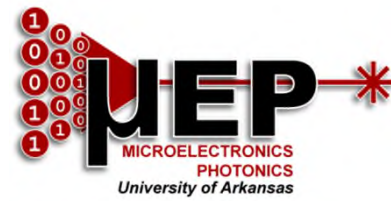




# Low Cost, Multi-Material 3-D Inkjet Printer



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## Background/Relevance

- Inkjet printing is capable of printing at high speeds, with high resolutions, and with multiple materials.
- Utilizing Inkjet printing methods for 3-D printing enables one-step, high-precision manufacturing of complex devices, such as printed circuit boards.



Printed toy

<http://www.stratasys.com>

## Innovation

- Design ways to use primarily the main systems (motors, print head, motherboard, etc.) from an Epson Workforce 30 (WF30) printer for the 3-D printer.
- Include subsystem for sintering printed nanoparticle suspension inks.

## Approach

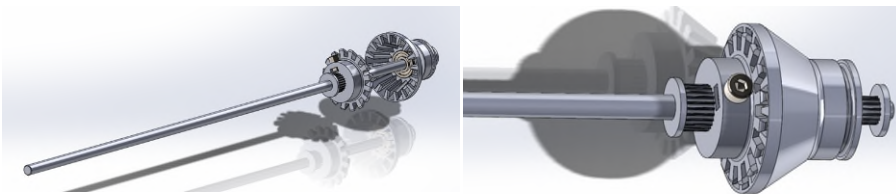
- Use WF30's driving mechanisms and software to make the print carriage travel above the build plate, instead of feeding paper under the print carriage.
- Use Open Bench Logic Sniffer to analyze the signal waveform for detection of the end of a page and the signal that starts feeding a new page.
- Use these signals to activate the stepper motor that controls build plate height, as well as to activate the curing/sintering systems.
- Convert the object slices into a representative image file format, such as JPEG, and send these files to the printer to print.

## Key Results

- When the WF30 printer finishes printing a file, it pauses for about 12 seconds before returning the print head to its home position, which time is used in the 3-D printer to perform the curing processes.
- Designed a clutch system to disengage the y-axis controls of the 3-D printer while it initializes.

## Conclusions

- Using primarily the systems found in the WF30 printer to build the 3-D printer will make it more reasonably priced, and thus more available to the average consumer and small business.
- Designing systems to print with both nanoparticle suspension inks and photo-curing polymers will increase versatility and reduce production time for complex objects.



Clutch Mechanism: disengaged (left), engaged (right)

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