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EE 449 - Computer Interfacing

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Final Project Report – Sumo Bot

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i. Project Performance:

There were two separate types of goals to be met throughout this project; the technical milestone goals and the hidden learning objective goals. The overall technical goal was to complete an autonomous sumo bot to operate within IEEE SAC regulations using various sensors. The milestones were small feats to accomplish in chronological order to meet the end goal. The five milestones in order consisted of choosing all of the components, sensor operation, movement, trial strategy implemented, and test the strategy implemented. Following these milestones would achieve the overall technical goal of an operational sumo bot. Due to time constraints, I was able to achieve only three of my set milestones. Choice of all the components, sensor operation, and movement were all achieved. I was not able to complete the last two milestones due to underestimating the given timeline to complete the project along with project closeout. Therefore, the next steps are to finish mounting the components so a trial strategy can be implemented and tested.

Near the termination of the project there were hidden learning goals that were to be met for the project. In particular, the learning goals set for the sumo bot were to learn how to decide on which components are the best to use for the best price, learn how to order the parts, and learn how to use proper time management. All three of these learning goals were achieved. I learned how to research components making sure they can interconnect and communicate with one another. I learned how to find the best prices for components and the ordering process. Lastly, I learned time management skills. While there were only 6 weeks to actually work on the project, 4 weeks were spent waiting for the parts. During this time I researched the proper operation of all components. I also taught myself the Arduino language so when the components arrived I was able to jump right in and start programming to get my second and third milestones complete.

ii. Administrative Performance:

For this project the only objective the administrative personnel had was to order the parts for the sumo bot. This process was somewhat slow which could have given me several more days to work on the sumo bot. To my knowledge, the parts were ordered more than 5 days after I submitted the parts list to be reviewed and ordered. When it came to technical assistance, the lab manager was readily available to answer all of my questions. These questions were regarding the voltage regulator circuit and also supplying the needed components.

iii. Organizational Structure:

This project mimicked that of a real world project in a classroom setting. Therefore it was hard to have great organization but acted as a simulator. Each week, Tuesday 9:00 – 11:15am and Thursday 10:00 - 11:15am, the students worked on their projects similar to an industrial environment. During these meetings, weekly updates were given to the professor (supervisor) on what was achieved and the next steps. Other than the classroom simulation, all other work was done whenever the student decided to work on it. In order to keep organizational structure, project management skills such as Work Breakdown Structure (WBS), Pert charts, and Gantt charts were taught to the students. Therefore, the students followed their own specifically created WBS to stay on track to complete their project outside classroom hours.

iv. Team Performance:

The projects were to be completed individually. In order to complete the desired technical goals for any of the projects chosen, it would have been highly beneficial to work in a team environment. The goals were a far stretch for individuals to achieve and this was in perspective

since the first day. If the projects were team based the technical goals would have been somewhat feasible. Also, teamwork is necessary in a classroom simulator to prepare the students for industry.

v. Techniques of Project Management:

The techniques of project management used were Work Breakdown Structure (WBS), Pert charts, and Gantt charts. The WBS is used to list in order tasks that need to be completed to reach the end goal of the project. These tasks can be colored green, yellow, or red to depict the difficulty of the task and whether or not it is feasible. The WBS also uses rule by 6 to have a rough estimate of how long each individual task will take. The last part of the WBS is to see which tasks are dependent on other tasks in the list. This step is important because it allows for the Pert and Gantt charts to be created to display the timeline of the project. The Pert chart is used to visualize how each task is dependent on one another and the time length to complete one task and move to the next until the project is complete. Each task is a bubble and an arrow connects the next task at hand. A time length is written on the connecting arrow. The Gantt chart is somewhat similar to the Pert chart. It uses horizontal lines/bars to depict the tasks. These bars are placed on a timeline grid to show the entire time process. Tasks that are dependent on one another are placed one after another. Tasks that are not dependent on other tasks are placed based off the starting point the user chooses. The Gantt chart is used to find free time (slack) within the WBS. This is called the critical path. This process is used to find extra time within the time constraints of the project. The project management skills were taught in the first week of the project and are very helpful. They allowed for an organized structure when completing a project.

vi. Benefits:

The technical goals of the project were not fully achieved due to time constraints. On the other hand, the learning objective goals were fully met. These learning goals allow me to benefit the class in several ways. I am able to write up a parts list to send out to be ordered properly. I am also able to help others manage their time better so they can work most efficiently. On the technical side of things, I obtained a better understanding of the Arduino microcontroller and programming language. Using the Arduino, I am able to get several sensors operational, short and long range IR sensors, and reflective sensors. I am also able to drive servo and DC motors. Overall these are great skills I will be able to offer the class.