Project Risk Management

The ‘Automatic Plant Watering System’ (APWS) takes a basic concept and is integrated with a miniature computer to perform the automated function of plant watering. There are specific risks which are associated with the project, in relation to the methodology and equipment reliability to achieve a successful result.

APWS receives input from multiple sensors to function at regulated intervals to maintain the good health and successful growth of the plants. These sensors must be able to fit in a ‘compact and aesthetically pleasing’ package environment for appeal to customers. This means that any equipment failure may result in degraded system capability to perform its plant watering function. In the most extreme extent is that a single sensor may cause a total systems failure which would render the device as useless.

For the system to persevere and operate, three laws dictate the device functions:

1. Normal (Automatic) Law
2. Alternate Law
3. Manual Law

The Normal Law is for standard operations where the computer determines that all components are fully functional with no degradation in capabilities.

Alternate Law is induced when the system detects degraded functional system failures.

Normal Law is when the user takes full control of the functions.

The device is designed to cope with failures and will degrade to a different state of law. In the instance that the water pump communicates to the computer that it is becoming reliable, the computer will acknowledge and disconnect the pump which will revert to using gravity for the transportation of water from the tank to the plants. The design of the redundancy is based on a modular system which means each individual part is independent of operating from each other in the event of failure.

The light source suggested for APWS is a hydroponic lighting system. The main risk associated with the device is power failure, which would again render the device useless. The design of the APWS suggests for an auxiliary power unit to be installed onboard the hydroponic light which can supply electricity for up to 15 minutes, while the user trouble shoots the problem until mains electricity is reconnected. The APU is an option for the user to install, which is readily accessible for implementation by using Double AA Batteries.

Overall, the APWS’ functional design floats above the philosophy of simplicity. This minimises the likelihood and possibilities of multiple failures, thus leading to improved reliability and efficiency of functions.

Project Description Group Processes and Communications

At CornichonRMIT, our mission to successfully deliver the project is a top priority which means that communication between team members is an essential aspect of the group’s culture. The communication between team members is endorsed with freedom and honesty to minimise the risk of misunderstanding and inadequate information being shared.

Each week during the assigned tutorials, each group member is expected to have reached a checkpoint to prevent rushing and improved task quality. We all have the responsibility to raise concerns and matters regarding the project as soon as possible so that the team’s course of action is carefully guided towards the primary goal.

In the event that a team member has not provided any communication during group discussions, the group as a collective will attempt to show empathy and consideration for the team member and their state of wellbeing. This depends on the circumstances imposed that an individual may have become withdrawn from the activities due to personal reasons. If a team member fails to provide a valid reason for being withdrawn from the group, disciplinary action may be requested for the Tutor to help assist in the situation which may lead to disciplinary action.

Outside of class, there are no mandatory meetings required – this is circumstance driven as long as there are no emergencies.

The remote method of communication being used is Facebook Messenger. The software has already proven itself in the live field with millions of users seamlessly communicating with each other, which means that the group has a reliable and practical way to share their ideas in the group chat. Facebook Messenger exists in the form of a mobile application and is also readily accessible via a web version for desktops.

Project Description Testing

The Automatic Plant Watering System unit will be rigorously tested for any design defects or failures which may impact the operational functions of the device. The planned tests will cover different environments experienced by the device, which may consist of multiple temperature and climate exposure. There will be 10 planned tests to check for software resilience to perform under extreme circumstances.

The extreme weather climate testing will be applied with the static temperature ranging from -18° to 50° Celsius; the aim of this test is to check if the components are performing as expected like during normal conditions. The components that are critical to the success of the test are the auxiliary power unit and sensors are infallible to the climate.

The language used by the software is Python, primarily because Raspberry PI operates through this means of communication and it is relatively simple to code and interact in programming. Our team is proficient of using Python programming language which makes the project easier to fulfill the functional requirements. It is expected that debugging the code will help assess the logical flow of the software, in which amendments could be made before live testing of the product.

Essentially, the software and hardware will undergo stringent testing to fulfill the reliability and operational requirements of the design. For the assurance of reliability and quality, the product is to have 10 continuously successful test results, however if there are any defects found during any stage of the testing, the team will need assess the prototype’s failure and testing will have to restart from the beginning.

If there are any problems revealed during the product testing, the team will revert to design mode and assess the implications caused by the fault. Once the team is satisfied with the rectification of the solution, the product will begin testing with basic systems test and focus more directly to the fix.

BASIC SYSTEMS TEST:

APWS normal operations examination of software and hardware.

DEGRADED SYSTEMS TEST:

Deficiency in system capabilities which is checked for any spectacular failure.

EXTREME SYSTEMS TEST:

Under the most extreme conditions, the test is designed to check the endurance of the product.