

Getting Started With The GUI

USER MANUAL

Version 1.0 ● 28th June 2020



BUG-Z, Inc. TEST BENCH

A new way to test and
validate your applications

BUG-Z IS PROUD TO PRESENT THIS PRODUCT TO YOU HOPING THAT IT WILL SERVE AND SATISFY YOUR NEEDS AND EXPECTATIONS.

THIS USER GUIDE IS MADE FOR OUR SPECIAL CUSTOMERS TO HELP IN UNDERSTANDING THE PRODUCT AND HOW TO DEAL WITH THE GUI IN AN ORDERLY AND PROFESSIONALLY MANNER.

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Project Description

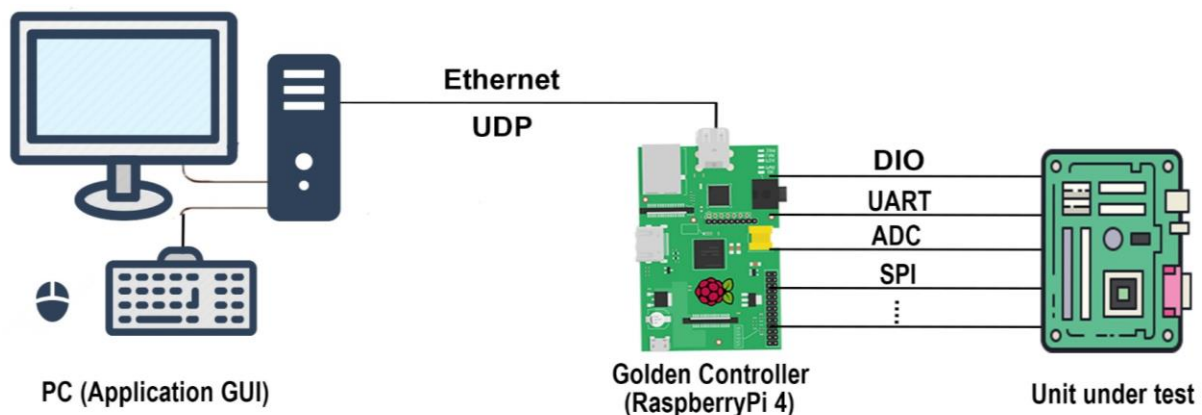
Objective:

Implementing a hardware in the loop (HIL) platform to automate the testing of complex embedded applications. A test system is used to emulate the environment, inputs and outputs that the unit under test is expected to under-go during its operation, such emulation is realized through automated test cases or direct application of specified inputs.

Modules:

- A Raspberry Pi: The test system (Golden ECU).
- A Communication Frame: An agreed upon format of the communicated message.
- A GUI: A user friendly GUI to facilitate the user entries to the system whether it is a test bench code or direct application.
- A UDP server and client: Coordinates the communication between the PC application and the raspberry pi.

Block Diagram:



Document Revisions

Date	Version Number	Document Changes
21/06/2020	1.0	Initial Creation

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1 Introduction

1.1 Scope and Purpose

Scope:

- Simulate sensors, actuators and any signals necessary before full system completion to prevent delays.
- Writing automated test cases to overcome human error, complexity and timing.
- Early testing will ideally lead to uncovering of defects earlier so they can be fixed.

Purpose:

- The purpose of this user guide is to get friendly with the GUI of our product which you will find easy, simple and efficient.
- We will cover all the functionality and workflows possible with detailed steps and procedures.

1.2 Process Overview

We have two modes of operation so we can say we will have two possible workflows.

First mode is Direct Mode and second is HIL (Hardware in the loop) mode.

Detailed workflow steps with snapshots and detailed description of each mode will be covered here in this guide.

2 Direct Mode

2.1 Description

The direct mode is responsible for exchanging frames of data back and forth between the Bug-Z application and the Golden Controller through a transport layer (UDP protocol over Ethernet), these data is continuously updated and displayed through our state of the art GUI to be monitored, analyzed and modified by the user as per his needs and requests.

2.2 Workflow

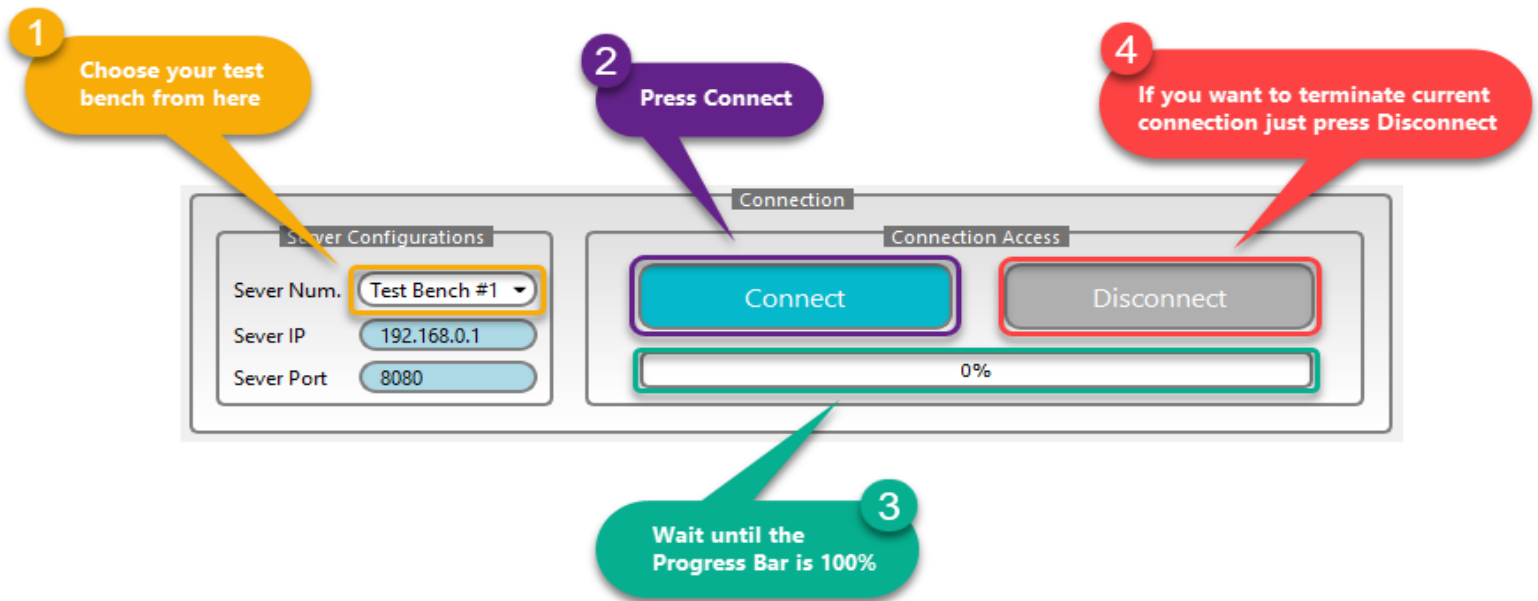
- Steps:
 - 1- Establishing a Connection to between Server and Client
 - 2- Choose between three main tabs (Main Features, Basic Communication and Automotive Communication).
 - 3- Once a connection is established the data will begin to be displayed and updated on the GUI in a periodically manner

2.2.1 Procedures for Establishing a Connection

Establishing a Connection to between Server and Client

- 1- Choose your desired test bench, each test bench has a unique IP address and a unique port number.
- 2- Press the Connect push button to establish a connection between PC (client) and test bench (server).
- 3- Once a connection is established through the transport layer and acknowledgments received on both sides the progress bar will reach 100%, if by any means the connection couldn't be established there is a timeout mechanism.
- 4- If you want to start a new connection or switch to HIL mode you have to terminate the current connection.

Please refer to the snap shot below for a detailed illustration.

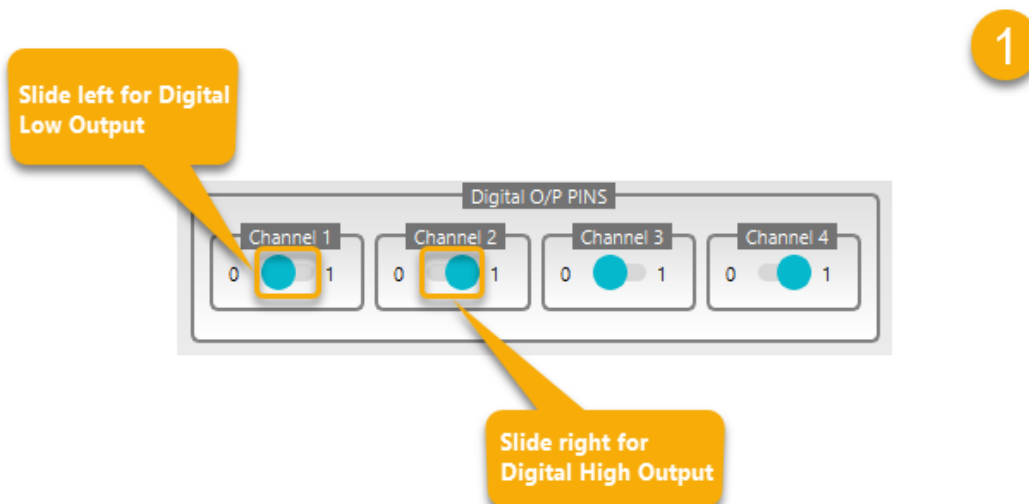


2.2.2 Main Tab Guide

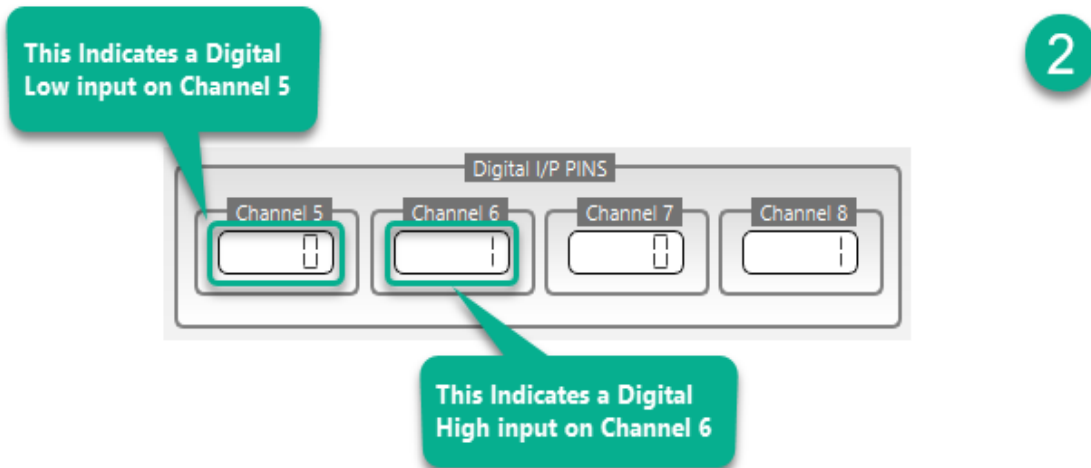
Choose between three main tabs (Main Features, Basic Communication and Automotive Communication).

2.2.2.1 Main Features Tab

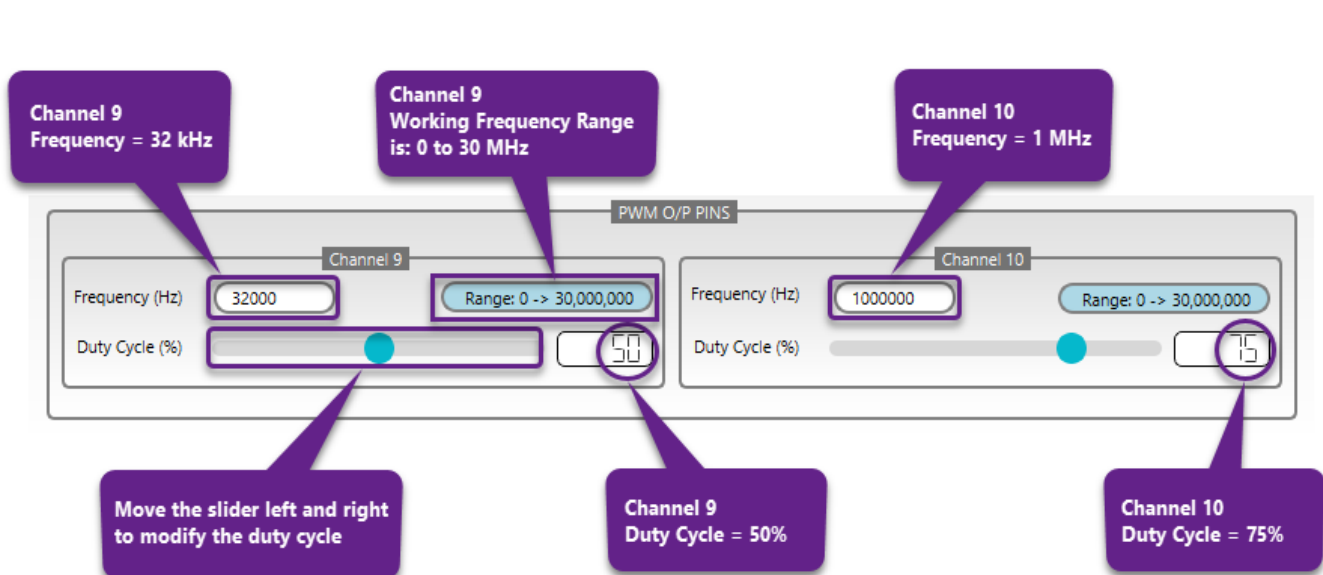
- 1- Digital O/P Pins group box gives you the ability to manipulate the output of four channels, you can move the slider left for digital low and right for digital high.



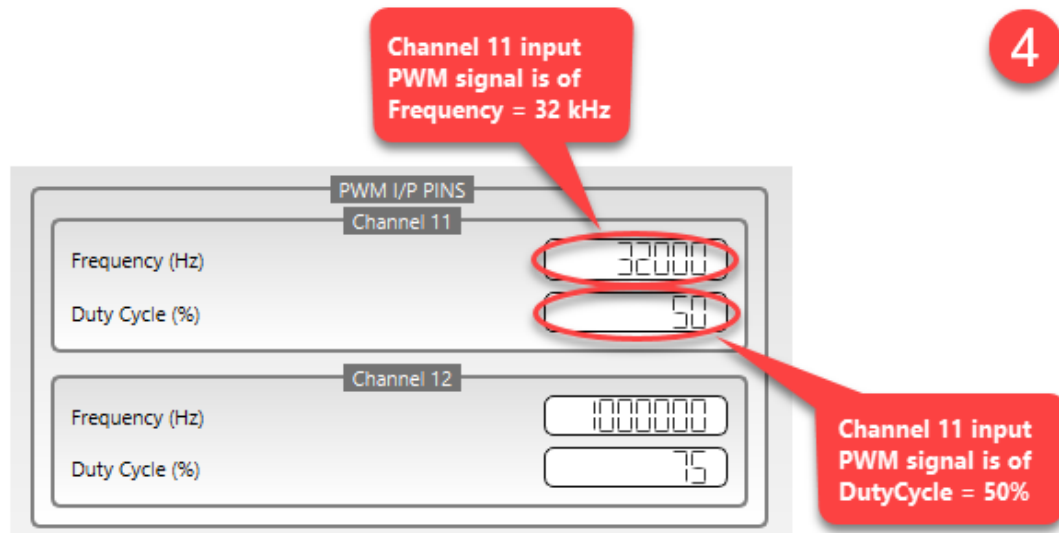
- 2- Digital I/P Pins group box allows the user to monitor the change in the digital signal input of four channels.



- 3- PWM O/P Pins group box gives the user two channels on which he can output a customized PWM signal with a desired Frequency and Duty Cycle (note: the frequency range is displayed to the user and this is the working range of the Golden Controller's channels).



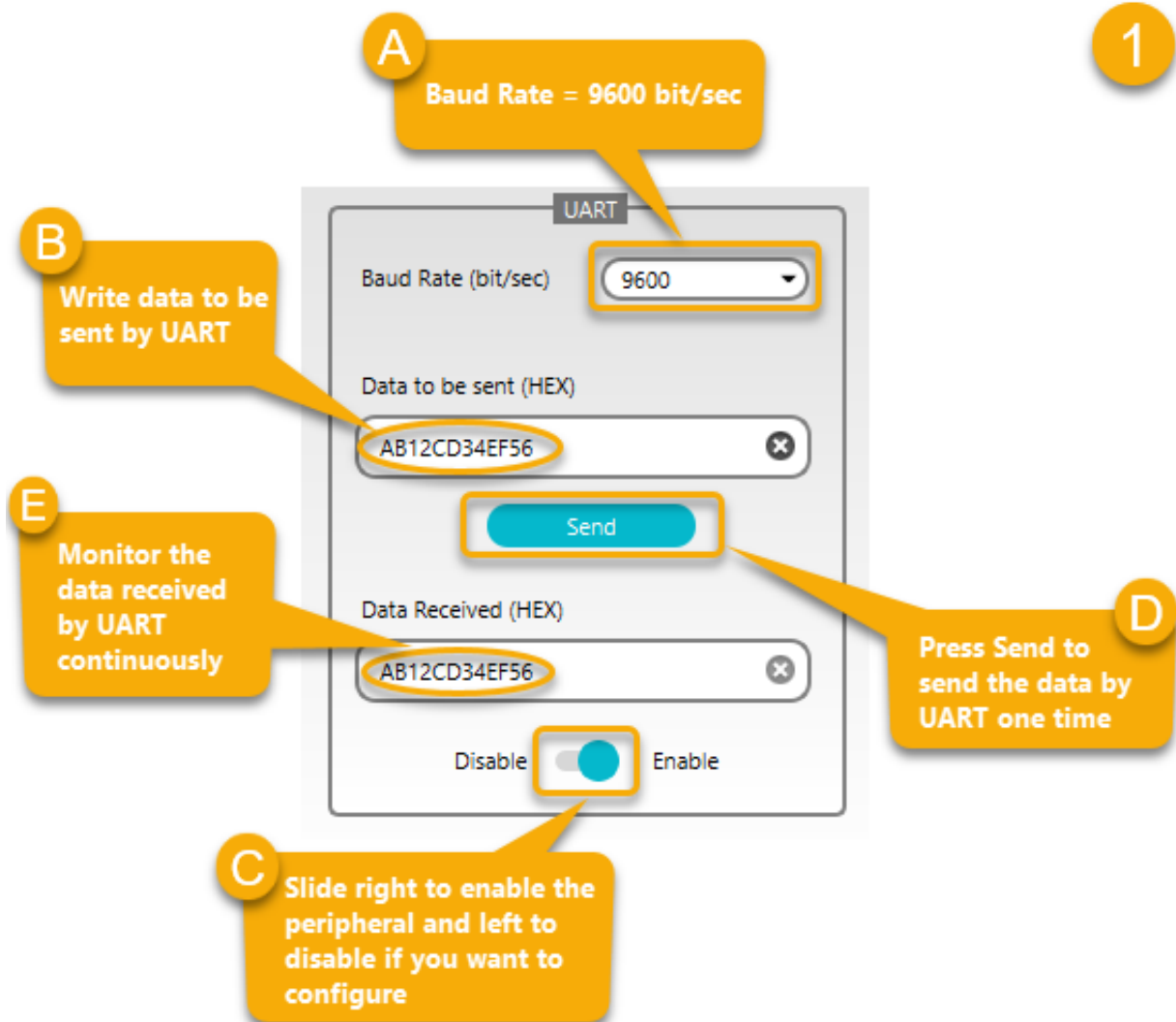
- 4- PWM I/P Pins group box allows the user to monitor the change in a PWM input signal of two channels displaying both the Frequency and Duty Cycle of the signal.



2.2.2.2 Basic Communication Tab

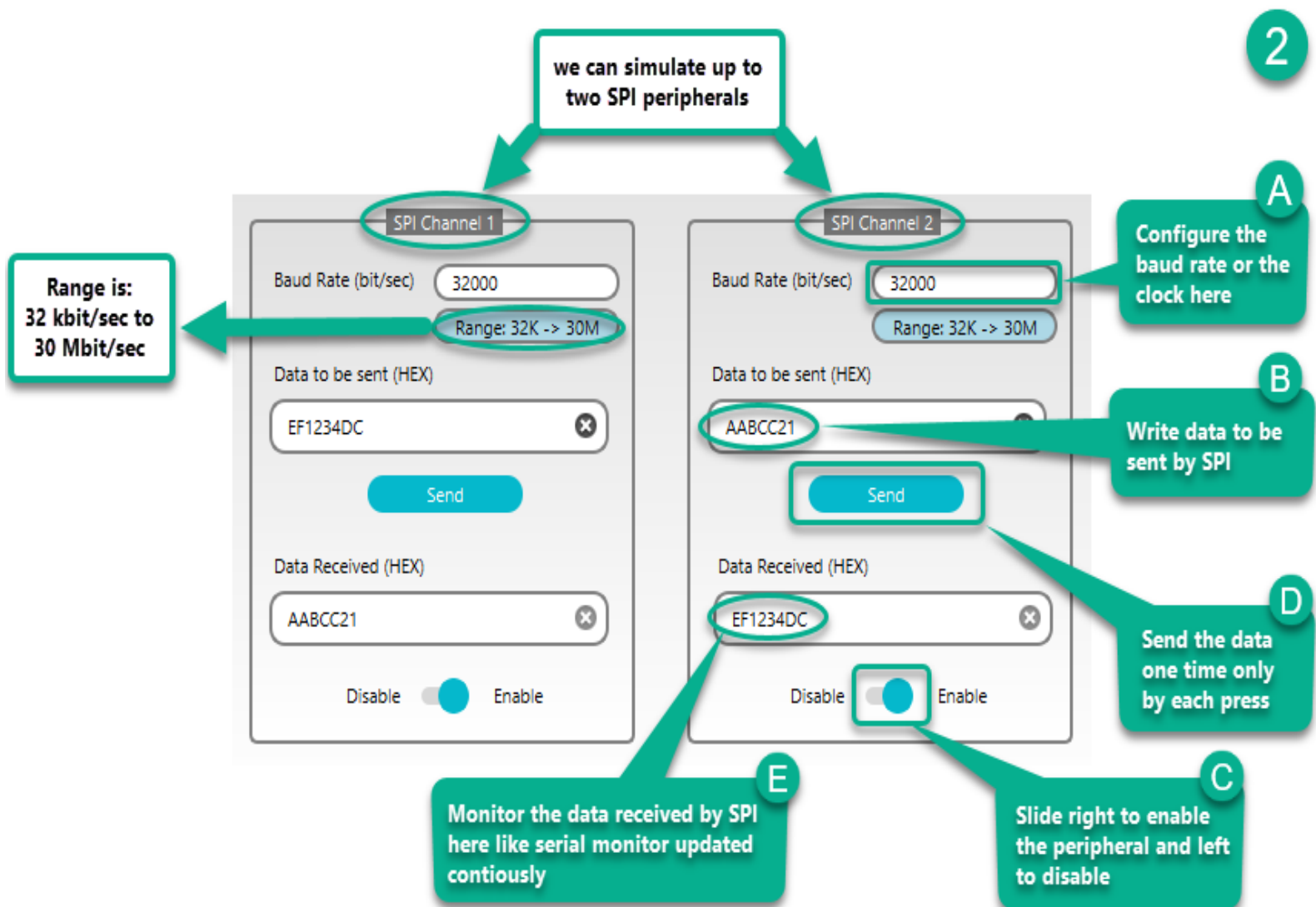
1- UART

- A. Configure the baud rate (note: configured only when the peripheral is disabled).
- B. Write the data to be sent by UART in HEX format (note: configured only when the peripheral is disabled).
- C. Move the Slider to the right to enable the UART.
- D. Press Send to send the data written by UART (note: each time the Send push button is pressed the UART will send the data one time not continuously).
- E. Monitor the data received by UART (note: this is updated continuously like a serial monitor).



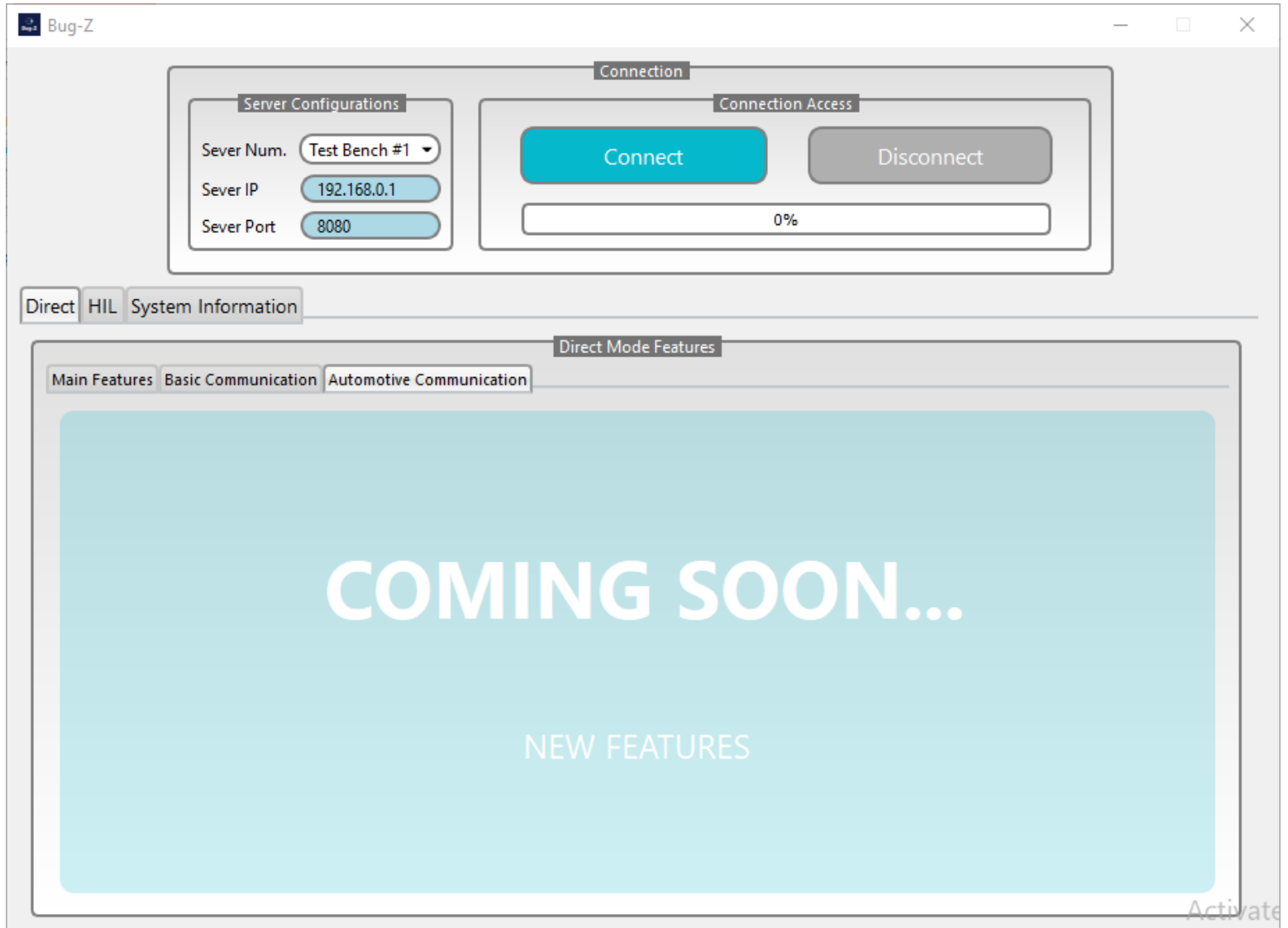
2- SPI

- A. Configure the baud rate or the Clock (note: configured only when the peripheral is disabled).
- B. Write the data to be sent by SPI in HEX format (note: configured only when the peripheral is disabled).
- C. Move the Slider to the right to enable the SPI.
- D. Press Send to send the data written by SPI (note: each time the Send push button is pressed the SPI will send the data one time not continuously).
- E. Monitor the data received by SPI (note: this is updated continuously like a serial monitor).



2.2.2.3 Automotive Communication Tab

This feature is yet to be added on the future versions of this software.



2.2.3 Cyclic Data Flow

- Now the backend of this software is actually exchanging frames of data through the transport layer (UDP protocol over Ethernet) and continuously refreshing and updating the GUI periodically.
 - All the data regarding The Main Features Tab is being sent periodically by a constant refresh rate to ensure optimized CPU Load and no crashing occurrences.
 - The data in the Basic Communications Tab is sent ONLY when two condition occurs:
 - 1- The peripheral is enabled (in case of receiving and sending)
 - 2- The Send push button is pressed (in case of sending only)Note: sending occurs with each press once not continuously.
 - All the Channels are pre-configured and determined in the software back end code
- Note: refer to System information Tab

3 HIL Mode

3.1 Description

The HIL mode is responsible for exchanging a whole script over TCP protocol, in which A test case script skeleton is generated for the user where they can call the desired APIs on the Pi remotely from their own PC via GRPC. A detailed explanation of the APIs is provided in HIL-mode-API guide (HIL-mode-API-guide.pdf).

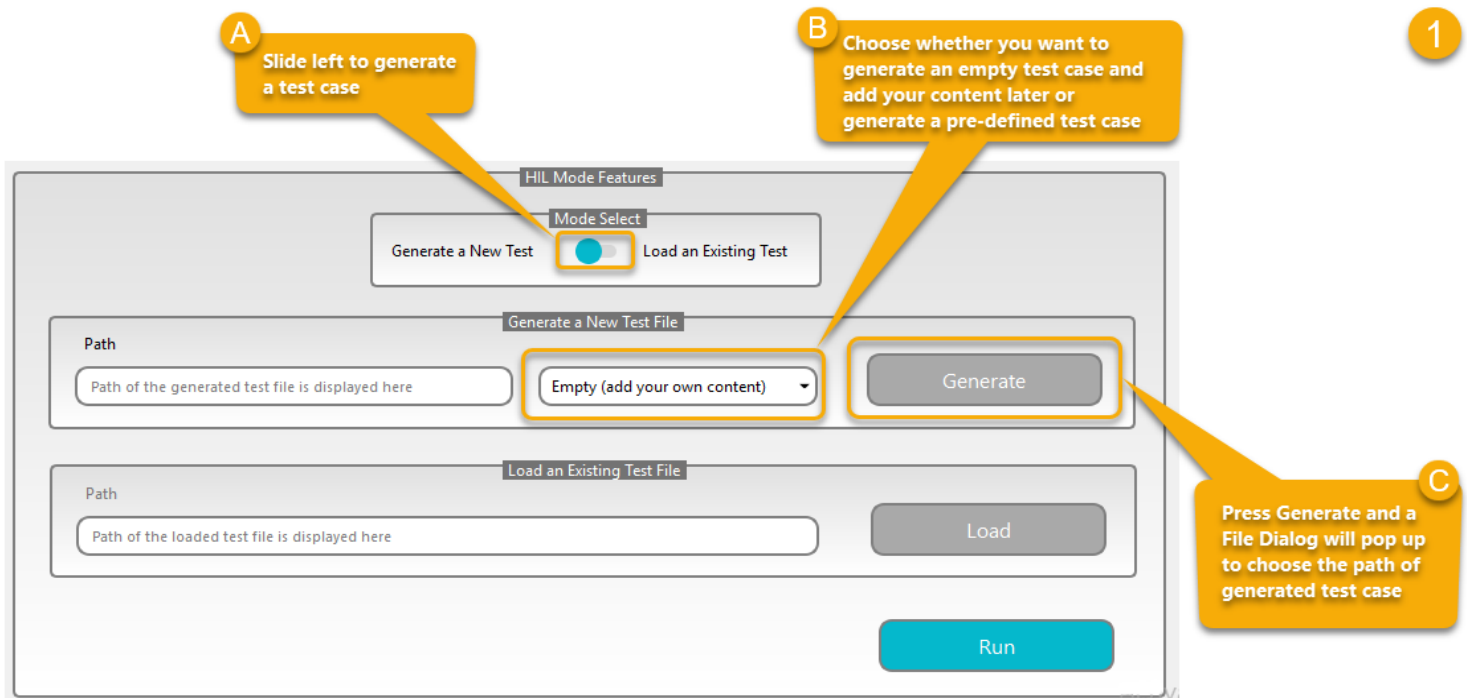
3.2 Workflow

- Steps:
 1. Choose between two modes whether to generate a new test template script or to load a previously saved one. (First the user should check that the Direct mode is disconnected by pressing disconnect in Direct mode tab).
 2. Once a Mode has been selected, the user can now edit the generated script
 3. Finally, the user could run the script now by pressing RUN button

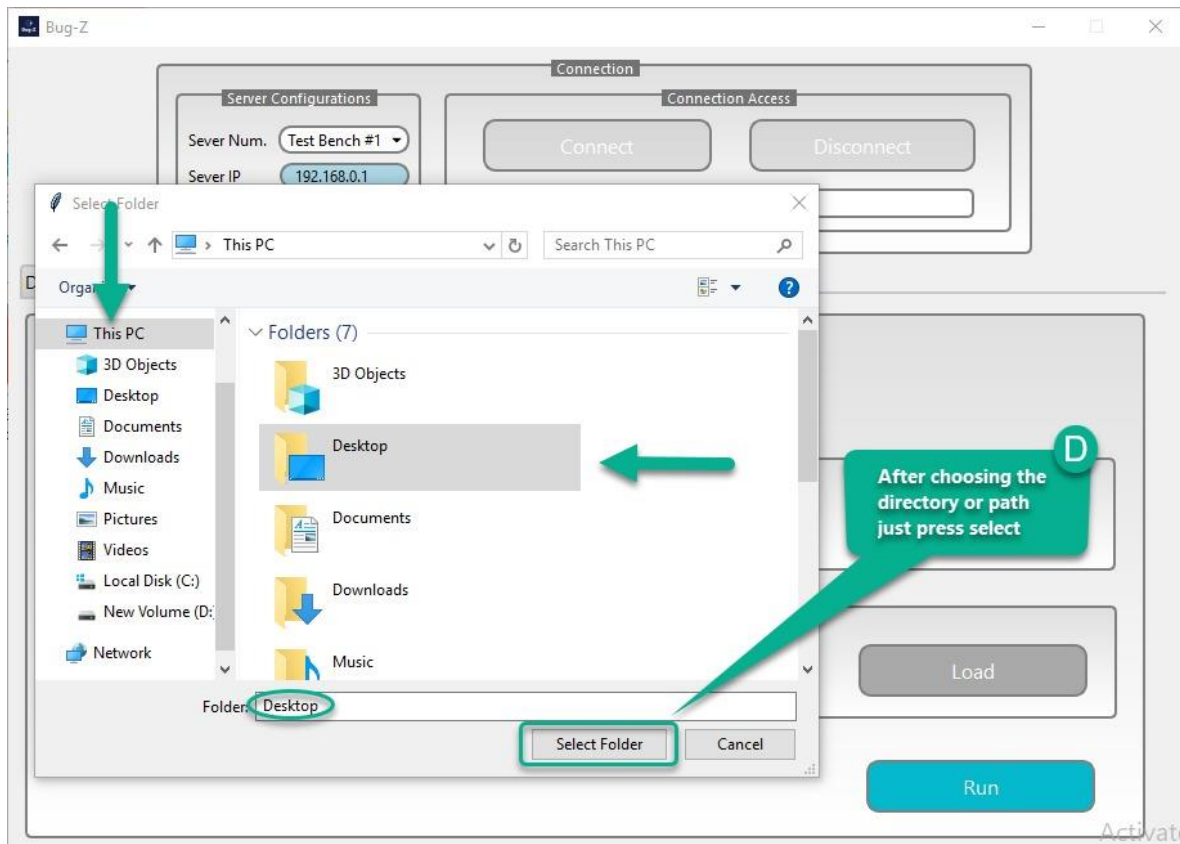
3.2.1 Procedures for Generating a new script

- A. Toggle the button to select generate a new test case.
- B. Choose whether you want to generate an empty script or the predefined script to blink a LED.
- C. Press Generate

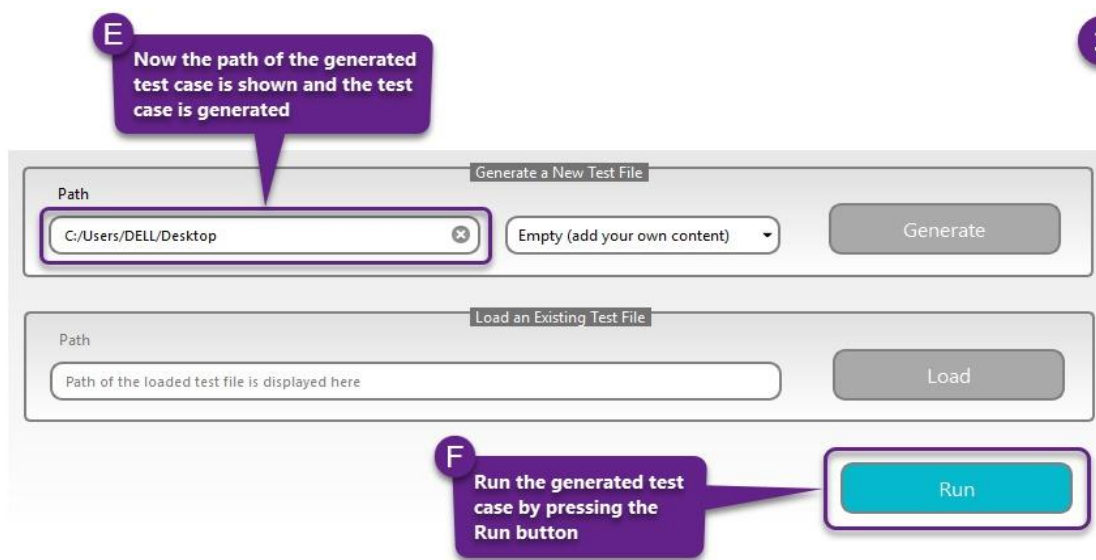
Please refer to the snap shot below for a detailed illustration.



- D. The file explorer should open and the user should now select a folder for the script to be generated.

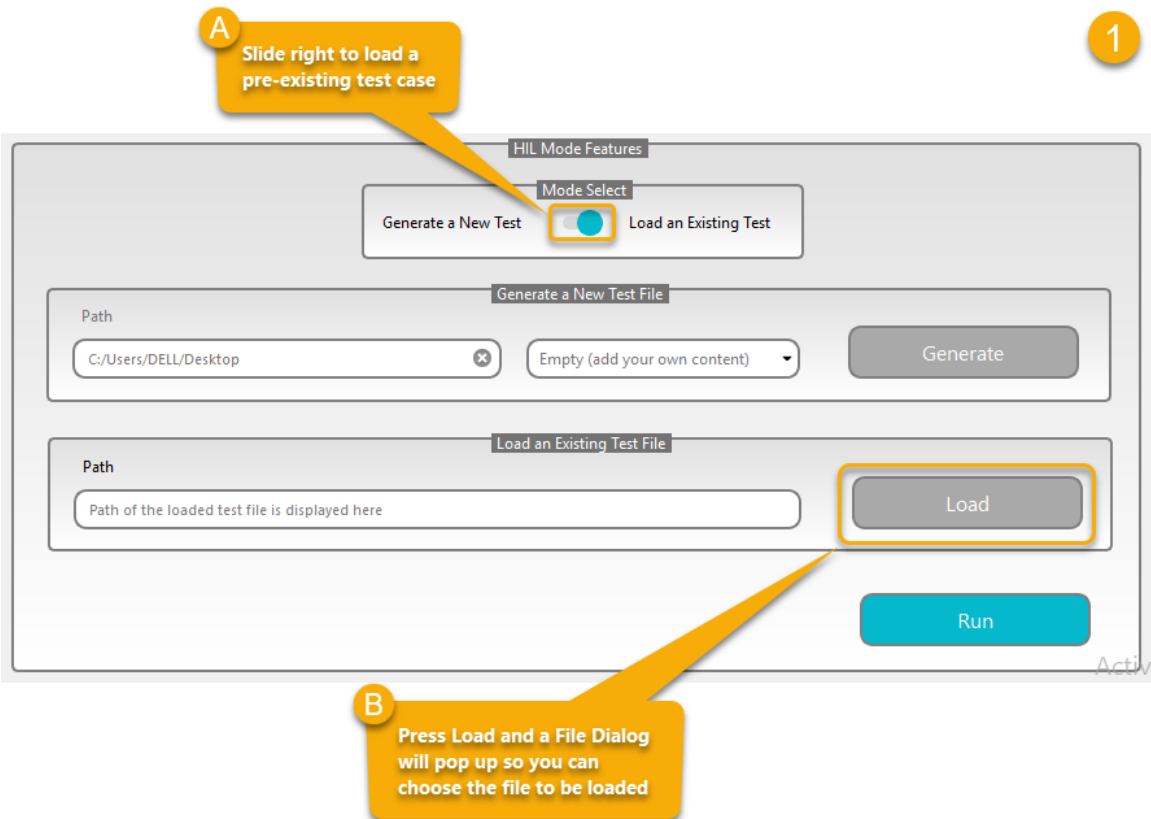


- E. The selected path should appear in the GUI after pressing select folder.
F. The user should now edit the generated file if required then press RUN.



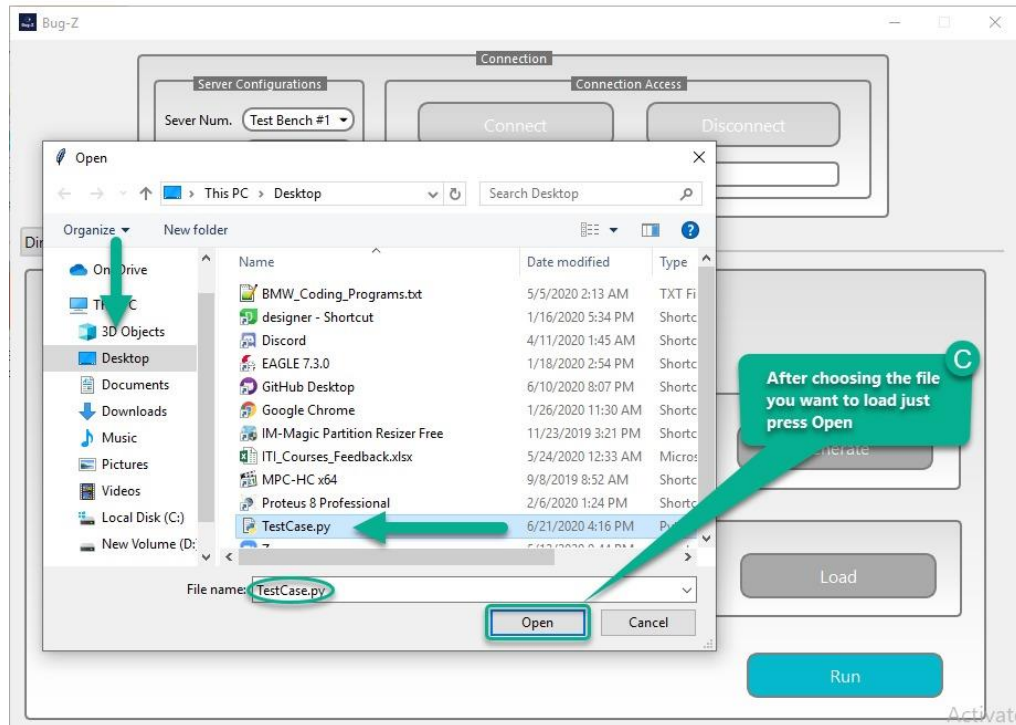
3.2.2 Procedures for loading an existing script

- A. Toggle the button to select load an existing test case.
- B. Press Load



- C. The file explorer should open and the user should now select the test case to be loaded and press open.

2



- D. The selected path should now appear in the GUI
E. The user should then press RUN.

3

