# Prospectus

Winter 2021, CIS 467 02

## Team Details

### Technical Strengths

**Trevor Hamilton**: I have experience using several different languages, including Java, C, and Python. I have also studied how to use various communication protocols, including HTTP, TCP, and UDP. I have worked on a few basic servers, primarily using Java and TCP. I have some experience with using cloud servers, such as MongoDB, and using API's to interact with them. I am also familiar with SQL databases.

**David Cowles**: The languages that I have the most experience with are Java, C#, and Assembly, with lesser experience using c++,c, python, and javascript. I also have experience with SQL, SQLite etc. My internship experience was primarily in the automated testing of API's, but I also did some development on large API projects. Some of my personal work implements Google's Cloud and Drive API's, so I'm familiar with that integration process.

**Logan Crowe:** 3+ years of professional experience with system administration, Linux and Windows based. About as much professional experience with end-point systems and manufacturing terminals. Amatuer experience with Raspberry Pi PLEX servers. Coding experience with C, C++, Python, Java, Ruby, Rust, SQL, and a school project in Ada.

**Ayden Martin:** I have experience with multiple languages such as Python, Java, Javascript, C, SQL. I would consider myself quick at picking up languages. Have slight experience with networking. Use Linux and Windows operating systems interchangeably, have dabbled in virtualization and can help set up a VM.

### Anticipated Growths

**Trevor Hamilton**: Most of my experience resolves around creating software, so I expect to learn a lot about the hardware aspect that goes into creating a physical server. I will also have to learn about how to properly utilize Raspberry Pi and Plex servers.

**David Cowles**: I'm looking forward to familiarizing myself with Plex, as well as the process of working on a team to design a software solution within an industrial manufacturing environment. It's also possible that we may do some work with machine learning, which I would be very interested in learning and using in the future.

**Logan Crowe:** Development of professional level PLEX server skills. Expansion of familiarity with manufacturing processes. Learning the SCRUM development process. Having developmental project experience on a professional level.

**Ayden Martin :** I am looking forward to getting more professional experience. I haven't worked very much on hardware development such as raspberry pi's so I am looking forward to that. Interacting more with APIs will make me more comfortable in the future too.

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## Background

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Automatic Spring Products Corp. currently has a set of production equipment mainly involved in shaping and cutting steel spools. At this time, it is necessary for employees to manually complete jobs by leaving the workcenter and utilize a PLEX kiosk to update the job status and start the next production process. Additionally, any time that the workcenter is not in production mode, consumed materials are not updated in the system. This is problematic as some material is used during setup, leading to an overestimation of available resources for production and a resultant inability to complete jobs. Our root server, using the sensors being set up by another team, should automate the communication with PLEX API's and accurately track resource consumption during all phases of production. Our server should also be able to modify workcenter status based on data from the mesh network being set up by the other team.

The ASPC production machines also need occasional blade replacements due to wear, and it is up to employees to determine when this needs to happen. Once we achieve the aforementioned functionality, we should set up our server to store and eventually process data from acoustic sensors on the production machines in order to automatically check for dull blades to ensure they are replaced on time.

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## Features

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Communication with Leaf and branch

- Utilizing wifi and ‘mesh’ network
- Needs to be able receive information to from each leaf for storage
- Send information from root to leafs for employee use
    - Metrics
        - Time per item
        - Parts
        - Scrap
    - Other vital information

Storage of information received

- SSD attached to hardware
- Needs to be able to store:
    - Part information especially part numbers
    - Productions timestamps
    - Availability of stores
    - Other vital information

Communication with PLEX cloud

- Regular or intermittent communication as decided by user
    - Regular communication during times of high connectivity
    - Intermittent communication during time of low connectivity
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Use Artificial Intelligence(push goal)

- Anticipate ordering
- Identify problem areas

Tools:

- A few (3-6) Raspberry PI devices
    - Associate peripherals needed for tasks like wifi communication, storage, etc
- PLEX Developers account(s)
- Test Data
- PLEX Inventory Operations Management API
- PLEX IIoT Event Data API
- PLEX Job Scheduling API
- PLEX Journal Entries API
- PLEX Parts API
- PLEX Production Operations Management API
- PLEX Supply Items API
- Possible other pre-purchased/free API’s or digital tools as needed but not mentioned here

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## Ethics (ACM/IEEE-CS Software Engineering Code of Ethics)

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1.01. Accept full responsibility for their own work.

2.01. Provide service in their areas of competence, being honest and forthright about any limitations of their experience and education.

2.02. Not knowingly use software that is obtained or retained either illegally or unethically.

2.03. Use the property of a client or employer only in ways properly authorized, and with the client's or employer's knowledge and consent.

2.05. Keep private any confidential information gained in their professional work, where such confidentiality is consistent with the public interest and consistent with the law.

2.06. Identify, document, collect evidence and report to the client or the employer promptly if, in their opinion, a project is likely to fail, to prove too expensive, to violate intellectual property law, or otherwise to be problematic.

2.09. Promote no interest adverse to their employer or client, unless a higher ethical concern is being compromised; in that case, inform the employer or another appropriate authority of the ethical concern.

3.01. Strive for high quality, acceptable cost and a reasonable schedule, ensuring significant tradeoffs are clear to and accepted by the employer and the client, and are available for consideration by the user and the public.

3.02. Ensure proper and achievable goals and objectives for any project on which they work or propose.

3.07. Strive to fully understand the specifications for software on which they work.

3.08. Ensure that specifications for software on which they work have been well documented, satisfy the users' requirements and have the appropriate approvals.

3.10. Ensure adequate testing, debugging, and review of software and related documents on which they work.

6.05. Not promote their own interest at the expense of the profession, client or employer.

6.06. Obey all laws governing their work, unless, in exceptional circumstances, such compliance is inconsistent with the public interest.