse, understanding of the concepts behind API, DLLs etc. The team will be challenged with a “real-world” software development problem. They will learn how to use MS Visual Studio and Eclipse to design and implement hardware-software complexes. As a bonus, they will get introduced into the world of detector development physics and its contemporary challenges.

Proposal #22

Online Marketplace Platform = one-stop-shop for buying ethical footwear online

Repairelhub

Petra Baiba Olehno

repairelhub@gmail.com

Material: [REPAIREL brief for GU project.pdf](#)

THE PROBLEM (we are trying to solve):

Wider-problem: The footwear industry in its current form is an accomplice to the climate emergency and is the reason for a lot of avoidable human suffering and negative environmental impacts. It accounts for 1.5% of the global climate impacts. Currently more than 24 billion pairs of shoes are manufactured worldwide every year, from which more than 330 million pairs are sold in the UK every year (since 2003) and this figure continues to rise. This creates an enormous amount of post-consumer (end-of-life) shoe waste, and only 15% of this waste in UK is collected and re-distributed as second hand shoes, while the rest of the 85% is disposed of in landfills.

Sub-problem: Being an ethical consumer and doing the right thing is still way too difficult, requires a lot of time investment and financial resources and therefore it isn't the mainstream but the afterthought. We at REPAIREL want to tackle this growing issue of shoe waste in UK by addressing the technology gaps in the shoe waste and recycling sector and develop sustainable long-term solutions, while also helping UK to recover from the economic impacts of Covid-19 and to deliver its Clean Growth Strategy and net-zero targets.

REPAIREL's first aim is to create a circular Shoe Repair Lab in Glasgow that will facilitate important and urgent research needed to innovate how UK shoe recycling industry deals with footwear waste, along with research and development of new and affordable sustainably designed alternatives to buying fast-fashion footwear.

Petra Baiba Olehno, the Founder and Managing Director of REPAIREL, has been working on developing REPAIREL since spring 2019 - conducting research, engaging with the community, future customers, potential partners and wider stakeholders, organizing and running 2 pilot events, applying for funding (4 grants received) and building REPAIREL's core team. REPAIREL is currently in the development stage and isn't trading yet.

SOFTWARE: The digital service we want to create is - an Online Marketplace platform = one-stop-shop for buying ethical footwear online that combines a list of pre-vetted footwear products (including our own products, such as Refurbished Donated Shoes and Remade Shoes - shoes made from waste materials of unrepairable shoes) + transparent sustainability info all in one place.

Specific features of the app:

- Streamlined/easy to use eCommerce functionality
- Comparison functionality that allows to compare side-by-side the sustainability of specific footwear products featured on the app (background info on the company, sustainability rating/score, environmental impacts of production, info about the materials, labor practices and factories used and wages paid to workers, treatment of animals in making the products) - so that our customers can more easily and confidently make informed decisions about buying footwear.

- Impact info of your purchase (displayed to customers after they place their purchase): calculations on what difference you are making in an easily understandable format (for example, what Sustainable Development Goals/causes has your purchase supported); stats on time saved by placing the order on doing background sustainability research via our app vs having to do this research yourself (based on shopping time averages for sustainable products))

This project can be broken into smaller proposals if necessary, for example developing just one of the features etc. There is room for flexibility from our side and we are happy to adapt to the needs and the scope of the course and the students.

Motivation for applying for this specific project is the opportunity to work with students and to gain capacity to develop a digital service which is a something that we are currently lacking in-house.

Proposal #23

Bespoke & Flexible Database for Course & Degree Calculations

School of Chemistry

Linnea Soler

Linnea.Soler@glasgow.ac.uk

Material:

[Chemistry 1.mp4](#)

[Chemistry 2.mp4](#)

The project aims to develop a flexible DB for the SoC, tailored for each degree programme, to allow for the robust and reliable calculation and publication of grades and degrees for the final year students.

Marks for each course, along with required weightings and calculations, are used to generate grades. Previous grades are extracted from MC and entered into the DB. Then, with the complete set of contributing honours course grades, the degree classifications are calculated (using the weighting for each course and year, as required by each specific degree). The outputs are CSV files to allow for easy uploads to MC. An added functionality is needed to allow calculation of course grades and degree classifications, with adjusted weightings, after components/courses are “set aside” to accommodate the new NDP policy. Legacy software from CS TEAMS (19-20), with the best elements of both selected, is provided and serves as inspiration for the final product. Each team may pursue options (a) or (b) or, ideally, incorporate both.

Proposal #24

Microservices for Embedded Systems

Leonardo

Andrew Hepburn

Andrew.Hepburn@leonardocompany.com

Material: [Leonardo Project Brief.pdf](#)

Proposal #25

Life Cycle Carbon Analysis Programme

Social Can Scotland

Gary White

gary@socialcanscotland.com

Material: [TPPSD Course 2020.docx](#) – Project 1

Full list of Customer Materials

[CENSIS – CS Student Project Proposal 2020-21.docx](#)

[Chemistry 1.mp4](#)

[Chemistry 2.mp4](#)

[CS 2020 Pitch.pdf](#)

[Dental Computing Science Projects.docx](#)

[DT image as iphoneXspacegrey portrait.png](#)

[DT v02 with new 1st building iphonexspacegrey portrait.png](#)

[Glasgow university project 2020.pdf](#)

[Lead Time for Change GitHub Action.pdf](#)

[Leonardo Project Brief.pdf](#)

[project Asist.pptx](#)

[REPAIREL brief for GU project.pdf](#)

[screenshot stacktower.jpg](#)

[StackTower – TR – PC, Mac Linux Standalone – Unity 2019.3.15f1 Personal DX11 2020-10-02 00-37-58.mp4](#)

[TPPSD Course 2020.docx](#)

[YES Glasgow Uni Project.png](#)