**Fixing Automated PLC Mole Car**

I corrected and recalibrated a 400-page PLC program codes in Automatic Mole Car that transport beer pallets. I also identified the hardware motor failure in a trouble mole car and developed professional ways to organize many PLC programs by creating Project Reports, and PDF searchable document procedures out of raw PLC programs. I made several other changes in other PLC programs later.

**Network Infrastructure and Security**

I identified network security holes in the company’s business network and automation system network. I proved security breaches by showing that VPN login access was exposed and tied to the one of the company's sub-domain URLs and showed other security weaknesses. I secured all PLC machines with enforced security protocols-- such as password installations, changing run mode keys statuses in the machines, and discovering easier and more effective connection and backup procedures for the programs because we had strange changes in PLC programs happening frequently and no one thought to figure out the causes until I was assigned for the automation system. The company even lost two PLC programs in their major control robots called the Retrievers. I figured out professional ways to interact with the PLC machines in the network that no one knew before me. I made a complete PDF network topology map of the whole automation system.

I also installed automated programs and scripts to maintain/monitor various servers and workstations in automation system that reduced system downtimes, costs to troubleshoot system slowness, and problems with paid support engineers at long distance on phone. I reduced the paid phone calls to 90% less than averaged $1500/wk the company had to pay to Dematic Corp. before I took charge of the system.

**Creation of Dematic Archive Catalog**

I analyzed and organized over 450 cases of undocumented unusable previous troubleshooting records from the Dematic Corporation. web archives and solved the challenge to copy them over and turn them into useful PDF searchable catalog. This catalog system is an indispensible valuable tool now for the company’s maintenance department and everyone else.

**Operation Analysis**

I identified frequent human errors in executing automation system operations that caused many downtimes and expenses with phone supports. I analyzed and documented operation procedures and enforced them as company’s policies now in operations, such as End of Run Protocols, Safety Protocols in Emergency Stops, and entrance to hazardous dynamic areas of machines, and other lost operating procedures or tricks that several operators are hiding from others to control the company’s dependency on them.

**Hardware Upgrades**

I looked into existing servers and workstations’ internal hardware and upgraded many key machines to their maximum potentials by upgrading CPUs, RAMs, video cards, network cards, hard drives, RAID cards, KVM switches, and etc. No one before me had knowledge, courage, and skills to understand these parts and shop for better parts. I also introduced better workstations and network switches for some parts in the automation systems. The person before me was replacing the failed machines or parts with exact same identical ones, creating repeated problems. My predecessor always paid over-priced for old obsolete technology yet not improving the existing system, and not fixing the problems.

**Reinstating GSMI Logger Server**

I reinstalled a useful computer called GSMI Logger server that was found broken by predecessors and no one knew how to fix it. I fixed the missing asp.net pages, other script pages, and configuration INI page in the IIS web server of this machine and figured out the tricks in hardware requirements to reinstate the machines to the automation system. GSMI has capability to show the movements, statuses, errors and problems, and live video graphics of the automation system activities during the run. GSMI now helped the head operator a great deal and boosted the company’s production speed at least 30%.

**QNX Clone Project**

I took a leading role in a backup project called QNX Clone Project. I made sure that backup procedures are available independently and understood for the company from the agent engineer who came to demonstrate and create backup machines with QNX operating systems. Through my plans, questions, and attentions to details, I created and authenticated documentation procedures to create several QNX PCs. My predecessors in the company were clueless with these QNX PCs that control important robots. They had no idea what operating system, what software language the programs were coded with, and even ignorant of the possibility to clone these machines.

**System Backup/ Recovery Analysis**

I analyzed the existing automation system and found out that many backup machines are obsolete and impractical. I identified the non-functional backup machines in their missing hardware and fixed the ones I could; I also identified that a software version installed on some machines were obsolete and synced the databases and software of three backup servers; and that the company didn’t have any real recovery plan with database and software version synchronization and switch-over plans. I devised plans and presented proposed solutions to the company’s owners.

**DB Accesses and Analysis**

My predecessors did not know how many physical database servers existed in automation system, how many databases were in the database servers, and how to even have access to the databases. I figured out and obtained credentials in the existing physical machines and their databases using unconventional and creative methods. I identified exactly how many database servers and databases are running, distinguishing the obsolete databases from the live ones and analyzed details database tables, values, and created database schema and data dictionary.

**Creation of Backup/ Development Environment**

I cloned four important servers and a client machine in the automation system that contains important software, and databases. Not only we had no backup for these machines that we believed we had, the existing hardware inside had disappeared from markets to buy spare parts, such as MOBO, RAID Cards, SCSI HDDs, and the computers as whole are out of support. I figured out ways to clone these very challenging machines. Trapped HDDs within RAID BIOS was a high-level challenge, SCSI HDDs added to elevated extreme difficulties, and the strict proprietary software packages installed on the machines presented almost impossible tasks to clone. I achieved this project that other in-house professional, one paid outside engineer, and other long-distance engineers failed before me. I created physical HDDs for those machines that can now run in many different physical machines; I also created virtual HDDs for the same machines that can now run in all other different computers with even different host operating systems. This clone environment is indispensible to make further changes in databases, software codes, hardware changes for the automation system, and also for testing purposes. Everyone was extremely frightened to make changes or tests before me because they never had test/dev environment like this available.

**Major Change in the Automation System**

I made a major change in the automation by changing the roles of the conveyor lanes. The temporary storage lanes called Buffer Lanes in the system are classified as “Dynamic Lanes” or “Static Lanes”. The automation system software controls the Dynamic Lanes forcefully without human actions. Product SKU assignments, product volume control, and lane shifts configurations are not possible for the operators and inventory control staffs in the Dynamic Lanes. The company’s owners and officials wanted to change this for more than 10 years. No one knew how to do this. By doing system analysis in databases, infrastructures, software and codes, and PLC programs, I figured out how to achieve this major task. I changed 8 Dynamic Buffer Lanes to become Static Lanes. Now the company can add eight new products to run in the automation system out of 78 available lanes, increasing 10% in production.

**Wrote and Installed New Program in the Automation System**

I wrote a new software program from scratch for the existing automation system that detects the SKU changes made by inventory control staff during the day time and reminds the night crew and head operator about the lane change configurations by popping a reminder message with detail descriptions of the changes made in the lanes. The program logs the changes in a database and reminds the operators by showing frequent popup flash screens until acknowledged.

**Programming and System Analysis Tasks**

Major control software (Middleware) of the automation system is written in 5000+ pages VB6 codes. The company has very crude raw source codes that are undocumented and no one ever looked at before. I accomplished so far about 35% analysis of the chaotic source codes that are mixed up with test projects, obsolete projects, modules, classes, abandoned databases, and abandoned incomplete obsolete parts. I also figured out the “secretive” tricks of the original developers who designed their software in peculiar ways in order to compile their source codes and install the software. In addition to VB6 code analysis and programming, I identified software languages and operating systems of some of the key machines in the system no one knew about, such as Fanuc Roboguide, QNX C++, MS Visual C++, Teach Pendent, Ruby, and MS DOS 6 to gather software tools, lay foundations, and progress towards complete system analysis and programming goals for future. I have the knowledge and capabilities to even decompile the executables when it’s necessary.

**Basic IT Management Tasks**

I also did other necessary basic IT tasks that were ad-hoc necessary issues to address occasionally, such as upgrading or replacing failing parts, HDDs, RAMs, client workstations in whole, routers, printers, switches, monitors, and server configuration issues.